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CROUCHING SUSPICIONS, HIDDEN POTENTIAL

United States Environmental and Energy
Cooperation with China

Pamela Baldinger and Jennifer L. Turner

柳暗花明

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Crouching Suspicions, Hidden Potential: United States Environmental and Energy Cooperation with China

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Acronyms and Measures

APEC	Asia Pacific Economic Cooperation
DoC	Department of Commerce (U.S.)
DoE	Department of Energy (U.S.)
EPA	Environmental Protection Agency (U.S.)
EPB	Environmental Protection Bureau (China)
ESCOs	Energy Service Companies
FYP	Five-Year Plan
MOST	Ministry of Science and Technology (China)
MW	Megawatts
NGOs	Nongovernmental Organizations
NOAA	National Oceanic and Atmospheric Administration (U.S.)
ODA	Official Development Assistance
OPIC	Overseas Private Investment Corporation (U.S.)
SDPC	State Development Planning Commission (China)
SEPA	State Environmental Protection Administration (China)
SETC	State Economic and Trade Commission (China)
TDA	Trade and Development Agency (U.S.)
Twh	Terawatt hours
WTO	World Trade Organization
USAEP	U.S. Asia Environmental Partnership
USAID	U.S. Agency for International Development
USDA	U.S. Department of Agriculture

Unless otherwise indicated, all currency is in U.S. dollars

ECSP REPORT 8: JOHANNESBURG AND BEYOND

What are the crucial issues for sustainable development? Why have the linkages between population dynamics and environmental degradation still not penetrated mainstream policymaking? Is there a future for environment and security research? The new edition of *Environmental Change and Security Project Report* addresses these questions by concentrating on issues for the August 2002 World Summit on Sustainable Development in Johannesburg, South Africa and beyond. To receive a copy, please email ecspwwic@wwic.si.edu.

Commentaries

What is to be Done at Johannesburg?
Issues for the World Summit on Sustainable Development

Articles

Population, Poverty, and Vulnerability: Mitigating the Effects of Natural Disasters
—George Martine and Jose Miguel Guzman

Migration, Population Change, and the Rural Environment
—Richard E. Bilsborrow

The Future of Environmental Security

Security and Ecology in the Age of Globalization
—Simon Dalby

In Defense of Environment and Security Research
—Richard A. Matthew

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Fire and Water: Technologies, Institutions, and Social Issues in Arms Control and Transboundary Water-Resources Agreements
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Plus: Official Statements on Environment, Population, and Security Issues
ECSP Meeting Summaries
Organizational Updates
Bibliography

Executive Summary

Crouching Suspicions and Hidden Potential:

U.S. Environmental and Energy Cooperation with China

Perhaps no country besides the United States will have greater impact on global energy and environmental strategies in the coming years than the People's Republic of China (PRC). The world's most populous nation already consumes more energy and emits more greenhouse gases than any country except the United States, and may surpass the United States in both categories within two to three decades. If China maintains economic growth rates of 5 to 7 percent per year its economy will increase three to fivefold by 2025—with enormous consequences for the rest of the world. Chinese experts predict that China's ability to meet energy demand from domestic sources will fall short by approximately 8 percent in 2010 and 24 percent in 2040—the resulting increased demand for energy imports could result in higher global energy prices. Moreover, China's breakneck pace of modernization already has left it with nine of the world's ten most polluted cities and its sulfur emissions have led to acid rain throughout Northeast Asia. Even countries halfway around the globe are feeling the impact of China's pollution problems and inefficient use of natural resources.

Despite these alarming trends and the growing role China undoubtedly will play in shaping future global energy markets and environmental trends, energy and environmental issues have not occupied a prominent position in U.S.-China relations. To the extent that energy and environmental issues have been considered at all, U.S. policy regarding cooperation with China in these areas has not been sustained or consistent, reflecting tensions in the U.S.-China relationship, disagreements between past administrations and Congress, and the higher priorities given to other issues in the relationship. The perceived incoherence of U.S. policy has not served well U.S. firms and citizens, the people of China, and key allies in the strategic East Asian region.

This paper explores the opportunities and challenges for the United States to develop a coherent approach to energy and environmental relations with China. This exploration begins with an overview of China's impact on global energy markets and environmental quality. In addition to examining the scope of such cooperation, the paper discusses commercial opportunities and challenges for U.S. environmental technology and energy efficiency companies in China. We argue in the conclusion that greater bilateral cooperation and information sharing on common environmental and energy problems not only improves bilateral governmental relations, but also could facilitate environmental and energy collaboration among NGOs, research centers, and news organizations in the United States and China. Such networks could better highlight the extent of U.S.-China economic and ecological ties. Cooperation on common environmental and energy challenges also could build confidence in the overall Sino-U.S. relationship and enable the two countries to work together on other pressing issues.

CHINA ENVIRONMENT SERIES: ISSUE 5

ECSP's China Environment Forum has published its fifth issue of the China Environment Series (CES). An annual journal for policymakers, researchers, educators, and environmental nongovernmental organizations (NGOs), CES features articles, commentaries, and meetings summaries that examine environmental and energy challenges facing China and explores creative ideas and opportunities for governmental and NGO cooperation.

Feature Articles

China's "Go West" Campaign: Ecological Construction or Ecological Exploitation?
—Elizabeth Economy

Searching for Energy Security: The Political Ramifications of China's International Energy Policy
—Philip Andrews-Speed, Xuanli Liao, & Roland Dannreuther

Pesticides in China: A Growing Threat to Food Safety, Public Health, and the Environment
—Jessica Hamburger

New Partners or Old Brothers? GONGOs in Transnational Environmental Advocacy in China
—Fengshi Wu

Commentaries/Notes From the Field

Looking into a Microcosm of China's Water Problems: Dilemmas of Shanxi—A High and Dry Province
—Jih-Un Kim

Networking for Development of Legal Assistance to Pollution Victims in China—Kenji Otsuka
Xinjiang: A Trip to the New Territory—Wen Bo

China's Nature Reserves: Protecting Species or Generating Profits?—Lawrence Glacy

The Yunman Great Rivers Project—Ou Xiaokun

Environmental Action as Mass Campaign—Jane Sayers

Spray-Painting Change? Beijing's Green Olympics, NGOs and Lessons Learned from Sydney
—Timothy Hildebrandt

Brick by Brick: Improving the Energy and Environmental Performance of China's Buildings
—Robert Watson & Barbara Finamore

Lean and Green: Boosting Chinese Energy Efficiency through ESCOs—Pam Baldinger

CES 5 includes summaries of China Environment Forum meetings as well as an updated and expanded "Inventory of Environmental Projects in China," which describes projects conducted by U.S. government agencies, U.S. universities, professional associations, and NGOs. This year's Inventory includes a significantly longer section on Chinese NGOs and environmental initiatives by other governments in China.

To obtain a copy of *China Environment Series Issue 5* or inquire about contributing to future issues, please contact ECSP Senior Project Associate Jennifer L. Turner by email at chinaenv@erols.com or phone at 202/691-4233. Copies may also be downloaded from the ECSP Web site at <http://ecsp.si.edu>.

PART I. China's Impact on Global Energy Markets and Environmental Quality

Perhaps no country besides the United States will have greater impact on global energy and environmental strategies in the coming years than the People's Republic of China (PRC). The world's most populous nation already consumes more energy and emits more greenhouse gases than any country except the United States, and may surpass the United States in both categories within two to three decades. If China maintains economic growth rates of 5 to 7 percent per year its economy will increase three to fivefold by 2025—with enormous consequences for the rest of the world. Chinese experts predict that China's ability to meet energy demand from domestic sources will fall short by approximately 8 percent in 2010 and 24 percent in 2040—the resulting increased demand for energy imports could result in higher global energy prices.¹ Moreover, China's breakneck pace of modernization already has left it with nine of the world's ten most polluted cities and its sulfur emissions lead to acid rain throughout Northeast Asia. Even countries halfway around the globe are feeling the impact of China's pollution problems and inefficient use of natural resources—industrial contaminants and dust from China are now reaching the United States via the Gulf jet stream.

Despite these alarming trends and the growing role China undoubtedly will play in shaping future global energy markets and environmental trends, energy issues have not occupied a prominent position in U.S.–China relations. To the extent that energy and environmental issues have been considered at all, U.S. policy regarding cooperation with China in these areas has not been sustained or consistent, reflecting tensions in the U.S.–China relationship, disagreements between past administrations and Congress, and the higher priorities given to other issues in the relationship. The perceived incoherence of U.S. policy has not served well U.S. firms and citizens, the people of China, and key allies in the strategic East Asian region. President Bush's announcement during a February 2002 visit to Beijing to “take active efforts” to cooperate with China on energy and environmental protection marks a welcome departure from the administration's previous year of silence on these issues. However, it will be critical for U.S. credibility and strategic well being for the government to make good on this statement and genuinely move forward with an active agenda.

Why Act?

Clearly, the onus for developing rational energy and environmental policies in China rests with the Chinese government and people. Indeed, China has taken several important steps over the past few years to become more energy efficient and reduce environmental degradation.² *U.S. policymakers, however, also should have a keen interest in the energy and environmental policies China adopts*, given the potential impact of these policies on the United States and the rest of the world.

It is strongly in the interest (politically and environmentally) of the United States to help China bolster its use of clean energy, energy efficient technologies, and energy conservation strategies in order to help prevent intensified competition for limited global energy

resources and further environmental degradation in the PRC. Moreover, in the aftermath of September 11, U.S. relations with China, which shares borders with both Afghanistan and North Korea, have gained greater strategic significance. Reaching agreement on sensitive security issues likely will prove difficult, especially without a reservoir of goodwill to draw from in other aspects of the relationship. As the United States and China share concerns over energy security and confront many of the same environmental challenges, cementing cooperation in these areas might help address not only immediate environmental concerns but also may help secure broader U.S. foreign policy and domestic goals, including:

- Improve U.S. and global energy security, for China’s oil imports will increase over time and China may also play an important role in developing new pipelines in central Asia;
- Improve political and economic stability in a region of key economic and strategic interest to the United States by decreasing tension over energy supply, natural resource utilization, and environmental degradation issues in East Asia;
- Help offset tensions in other parts of the Sino-U.S. relationship;
- Promote sales of U.S. energy-efficient and environmental technology and services to China, a potentially huge—but fiercely competitive—market;
- Reduce the potential for ecological damage to the U.S. West Coast, Alaska, and Hawaii from Chinese pollution and dust storms;
- Decrease the likelihood of China becoming dependent on unstable oil-rich states—Chinese oil companies already have acquired concessions in Sudan, Iran, and Iraq;
- Demonstrate U.S. commitment to international environmental issues by engaging a key emerging nation;
- Improve cooperation between the United States and China on critical international environmental issues, such as climate change while encouraging China to become a leading example of “developing country participation” in an international climate mitigation effort;
- Stabilize global food supply by bolstering Chinese food production through the amelioration of environmental problems such as acid rain and desertification;
- Promote the growth of civil society and citizen involvement in China by strengthening nongovernmental energy and environmental contacts between the United States and the PRC; and,
- Improve the health and living standards of hundreds of millions of people in Asia by reducing environmental degradation in China and along its borders.

Why Now?

The Bush administration and Congress have an unprecedented opportunity to develop a coherent approach to energy and environmental relations with China. On the American

side, the war against terrorism will require the U.S. government to engage China so that it does not undercut U.S. efforts in central Asia, the Middle East, or the Korean peninsula. In addition, President Bush has called for a “new partnership with the developing world to meet our common environmental and economic goals,” and announced in Beijing in February that the United States “look[s] forward to finding areas where we can work together” on energy and climate change. Mounting a significant cooperative program with China would help demonstrate the administration’s sincerity to the cause of reversing global warming, and might lessen U.S. isolation on this issue in the international community.

Moreover, cooperating with China on energy and environmental issues would help strengthen U.S.-China ties, which have been strained by the April 2001 surveillance plane incident, friction over Taiwan, and a wide range of other issues. Indeed, strategic and other issues are likely to continue to buffet the relationship; a concerted effort by the world’s two largest energy consumers to work together to solve their energy problems could build some degree of confidence that helps the relationship weather tough times.

The January 2001 resumption of Trade and Development Agency (TDA) funding for China, coupled with Congress’s decision to grant China permanent normal trade relations once it entered the World Trade Organization (WTO) (which occurred in December 2001), create a positive foundation upon which to build. The Asia Pacific Economic Cooperation (APEC) Leader’s Meeting and the UN World Summit on Sustainable Development (in September 2002) provide excellent opportunities for the Bush administration to broach the subject of renewed cooperation in the energy and environmental areas.

In China, the time is right for a new focus on energy and the environment. The International Olympic Committee’s decision to award Beijing the 2008 summer games is sure to lead to significant efforts and spending to clean up the city’s environment. China’s Tenth Five-Year Plan (FYP), a blueprint for economic development from 2001 to 2005, is the “greenest” yet, calling for environment-related investments of around \$85 billion. U.S. firms and government agencies possess expertise in many of the areas cited as Tenth FYP priorities, such as energy efficiency and air pollution control. The United States therefore could play a valuable role in helping China meet its goals—simultaneously boosting exports of U.S. firms and reducing the U.S. trade deficit with China. Areas of potential cooperation are highlighted in Part II below.

Improving the Chinese government’s regulatory capacity, as well as the environmental monitoring and efficiency of Chinese industry, will become even more important now that China has joined WTO. Accession to WTO may well spur even faster modernization of Chinese industry and consumption patterns. It is imperative that this modernization be achieved in as sustainable a manner as possible, to protect human health and ecosystems in China and elsewhere, and to ease pressure on international oil and gas reserves.

Finally, security concerns and recent price fluctuations for oil and natural gas—both domestically and on international energy markets—give both countries motivation to reduce imports and improve energy efficiency. Price fluctuations are also spurring the development of alternative energy development in both the United States and China. The U.S. National Academy of Science has called for greater cooperation and research with China on such issues. Industry groups such as the U.S.–China Business Council and U.S. Chamber of Commerce also support greater cooperation with China on energy and environmental issues. Decisions regarding energy supply being made *now* by the Chinese leadership will have long-term impacts, and it is in the U.S. interest—strategically and commercially—to be as involved as possible in assisting China onto a more sustainable energy path.

This paper highlights opportunities for, as well as barriers to, U.S.–China energy and environmental cooperation. We conclude this paper with a range of policy options to help stimulate discussion of these issues amongst the Congress, administration, and others in the American policy community.

The Environmental Situation in China Today

China is in the midst of two historic transitions: (1) from a rural, agricultural society to an urban industrial one, and (2) from a command economy to a market-based one. Over the past 20 years China has lifted an estimated 200 million people out of poverty and become the world's tenth largest trading economy. About one-third of China's population now resides in urban areas, and the figure is expected nearly to double by 2020. The speed with which China is accomplishing these social and economic transformations, however, is generating tremendous pressure on the country's social and natural resources. China's geography and enormous population—1.25 billion, with an additional 14 million added every year—further exacerbate the difficulty of developing adequate infrastructure and managing resources. On a global basis, China has 22 percent of the world's population living on 7 percent of the world's arable land. Per capita farmland, grassland, and water resources are less than one-third the world average. Forest and oil resources per capita are just one-tenth of the world average.³ Large amounts of land are lost each year to desertification due to soil erosion from deforestation and over-grazing. Arable land and water resources are unevenly distributed between east and west, north and south. (See Tables 1 and 2 for an overview of China's environmental quality)

Energy and Transportation

China's increasingly diversified economy has grown an average of 10 percent annually over the past two decades, making it one of the 10 largest in the world. This economic growth has been powered by considerable rises in energy consumption—China accounted for around 10 percent of global energy consumption in 1997 (second in the world behind

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TABLE 1. Energy and Environmental Trends in China

Air Quality Facts	Air Quality Trends
<ul style="list-style-type: none"> • 9 out of 10 most polluted cities in the world are in China • Respiratory disease is the number one cause of death in China • Mobile sources (3 out of 1000 people own a vehicle) contribute approximately 45-60% of NO_x emissions and 85% of Carbon Monoxide emissions in China's urban areas 	<ul style="list-style-type: none"> • Between 1995-2000, the Chinese government shut down 65,000 small heavily polluting factories • China's global share of carbon emissions decreased 8.8% between 1996-2000; today China is the 4th largest emitter of carbon dioxide in the world • In March 1997 the Chinese government mandated lead free gas by 2000. Beijing and Shanghai have instituted stricter lead free regulations and a significant number of taxis and buses in these cities are now lead free • In 1998 the Chinese government began adopting stricter emission standards for autos
Water Facts	Water Trends
<ul style="list-style-type: none"> • 640 major cities face water shortages; shortages cause an annual loss of 11.2 billion USD in industrial output • 86% of China's rivers exceeded local pollution standards in 1998 • Half of the population (around 700 million) consumes drinking water contaminated with animal and human waste exceeding the applicable maximum permissible levels • 70% of cities have no sewage treatment plants 	<ul style="list-style-type: none"> • Annual water shortage in 2000 was estimated at 29 billion cubic meters and in 2020, water shortage of 50 billion cubic meters is expected • Between 1990 and 1995 China's industrial wastewater pollution declined, but because of the rise in residential pollution sources and lack of wastewater processing plants, overall water pollution worsened • The Tenth Five-Year Plan targets the construction of more water quality monitoring systems and hundreds of wastewater treatment plants • Major dam and huge water transfer development reflects the continued prioritization of water supply management over conservation
Forest and Biodiversity Facts	Forest Trends
<ul style="list-style-type: none"> • Forests cover 14% of China's land mass 	<ul style="list-style-type: none"> • Forestlands have decreased 1.2% annually over the past decade • Deforestation is creating severe erosion and desertification, as well as exacerbating the severity of floods • In 1998 Yangtze River floods led to a partial logging ban in southwest China, which has led to increased imports of timber from Myanmar (Burma)
Coal and Oil Facts	Coal and Oil Energy Trends
<ul style="list-style-type: none"> • Coal is China's largest fuel source, accounting for approximately 70% of China's primary energy • 23% of China's energy comes from oil 	<ul style="list-style-type: none"> • GDP per unit of energy use increased from 0.8 (USD per kg) in 1980 to 4.0 in 1997 • 30% of China's oil is imported, 40% of which comes from the Persian Gulf • Net oil imports in the year 2010 could reach 150 million tons, which would fulfill 50% of China's oil requirements
Renewable Energy & Natural Gas Facts	Renewable Energy & Natural Gas Trends
<ul style="list-style-type: none"> • Traditional, noncommercial biomass constitutes 15% of China's total primary energy use. Commercial renewables (wind power, solar, small hydro, biogas, and biomass gasification) account for another 2% 	<ul style="list-style-type: none"> • The use of solar home systems is rapidly expanding in China, with approximately 200,000 systems already installed for rural electrification • China has world's highest wind energy potential • 15 GW of electric power generation capacity from renewable sources in 1995 rose to 20 GW in 2000—7% of total installed capacity • Domestic production of natural gas is forecasted to jump from 28 billion cubic meters in 2000 to 60-75 billion cubic meters by 2010, and 100 billion cubic meters in 2020
Nuclear Energy Facts	Nuclear Energy Trends
<ul style="list-style-type: none"> • Total nuclear power capacity was 13.62 Tivh (Terawatt hours) in 1997, 1.27% of global total 	<ul style="list-style-type: none"> • 6 new nuclear power plants (8800 MW capacity) planned by 2005

Sources: World Resources Institute Web site: Section on China. (Oct. 2001) www.wri.org; World Bank Data on China (Oct. 2001). www.worldbank.org; *China Environment Series*. (1997-2000), Woodrow Wilson Center, <http://ecsp.si.edu>; Zheng Yisheng and Qian Yihong. (1998). *Grave concerns—Problems of sustainable development for China*. China's Problems Series. Beijing: China Publishing House (Excerpts available in English at U.S. Embassy in Beijing Web page: <http://www.usembassy-china.org.cn/english/sandt/svhards1.htm>); World Bank. (2001). *China: air, land, and water: Environmental priorities for a new millennium*. Washington, DC: World Bank; Andrews-Speed, Philip, Xuanli Liao, and Roland Dannreuther. (2002). "Searching for energy security: The political ramifications of China's international energy policy." *China Environment Series*. (Issue 5). Washington, DC: Woodrow Wilson Center.

TABLE 2. Comparison of Environmental Quality Indicators in China and the United States

		China	United States
Air	Total carbon dioxide emissions (1999, million metric tons (mmt))[Emissions per capita, mmt] ^a	669 [0.5]	1,520 [5.6]
	Total carbon dioxide emissions (1990-1999) as percentage of global total ^a	7.0	30.3
	Percent change in CO ₂ emissions 1996-2000 ^b	-8.8	+6.3
	CO ₂ emissions per capita (1996, kg) ^a	2,729	19,674
	Annual use of ozone depleting substances (odp) (1998, production data, 000mt odp) ^c	98	32
Biodiversity and Conservation	Percentage of total threatened mammal species ^a	18.7	8.0
	Percentage of land in Protected Areas (1999) ^a	6.2*	13.1
	Percent change in natural [plantation] forest area between 1990 and 1995 ^a	-0.48 [-7.97]	0.28† [n/a]
Energy	Total per capita energy consumption (kg oil equivalent, 1997) ^d	883	7,956
	Total commercial energy use (1998, 000,000mmt)[Production, 000,000mmt] ^c	1,031 [1,020]	2,181 [1,695]
Water	Emission of organic water pollutants (000kg per day)[000kg per day per worker] ^c	8,492 [0.14]	2,577 [0.15]

Sources:

^a On-line database: *Earth trends: The environmental information portal at World Resources Institute*. (2001). www.wri.org^b Streets, David, G. et al. (2001). "Recent reductions in China's greenhouse gas emissions." *Science*, (294), (30 November), 1834-1837.^c Data from Prescott-Allen, R. (2001). *The wellbeing of nations: A country-by-country index of quality of life and the environment*. Washington: Island Press.^d UNDP, UNEP, World Bank, and World Resources Institute. (2000). *World resources 2000-2001 people and ecosystems: The fraying web of life*. Washington, DC: World Resources Institute.^e World Bank development indicator data. (2000). www.worldbank.org* China's State Statistical Bureau (SSB) records the protected land areas as constituting 8.8% of China's total land mass. See SSB. (2001). *China environment yearbook (Zhongguo Huanjing Nianjian)*. Beijing: SSB Publishing Office.

† Data for full forest area change in the United States.

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the United States). Projections indicate that China will consume approximately 14 to 16 percent of world energy by 2020.⁴

This fact is of particular importance given the composition of China's energy production. Around 70 percent of China's energy comes from coal (predominantly high sulfur content), approximately 23 percent from oil, 2 to 3 percent from natural gas, and the rest from a combination of hydropower, nuclear, renewable, and biomass energy sources (millions of peasants generate heat and cooking fuel by burning straw, wood, and cow dung).⁵ Although the Chinese government seeks to diversify energy sources, especially by developing natural gas markets, China will remain dependent upon coal for the foreseeable future. This dependence, coupled with the low quality of much of the coal and the lack of widespread coal washing facilities and scrubbers at industrial facilities and power plants, has led to serious health problems and deterioration of China's air quality. Respiratory disease is a leading cause of death—researchers estimate 178,000 urban deaths and as many as 1 million total deaths a year were attributable to air pollution between 1990 and 1995—and most Chinese cities far exceed ambient air quality standards set by the World Health Organization.⁶

As the burning of coal releases carbon dioxide—a greenhouse gas that contributes to climate change—and other gases that lead to acid rain and other environmental problems,

China's energy consumption is also of concern to its neighbors and the rest of the international community.

The growth in China's energy supply over the past 20 years has been matched by considerable efforts and investments to improve energy efficiency. Although there are some disagreements among Chinese and Western analysts on the energy statistics,⁷ it appears that China's energy demand may have grown at only half the pace of GDP—an unprecedented achievement for a developing country.⁸ Nevertheless, Chinese industries are still much less energy efficient than those in developed countries, and total energy consumption will probably rise sharply for the foreseeable future. Chinese officials at the State Development Planning Commission (SDPC) predict that China's total primary energy consumption will quadruple by 2040.⁹

Energy demand also has been spurred by a surge in vehicle production and purchases over the last decade. As a result, vehicle emissions have replaced coal soot as the major source of air pollution in several major cities. In response, the government has mandated a rapid phase-out of leaded gasoline, imposed tighter emissions standards, and is encouraging greater spending on alternative fuels.¹⁰ But rising incomes, modernization, and China's entry into WTO, which will result in reduced tariffs on auto imports and permit foreign auto manufacturers to provide financing, will surely lead to faster growth in auto purchases. Some analysts estimate the number of vehicles on Chinese roads will rise from 12 million in 1997 to 49 million by 2010.¹¹ Mobile-source pollution is expected to become a growing problem and increased vehicle emissions will contribute further to China's air pollution problems and climate change. The impact of economic growth and modernization on China's energy use is neatly encapsulated in the following predictions from the U.S. Department of Energy's (DoE) Los Alamos National Lab:¹²

- Transportation fuels consumption will quadruple by 2015;
- Oil imports could reach up to 8.8 million barrels per day in 2015; and,
- Energy consumption in commercial buildings will increase seven-fold by the year 2015.

Natural Resource and Environmental Management

China's rapid economic growth and industrialization—coupled with insufficient price reforms, a populace ill-informed about environmental protection, and bureaucratic inefficiencies that inhibit adequate funding for protection and implementation of environmental laws and standards—have taken a serious toll on the country's environment and natural resources. For example:

- 700 million Chinese drink water that is at least partially polluted;
- Less than half of the 20 to 40 million tons of hazardous waste China generates every year is treated or re-used;¹³

- Nearly 28 percent of China's landmass is denuded, the result of extensive logging and soil erosion; the area of land degraded, desertified, or salinized in China is expanding by 2 million hectares each year;¹⁴
- Some 90 percent of China's grasslands are degraded to varying degrees;
- Soil sampling on 300,000 hectares of farmland in protected areas revealed that approximately 12 percent were contaminated with heavy metals;¹⁵
- Haze from air pollution that blocks sunlight may be depressing China's farm yields by 5 to 30 percent;¹⁶
- 15 to 20 percent of China's wildlife species are under threat of extinction;¹⁷ and,
- Red tides—abnormal algae growth caused by marine pollution—were recorded 28 times in the year 2000, up from 13 in 1999. The area affected totaled 10,000 square kilometers.¹⁸ Such pollution has caused hundreds of millions dollars in losses to the fishing industries in China and Hong Kong over the past few years.

According to the World Bank, environmental degradation costs China the equivalent of 8 percent of GDP—around \$60 billion—annually. Vaclav Smil, a well-known Canadian scholar, puts the figure as high as 18 percent.¹⁹ With economic growth hovering around 7 to 8 percent over the past few years, Chinese leaders now recognize that environmental degradation is actually a constraint to future economic development. With the leadership's newfound awareness have come efforts to bolster the authority of China's State Environmental Protection Administration (SEPA), strengthen enforcement of environmental laws and regulations, and increase spending on urban sanitation and environmental protection. The Chinese government also has become much more open about admitting the country's environmental problems, and seeks outside advice from multilateral institutions, foreign governments, and foreign nongovernmental organizations (NGOs) on how to cope with pollution and natural resource management issues. Beijing also has allowed citizens to form environment-focused NGOs, and often works with such groups to educate the public about various issues.²⁰

In order to reduce population pressure on the eastern third of the country, where the bulk of the citizenry live, the Chinese government also is embarking upon an ambitious "Develop the West" campaign. While the most recent Five-Year Plan includes the goals and targets for central government investment in transportation and communications infrastructure in western China, few projects have yet begun. Care must be taken in developing this region, for western China has limited water resources and fragile, pristine ecosystems (from alpine to desert) that affect much of Asia. The Mekong and Irawaddy rivers, for example, originate in China and damming or water diversion projects constructed in China could affect millions of people downstream, in Thailand, Laos, Cambodia, Vietnam, Myanmar, and India. (See Box 1 for a more detailed discussion of water challenges in China)

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Box 1. Water Stress and Conflict in China



Amid a record-breaking drought in Northern China in the summer of 2000, the Miaogong Reservoir in northern Hebei Province had to be drained almost completely to provide emergency water to Tianjin, one of the largest cities in China. Herders thus were able to graze their cattle in the emptied reservoir. (Photographer Ma Jun, SCMP.com)

The contentious nature of managing water resources is summed up aptly in a quote attributed to Mark Twain: *Whisky is for drinkin' and water is for fightin'*. While whisky is not the libation of choice in China, water is certainly a resource over which Chinese government bureaus, provinces, cities, villages, and farmers fight. Conflicts and problems over water have increased in number and severity throughout China over the past twenty years as a result of burgeoning water

demand, inefficient use of existing resources, and increasing levels of water pollution. Diminishing water supplies—from both overuse and pollution—present great environmental, economic, political, and social challenges to China. Actions taken by China to mitigate its water problems could impact the rest of the region, and thus present challenges to the United States as well.

Environmental Impact

According to a 2001 World Bank study,²¹ between 1980 and 1993 industrial water use in China doubled, and urban water consumption soared 350 percent. This jump in demand, coupled with the huge amounts of untreated municipal and industrial waste dumped directly into lakes, rivers, and coastal waters threatening water resources in both the dry north and the water-rich south. In western and northern China denuded forests and grasslands have exacerbated flooding and drought. Polluted rivers flowing into the seas, combined with China's unregulated ship-breaking industry, are degrading coastal waters.

Impact on Citizenry

In China, access to potable water is limited both by scarcity and severe water pollution. Overuse of groundwater has caused the water-table level in northern China—particularly in Beijing and Tianjin—to drop substantially over the past five years, posing a serious threat to the region's water supply. In the summer of 2000, a drought in northern China destroyed 35 million acres of crops and left over 6 million people without adequate access to water. After this drought, approximately 200,000 hectares of Hebei Province's cropland produced no yield.²² Throughout China approximately 60 million people, predominantly in rural areas, face challenges in getting enough water for their daily needs.²³ Urban residents are plagued by both water shortages and growing water quality problems. For example, only 6

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Box 1. Water Stress and Conflict in China

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of the 27 largest Chinese cities supply drinking water that meets government standards.²⁴ In 1998, floods on the Yangtze River—exacerbated in great part by upstream deforestation—led to a loss of thousands of lives and caused over US \$20 billion in damage.²⁵

While the Chinese government has promulgated a number of water use laws and regulations that mandate water conservation efforts (such as water fee collection, rationing programs, water use permits, installation of water efficient equipment), weak monitoring and enforcement capability at the local levels and difficulties in creating clear water-use rights hinder many water reforms. Thus, increasing water supply through major dam and water diversion projects continues to be a cornerstone of China's response to water shortage. Some studies estimate that more rigorous water conservation efforts could save China 100-200 billion cubic meters of water per year and thereby cut China's current water consumption about one quarter²⁶ and obviate the need for massive dam and diversion projects.

China's two most notable water diversion projects are the Three Gorges Dam and the South-North Water Transfer Project. While these projects offer water supply and flood control benefits, they also will lead to the relocation of millions of Chinese citizens and will have a significant impact on the surrounding environment and ecosystems.

- **The Three Gorges Dam** (*Sansxia Shuiba*). In 1994, the Chinese leadership approved plans to construct the world's largest dam and hydroelectric facility. Capable of supplying an estimated six percent of China's total electrical generating capacity (meeting two percent of the country's energy needs) upon completion, the Three Gorges Dam also should help prevent floods and facilitate safer navigation in the upper and middle reaches of the Yangtze River. The dam will stretch nearly a mile across and tower 575 feet above the river. The reservoir will stretch over 350 miles upstream and submerge riverbank villages and towns, forcing the displacement of close to 1.9 million people. The reservoir, which may quickly fill with siltation behind the dam, will threaten endangered species and submerge waste dumps on the bank as well as trap untreated sewage and industrial effluents.²⁷
- **South-North Water Transfer** (*Nanshui Beidiao*). This project would divert water to the north from the Yangtze River Basin, with potentially negative impacts on the environment and the lives of relocated people. The project would build three routes (western, central, and eastern routes) to divert water from southern China. The central route—a 770-mile canal and aqueduct that would supply water-hungry Beijing—is to be the first built at an estimated cost of nearly US\$10 billion. To make way for this canal, more than 200,000 people would be forced to relocate, most likely to higher land, which would need to be cleared of forests, adding to serious soil erosion problems.²⁸

The construction costs of the eastern route alone would be approximately 20 billion Yuan (US\$2.5 billion), but the Chinese government may have to spend an additional 25 billion Yuan on treating industrial and household wastewater in areas covered by the eastern route.²⁹

Economic and Political Impacts

Water pollution and scarcity create a plethora of negative impacts on the Chinese economy, including lower crop yields and a slowdown of industrial production. In 1997, the World Bank estimated that water scarcity in Chinese cities costs about \$14 billion in lost industrial output, while water scarcity and pollution contribute to agricultural losses of roughly \$24 billion annually.³⁰ The Chinese government continues to prioritize supply-side water management over conservation work, leading to extremely costly projects such as the Three Gorges Dam and the south-north water transfer project. Such large public water work projects have been fraught with embezzlement and corruption by central and local officials. Such fraud not only angers citizens, but also exacerbates existing intergovernmental power struggles to control and manage water resources in China.

Water Conflicts and Protest

In addition to the environmental and economic costs of water degradation, polluted water and shortages have contributed to social unrest in China. The Western news media and nongovernmental community tend to focus on high-profile water conflict stories, such as the problems of citizens relocated for the construction of the Three Gorges Dam. However, inter-provincial and low-level water disputes and conflicts are growing in number and even becoming violent. One of the most high-profile inter-provincial water conflicts has arisen on the Yellow River (Huanghe), which begins in western China's Qinghai Province and flows through eight provinces before reaching the sea. Because of upstream urban growth and expanding irrigation projects, the river is running dry downstream up to 200 days a year. The Chinese government's moves to increase the power of the Yellow River Basin Commission have helped restrict upriver overdrafts of water, but provinces and counties continue to dispute their rights to use the water.

Lack of access to clean water has sparked a growing number of citizen complaints. Between 1991 and 1993 environmental bureaus in China received roughly 330,000 complaints (letters and visits), one-third of which focused on water pollution problems. One Chinese academic reviewing rural-based environmental disputes (many over water) from the 1970s to the 1990s found that of 278 disputes, 47 led to protests, petitions, sabotage or riots.³¹ In a more recent example, one policeman died and 100 people were injured in Shandong Province during a two-day clash in which farmers were defending their illegal water diversions.³²

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Box 1. Water Stress and Conflict in China

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In terms of transboundary water issues, China's development of the upper reaches of the Mekong River causes much concern in the region. As only an observer rather than a full member of the Mekong River Commission, China is not obligated to clear dam construction projects with downstream countries. In December 2001 China completed the Dachaoshan dam on the Mekong, which is feared to have disastrous effects on fisheries and farms in Vietnam, Thailand, Laos, Cambodia, and Myanmar. In addition to continuing to build dams on the Mekong, Beijing also has plans to turn the Mekong into a shipping link to import Southeast Asian raw materials and goods. In November 2001 Premier Zhu Rongji announced an aid packet to Laos and Myanmar to blast 180 miles of rapids to promote the shipping strategy.³³

Potential of Sino-U.S. Water Collaboration

China faces some of the most serious water shortages in Asia, if not the world. China's water problems do not stem from a single crisis, but represent a diverse collection of water stresses that raise environmental, social, and political challenges to Chinese policymakers. If China's water challenges are not mitigated, they might seriously hinder China's economic growth and ultimately become a destabilizing element with negative implications for stability in the Asian region.

The United States has dealt with water challenges similar to those facing the Chinese government. U.S. government agencies possess many of the policy, legal, scientific and technological experience and capabilities that could help Chinese policymakers address many of China's water woes. Within the U.S. government, the Department of Commerce (National Oceanic and Atmospheric Administration and the International Technology Industries Office), EPA, U.S. Geological Survey, U.S. Department of Agriculture, and U.S. National Weather Service have all participated in Sino-U.S. cooperation on a broad range of water issues (See Appendix A). Building on these projects and information exchanges, the United States could collaborate with China in the following areas: 1) conservation technology, 2) water dispute resolution techniques, 3) conservation policy, 4) waste treatment systems, 5) land and natural resource planning and management, and 6) hydrological and climate information gathering. Sino-U.S. cooperation in these areas could be productively used to help relieve the potentially destabilizing water stresses in China and improve the quality of life of millions of people.

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Chinese Environmental Priorities

For the current five-year plan (2001–2005), Chinese officials estimate that the plan’s environmental objectives will require investments totaling around \$85 billion. Major priorities include: construction of urban sewage treatment plants; control of industrial liquid waste; air pollution control, including increased use of desulphurization equipment; and construction of solid and hazardous waste disposal facilities.

The central government is expected to provide only 11 percent of the total amount of the needed environmental investment, with provincial and local governments to supply around 35 percent, foreign governments and institutions around 5 percent, while the rest is to come from private enterprises in China. However, China’s regulatory environment and pricing policies inhibit investment in environmental infrastructure, and it is unlikely many Chinese enterprises can afford to undertake expensive upgrades. Chinese experts, therefore, are considering the use of stock markets, bond placements, revolving environmental funds, and tax policies as possible environmental financing vehicles, though none of these channels currently is well developed in China. Moreover, the proponents of such vehicles typically are attached primarily to environmental or planning regulatory bodies, not to financial ones. Environmental financing (particularly the policy and regulatory aspects) is an area in which U.S. state and federal government training and assistance could be very helpful to the Chinese.

The amount of spending called for in the new Tenth FYP—1.3 percent of GDP—is identical to that called for at the beginning of the Ninth FYP in 1996. According to SEPA Minister Xie Zhenhua, environmental protection investments reached \$41.8 billion during the Ninth FYP (1996–2000), or about .93 percent of GDP—far below the figure called for at the outset, but significantly more than the 0.73 percent spent during the Eighth FYP. A significant portion of the \$43.5 billion raised through three central government fiscal-stimulus bond issues from 1997 to 2000 reportedly was used in three main areas: 1) to improve environmental protection and management of natural resources; 2) to expand daily wastewater treatment capacity by more than 8 million tons; and 3) to increase solid waste treatment capacity by 31,000 tons.

Minister Xie has publicly announced that a priority of the Tenth FYP is to reduce total emissions of major pollutants 10 percent below levels called for in the Ninth FYP. In order to reach this goal, Chinese environmental regulators are to make greater use of market-based measures for controlling pollution, such as emissions charges and “total emissions control” (i.e. “cap and trade” systems).³⁴ (For more details on the Tenth FYP, see Box 2)

China’s Energy Priorities

Chinese authorities are currently engaged in a major debate over how to diversify energy supply without harming the country’s security or further damaging the environment—

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Box 2. Tenth Five-Year Plan Targets

In order to meet the environmental objectives of the Tenth Five-Year Plan (FYP) the Chinese government will require investments totaling around \$85 billion. Some of the environmental and energy efficiency targets drawn up by SEPA and other agencies include:

- Urban sewage treatment rate should reach 50 percent (currently the rate is around 30 percent);
- 90 percent of urban households will use gas for heating and cooking (up from 84 percent);
- Area set aside for nature reserves will be expanded 32 percent to 11.2 million hectares;
- Forested land will reach 19 percent of total area (from 14 percent);
- The amount of land affected by erosion and desertification will be stabilized at the 2000 level; and,
- The number of “key” cities targeted for pollution control will be raised from 47 to 100; all 100 of these cities are to meet national standards by 2005 for air and water quality and noise.

Key environmental infrastructure projects slated for the Tenth FYP include:

- Construction or expansion of 145 urban wastewater treatment plants in the basins of the Huai, Hai and Liao rivers and the Tai, Chao and Dianchi lakes;
- Construction of 22 hazardous waste facilities;
- Installation of desulphurization equipment on 51 coal-fired power plants in the acid rain control areas;
- Construction of 30 plants to treat sewage entering the Bohai Bay;
- Construction of a marine environment monitoring operation system for offshore areas; and,
- Installation of 151 sewage and urban waste management plants in the Three Gorges reservoir area (by 2010).

Sources: “Environmental objectives and investment requirements for China’s 10th five-year plan.” (November 2000). U.S. Embassy Beijing Web site: <http://www.usembassy-china.org.cn/english/sandt/>; China’s Year 2000 “State of the environment” report. (June 2001). U.S. Embassy in Beijing Web site; “China’s marine S&T targets for the new century.” (2001, August 30). *China Economic News*; “A cup half empty.” (2001, April 23). *Business China*.

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a debate very similar to the one taking place in the United States. Unable to meet growing petroleum demand with local supply, Chinese oil companies have been acquiring interests in exploration and production abroad, and to date hold concessions in Kazakhstan, Venezuela, Sudan, Iraq, Iran, and Peru.³⁵ The Chinese also have held discussions with officials in Russia and Kazakhstan about constructing oil pipelines to tap deposits in central Asia and Siberia. To cushion itself from possible shortfalls and international price disruptions, the Chinese government hopes to set aside 6 million tons of oil by 2005 in a mechanism similar to the U.S. Strategic Petroleum Reserve.³⁶

Over the past few years Beijing also has begun to promote the adoption of cleaner sources of energy and this trend will continue. Most attention will be paid to natural gas, though some experts are interested in off-grid energy sources such as fuel cells. Major cities along the coast are converting residential heating and cooking facilities from coal to natural gas. According to the State Development Planning Commission (SDPC), daily natural gas supply capacity was expanded by 7 million cubic meters during the Ninth FYP and the area served by centralized district heat (as opposed to individual, usually coal-fired, furnaces) grew by nearly 87 million square meters.

Chinese officials indicate they plan to construct six regional natural gas pipelines within the next 10 years, which would increase the share of natural gas from 2 to approximately 7 percent of total energy consumption.³⁷ These figures will remain highly suspect, however, until the government develops clear policies to actively promote the utilization of natural gas throughout the economy. Aside from natural gas, a report recently issued by China's SDPC indicates the Chinese government aims to increase consumption of new and renewable energy sources considerably by 2010. Solar and wind energy production is slated to triple, while geothermal production is to double and tide energy is to jump from 50 to 310 megawatts (MW).³⁸ Energy efficiency will also continue to receive attention during China's Tenth FYP, with emphasis being placed on the formation of energy service companies (ESCOs), the creation of building codes, and greater use of energy efficient building materials.

The decisions the Chinese leadership makes today regarding energy and environmental protection will have a great impact on the United States and the rest of the world for many years to come. In Part II of this paper we discuss the statutory and institutional obstacles in China and the United States that hinder bilateral energy and environmental cooperation. Part III explores the current commercial opportunities and challenges for U.S. energy efficiency and environmental technology businesses wishing to expand into the China market. Part IV reviews the past successes and shortcomings of bilateral governmental cooperation in a wide range of energy and conservation sectors. The conclusion in Part V provides some concrete policy options on how the United States and China could tap into the hidden potential of energy and environmental cooperation. ■

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PART 2. Barriers to Sino-U.S. Environmental and Energy Cooperation

The Greening of U.S.-China Relations?

After the People's Republic of China and United States established diplomatic relations in 1979, environmental and energy research, exchanges, and projects were some of the first beneficiaries. Energy and environmental issues were viewed as non-contentious and mutually beneficial policy areas. While (or perhaps because) these areas of cooperation have not made front-page news, such bilateral environmental collaboration has grown, albeit in fits and starts, over the past 20 years—even continuing in times of heightened tensions between the two countries. The Sino-U.S. cooperative agreements and protocols on environmental and energy issues have led to numerous training courses on pollution control methods, scientific exchanges, partnerships on setting energy efficiency standards, as well as joint research on climate change, water issues, and renewable energy.

Despite the impressive list of protocols and cooperative environmental and energy projects (outlined in Part IV and in Appendix A), commitment to building such collaboration rarely has been granted high priority in either the United States or China. U.S. government environmental and energy efforts in China have not been nearly as extensive as those conducted by the Japanese and German governments, due to congressional restrictions on giving formal development assistance to China and limited budgets of various U.S. agencies conducting international environmental and energy work. Prior to the creation of an interagency bilateral environmental forum in 1997, the lack of prioritization by various administrations and insufficient coordination among U.S. government agencies also hindered Sino-U.S. environmental cooperation. Moreover, the 1997 high-level bilateral environmental initiative *U.S.-China Forum on the Environment and Development* (described in Part IV) did not succeed in raising sufficient funds or congressional support for U.S. agencies working on energy and environmental activities in China.

Statutory restrictions and institutional hindrances, which are described below, have significantly limited sustainable development initiatives between the United States and China. The outline of these restrictions is followed by a brief overview of Sino-U.S. environmental and energy collaborative activities and a discussion of the market opportunities and barriers for environmental and energy efficiency technology exports from the United States. These brief discussions aim to highlight how such cooperation is (or could be) helping to promote U.S. foreign policy interests in the areas of:

- (1) Peace and national security;
- (2) Economic development;
- (3) Human and ecological health;
- (4) Humanitarian assistance; and,
- (5) Rule of law and governance.

Hindrances to Sino-U.S. Environmental and Energy Cooperation

Despite 20 years of bilateral energy and environmental collaboration and numerous protocols, U.S.-China cooperation in these areas has faced political and logistical obstacles on both sides that hamper the effectiveness of existing programs and limit the potential impact of future cooperation. *This cooperation could offset tensions in other parts of the Sino-U.S. relationship.* Moreover, closing the door to energy and environmental cooperation also could cause the United States to fall further behind other countries in promoting sales of energy-efficient and environmental technology and services to China. Below are specific factors in the United States that hinder bilateral environmental and energy cooperation with China.

Obstacles in the United States

- *Statutory restrictions on development assistance to China:* While nearly 20 U.S. government agencies currently carry out some form of environmental or energy collaboration with Chinese counterparts, their work is supported completely by internal agency budgets and not formal development assistance. Statutory prohibitions prevent USAID environmental assistance and governance programs from operating in China (see Box 3). Most striking has been the inability of the U.S.-Asia Environmental Partnership (a USAID-affiliated institution) to work in China. U.S.-Asia Environmental Partnership (USAEP) is a public-private government program focused on Asia, but the fact it is not permitted to work in China clearly undermines its efforts to promote regional environmental and energy efforts as well as its capacity to promote sales of U.S. energy efficiency and environmental technologies in the fastest growing economy in Asia. The restrictions preventing USAEP from operating in China, however, are now not the only barrier to its China entry. In August 2001, budget constraints led the Department of Commerce's Foreign Commercial Service (FCS) to cut its partnership with USAEP. This loss of support resulted in the closure of USAEP offices in Hong Kong, Taiwan, and other areas in Asia. This move has further undermined U.S. credibility in the region and diminished support for sales of U.S. technologies. Even should Congress permit USAEP to operate in China, it is difficult to see how the program would operate without FCS financial support. For the past several years there have been legislative efforts in Congress to grant USAEP permission to operate in China, but they have never passed the House due to the concerns of various members over China's behavior in *non-environmental* areas.¹
- *Lack of high-level support for international energy and environmental cooperation:* Without clear commitment by high-level officials in the administration and in Congress, U.S. government agencies will not risk devoting time and resources to bilateral work with China.
- *Low budgets:* Low and continuously shrinking budgets in U.S. government agencies for international energy and environmental activities hinder effective bilateral cooperation. The low budgets reflect the lack of priority by successive administrations as well as the often-hostile attitude of the Congress toward China.

Box 3. Statutory Restrictions to ODA for China

The **Foreign Assistance Act** (which created the U.S. Agency for International Development—USAID), the **Arms Export Control Act**, and annual **Foreign Appropriation Acts** all contain restrictions linked to human rights and arms control violations that are (or could be) used to prohibit overseas development assistance (ODA) and economic support funds (ESF) to China (See Appendix B for list of statutory restrictions). Notably, previous administrations, for political reasons, have never stated formally that these restrictions apply directly to China. There exists, however, a de facto ban on formal development assistance and USAID operations in China. Currently, with the exception of some support for some nongovernmental organizations working on environmental, human rights, and health issues in Tibet, no ODA or ESF is given to China and the Department of State prohibits USAID from operating in China. The reasons for this prohibition are, not surprisingly, linked to the tensions and conflicts in U.S.–China relations. The ODA prohibitions close the door on what could be a key avenue for bilateral energy and environmental funding. Appendix B lists “notwithstanding clauses” in various acts that could create direct opportunities for narrowly defined aid and assistance to China or be used to open up targeted assistance programs to China.

- *Bureaucratic hindrances:* Extremely strict internal rules for dealing with foreigners, especially Chinese, hinder the activities of several government agencies, notably the Department of Energy and the Office of the Deputy Under Secretary of Defense (Installations and Environment) that works on environmental security. While these departments obviously must adopt strict security measures, excessive paperwork requirements may dim enthusiasm and willingness to engage Chinese counterparts.
- *Inadequate coordination among U.S. government agencies:* Environmental problems are inherently interconnected and demand cooperation among various agencies, even at the domestic level. The problem of insufficient coordination among agencies working in China was mitigated somewhat by the creation of the U.S.–China Forum on Environment and Development in 1997. Prior to this Forum, only ad hoc mechanisms for interagency coordination existed. While the Forum helped U.S. agencies learn about the work of other agencies, the lack of funding for Forum activities prevented it from reaching its full potential as a coordinating mechanism.
- *Inability of U.S. Export-Import Bank to offer competitive rates:* The U.S. Export-Import Bank (Ex-Im Bank) established a \$100 million Clean Energy Program in 1999 to finance U.S. exports of renewable energy and energy-efficient technologies to China, but has yet to disburse any of the funds. As Ex-Im Bank loans are offered at commercial rates, the bank has found it difficult to compete with concessionary rates offered by other countries. The Chinese, as well as many U.S. multinationals, also consider Ex-Im Bank to be more inflexible than its Japanese and European counterparts.

- *Insufficient support for U.S. energy efficiency and environmental technology companies:* The Department of State and the Department of Commerce's Foreign Commercial Service and Environmental Technologies Industries Office have devoted some staff in the embassy and consulates in China to bilateral environmental and energy cooperation. Only recently has the DoE stationed one individual in China to work on bilateral energy cooperation. However, Ex-Im Bank, EPA, and USAEP do not have staff on the ground in China who can develop connections with Chinese institutions and assist U.S. companies. The governments of Japan and the European Union devote significantly more resources and staff to exporting to China. Thus, even though American firms may have superior technology, they often find they have neither the financial resources to challenge competitors backed by their countries' tied aid programs nor consistent government support (this issue is discussed more fully in Part III).
- *Contentious nature of U.S.-China relations:* Political tensions between the United States and China cause many in U.S. government agencies to hesitate working with Chinese counterparts. This hesitancy is due to fears that such work could cause their agency to attract negative attention and a concomitant loss of funding, or simply because it is too difficult to get permission to work with Chinese counterparts.

Obstacles in China

Political and economic factors on the Chinese side also act as hindrances to productive bilateral energy and environmental collaboration. Notably, some of these obstacles and political weaknesses represent areas in which U.S. training and exchanges could help strengthen China's ability to protect its environment.

- *Low priority of environmental protection:* Traditionally, the Chinese government has paid lip service to environmental protection and has not given this issue the priority it deserves. A 2001 World Bank study stated that China should be spending much more in this area. Though the Chinese leadership and public are beginning to realize the importance of environmental protection work, the government must clearly prioritize environment and sustainable development activities and grant appropriate status and funding. Equal attention needs to be paid to environmental protection at the provincial and local levels. The United States might be more willing to collaborate with China in the environmental and energy efficiency spheres if the Chinese government showed greater commitment to environmental protection.
- *Bureaucratic competition:* Internal competition among Chinese agencies to manage natural resources and energy policy not only hinders domestic programs, but also limits the effectiveness of U.S.-China bilateral initiatives. For example, sometimes the Chinese government has difficulty selecting which agency will lead on bilateral environmental or energy initiatives. Once selected, the lead agency in a bilateral agreement often will not

“share” the resources and planning responsibilities with other Chinese agencies, to the frustration of the U.S. agency partners. This intergovernmental competition within China creates a disincentive to bilateral cooperation.

- *Weak environmental agencies:* Although China’s main environmental agency (SEPA) has been raised to the ministerial level, it remains understaffed and under funded. Local government leaders often ignore lower-level Environmental Protection Bureaus (EPBs). Similar to EPBs, natural resource management agencies at the local level (such as water and forestry bureaus) also face challenges of getting resources and political support. The Ministry of Science and Technology (MOST), which conducts research on new technologies and helps fund scientific initiatives, is another major agency working on environmental issues. MOST is a much stronger agency than SEPA, but still must compete with other agencies for resources.
- *Continuing reforms and government reorganization:* Constant reforms and periodic reorganization of Chinese government agencies result in U.S. agencies “losing” their counterpart agency or having to deal with staff changes that might negatively impact cooperation.
- *Devolution of economic and fiscal authority:* The implementation of environmental policies in China has been complicated by the devolution of economic and fiscal authority to lower-level governments, some of which lack the understanding, resources, or desire to fully develop and implement environmental regulations or create mechanisms for fairly solving disputes over natural resources. Local governments not only receive less financial support from the central government than in the past but also are prohibited from offering their own debt instruments to finance environmental infrastructure—even though they increasingly bear the financial burden of providing such infrastructure. The number of potential Chinese partners (at both the central and local levels) for U.S. environmental and energy agencies far exceeds current U.S. spending levels. Notably, the lack of capacity at the local level to implement environmental policies indicates a promising area for Sino-U.S. city-to-city or province-to-state cooperative efforts.
- *Insufficient rule of law:* In the 1980s the Chinese government began to shift China’s economy from a command-economy to one dictated by markets and subject to the rule of law. Increasingly, the government has undertaken reforms to promote the rule of law throughout all segments of Chinese society. However, legal reforms and infrastructure are far from complete, creating problems for international cooperation. For example, without better contract and intellectual property rights protection, U.S. energy and environmental technology firms will be unwilling to transfer technology. The Chinese government has taken steps to improve this situation, and China’s accession to WTO should compel further progress.
- *Reliance on concessionary financing:* The Chinese government receives considerable amounts of concessionary financing for environmental and energy projects from Japan and the

European Union, and is also a major recipient of multilateral finance. (See Part III for details) Not surprisingly, the Chinese government has come to rely on—and even to demand—concessionary financing from all developed countries. Ultimately, concessionary financing may not be the best way for China to strengthen its environmental protection and energy efficiency infrastructure, for such financing creates market distortions and does not always guarantee projects receive the best equipment and assistance. Demands for concessionary financing limit the ability of the United States to cooperate with China, since Ex-Im Bank can offer only commercial rates and the United States provides no official development assistance (ODA) to China.

- *Inexperience with market tools:* Among Chinese environmental and energy regulators there is a lack of experience and understanding on how to use market mechanisms as policy tools. Financial authorities, meanwhile, have little experience with environmental projects and are loathe to grant financial concessions (such as tax breaks). This lack of experience hinders effective implementation of bilateral projects that emphasize free-market mechanisms, such as emissions trading.

Some of the above statutory and institutional hindrances in the United States and China not only hinder bilateral governmental cooperation, but also act as barriers for U.S. companies wishing to break into the energy and environmental technology markets in China. The following section explores more fully the commercial opportunities and challenges for U.S. companies. ■

¹The most recent Congressional attempt to support USAEP in China was the Foreign Operations, Export Financing, and Related Programs Appropriations Act (Senate—Amendment number 3511, June 21, 2000). This amendment was sponsored by Senators Baucus and Roberts and aimed to permit appropriated funds for USAEP—to be used for environmental projects in the PRC. The goal would be to enable the U.S. government to help U.S. businesses connect with provincial and municipal governments in China to initiate badly needed environmental engineering projects. Such work seeks to help prevent environmental catastrophes resulting from intense industrialization and development in the PRC.

PART 3. Commercial Opportunities and Challenges for U.S. Companies

The global market for environmental technologies will exceed \$550 billion by 2005, according to U.S. Department of Commerce figures. The bulk of this market lies in developing countries, where sales of environmental technologies are growing as fast as 10 percent each year, compared to relatively flat rates in the developed world. Currently, the U.S. environmental industry generates around \$200 billion in revenues, supporting approximately 1.3 million U.S. jobs. U.S. firms export around 11 percent of total production, far less than the over 20 percent exported by key competitors such as Japan, Germany, and the United Kingdom.

The market for energy efficient and environmental goods and services in China is growing due to China's booming growth and increasing concern about environmental degradation. China's spending for environmental protection hit 1.1 percent of GDP in 2000, though the figure was higher in some urban areas, such as Shanghai. Government environmental officials hope to increase spending levels to 1.3 or even 1.4 percent of GDP by the end of 2005—such an amount would exceed \$15 billion per year.

The Chinese government will target key areas of investment during the Tenth five-year plan (FYP, 2001–2005). The key FYP areas are outlined below (the figures, in U.S. dollars, are government targets and may not be realized). These areas of investment represent promising sectors for U.S. firms:

- *Air-pollution control equipment:* Chinese government analysts estimate that China will require investment of approximately \$36 billion to meet its air pollution objectives over the next few years. About one-third of this amount is to be spent on desulphurization equipment.¹
- *Water and wastewater treatment:* Some \$30 billion has been targeted for the reduction of water pollution. The Chinese government has projected to spend about \$12 billion on urban sewage treatment plants, with the rest to be spent on industrial wastewater treatment. A special focus will be on the upper reaches of the Yangtze River in the Three Gorges Dam area.
- *Solid waste treatment and disposal:* Chinese planners hope to spend \$7 to \$11 billion on urban refuse treatment plants, centralized hazardous waste treatment and disposal plants, and industrial solid waste treatment and recycling.²
- *Renewable energy:* Chinese officials will require regional power sectors to produce a minimum of 5.5 percent of electricity from renewable sources by 2005. Total energy consumption from renewable sources is to increase 10-fold by 2015, to 2 percent (this figure excludes biomass). The largest increases are expected to come from increases in wind power capacity. Beijing officials claim solar and geothermal energy will be the main sources of energy used to supply hot water and electricity to the 2008 Olympic Games village.³

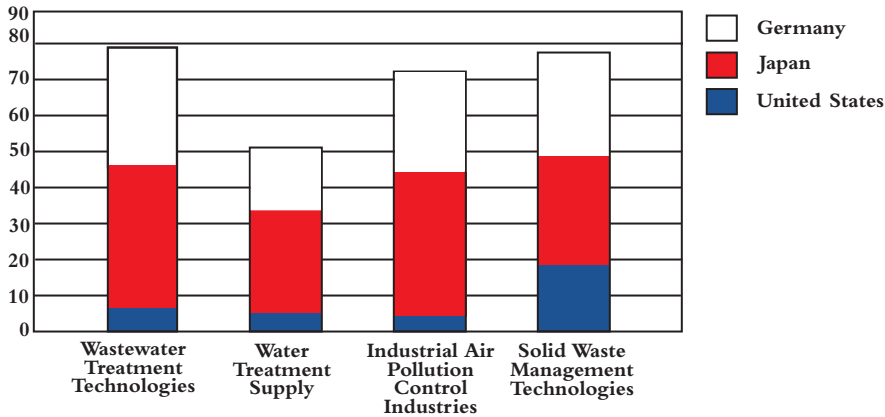
- *Natural gas*: Chinese planners hope that natural gas will account for at least 10 percent of commercial energy consumption by 2020, up from 2–3 percent at present. Considerable investment will be needed to identify domestic resources, build transport and distribution infrastructure, and to create natural gas markets. Major cities along the coast are converting industrial boilers from coal to gas, along with residential heating and cooking facilities.⁴
- *Vehicle and gasoline-related pollution controls*: Euro 1 vehicle emissions standards have been adopted in Beijing, Shanghai, and Guangzhou and are to be implemented nationally by 2003.⁵ These standards require vehicles to possess fuel injection systems and emissions-control equipment. Though implementation of these standards currently is uneven, large cities in China are purchasing new fleets of buses and taxis to meet the standards. The standards require that existing vehicles must be retrofitted with the requisite equipment or face being scrapped. The U.S. Foreign Commercial Service in Beijing estimated the market last year for imported emission-control technologies at \$270 million. Many Chinese cities are introducing vehicles powered by alternative fuels such as liquefied petroleum gas, compressed natural gas, electricity, propane, or a combination thereof, yielding opportunities in all of these technologies for U.S. firms, as well as downstream applications (such as filling stations). The Chinese government also adopted national unleaded gasoline standards in July 2000; however, Chinese refineries cannot yet meet these auto emissions controls standards. Such problems present foreign firms with opportunities to export higher-quality gasoline or help upgrade Chinese refineries.
- *Energy efficiency equipment*: According to Li Rongrong, Minister of the State Economic and Trade Commission (SETC), the Chinese government aims to decrease its energy consumption from 2.77 tons of standard coal per 10,000 Yuan of gross domestic product in 2000 to 2.2 tons by 2005.⁶ According to China's State Development Planning Commission (SDPC), key technologies ripe for energy efficiency renovation projects include industrial boilers, steam pipe networks, motors, industrial kilns, buildings (particularly heat systems), and lighting systems.

Challenges to U.S. Participation in China's Energy and Environmental Markets

Despite China's great need for investment in energy efficient and environmentally friendly technologies, foreign firms, including those from the United States, face a number of significant obstacles when pursuing sales and investments in China. These stem from unrealistic tariffs and low rates of return, lack of hard currency, Chinese protectionism, inadequate protection of intellectual property, non-transparent and fragmented regulatory bureaucracies, and lack of policy support.

On top of all these constraints China lacks well-developed financial mechanisms critical to reducing risk and generating investment funds. Financing constraints are perhaps the

Figure 1. Foreign Market Shares in Environmental Technology in China



Source: *stat-usa.gov* U.S. Foreign Commercial Service and Department of State Industry Analyses.
^a1998 analyses and ^b1999 analyses

most significant impediment to foreign firms seeking to sell to China’s energy efficiency and environmental markets. U.S. firms, in particular, have had difficulty dealing with financial issues in these sectors. Despite the high regard in China for U.S. technology, American firms have lagged behind their competitors in China’s environmental markets. (See Figure 1)

U.S. Government Agencies Prohibited from Operating in China

The lackluster U.S. performance is due largely to the inability of U.S. firms to match the substantial tied-aid programs and more flexible financing arrangements of other countries. As discussed in Part II of this paper, numerous U.S. government programs available to help U.S. firms in other countries do not operate in China, due to restrictions imposed by Congress. Such programs include:

- *U.S. Agency for International Development (USAID)*: USAID is the main conduit of U.S. foreign assistance for the alleviation of environmental problems and promotion of sustainable development. No USAID funds are spent in China. Restrictions on USAID also prevent the *U.S.-Asia Environmental Partnership (USAEP)* from operating in China. USAEP was founded as a presidential initiative to blend U.S. development and trade agendas in pursuit of cleaner growth and sustainable development in Asia. In other countries USAEP has funded foreign participation at U.S. trade shows as well as U.S. product demonstrations abroad.
- *Overseas Private Investment Corporation (OPIC)*: OPIC is an independent federal agency that provides political-risk insurance and financing to U.S. firms investing in developing countries. Each year significant amounts of OPIC financing go toward energy and environment-related investments. U.S. sanctions have barred OPIC from China since 1989,

preventing U.S. firms from tapping OPIC guaranties and project finance for China projects. The sanctions also bar OPIC-invested funds, such as Aqua International Partners, L.P. and the Global Environment Emerging Markets Fund—which focus on the water and clean energy/water sectors, respectively—from investing and profiting in China.

U.S. Versus OECD Government Assistance to China

While several U.S. government agencies work with their Chinese counterparts on energy and environmental issues (See Part IV), the level of U.S. interaction is far less than that of many European and other countries.

Between 1988 and 1997, for example, Japan, the European Union, and other countries provided China with well over \$20 billion in official development assistance (ODA). In FY1998, Japan extended ¥423.8 billion in environment-related ODA (commitment basis) worldwide, accounting for 24.5 percent of its total ODA budget, according to the Ministry of Foreign Affairs.⁷ In FY1999, around 65 percent of all Japan's yen loans to China included environmental objectives.⁸ The United States provides no ODA to China, though individual government agencies spend small sums on bilateral cooperative programs, which includes support for environmental initiatives.

ODA Spending in China's Environmental Sector

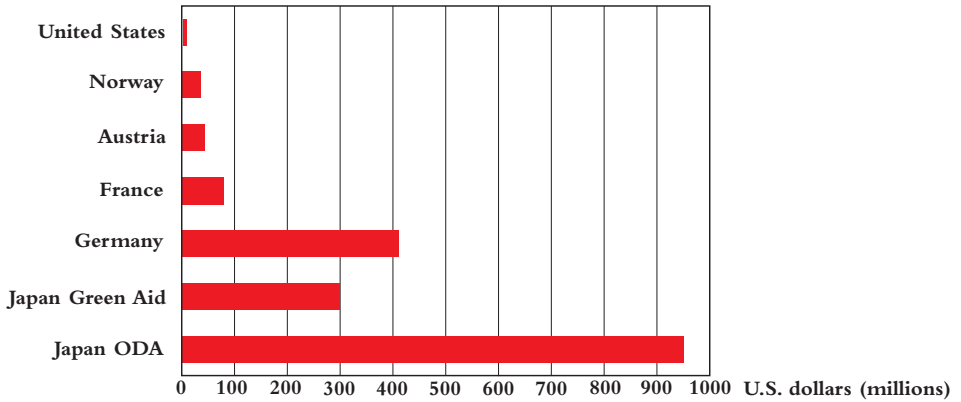
Foreign competition in China's environmental arena is fierce, given the future potential of Chinese markets and the desire of many companies to establish their names and reputations early. As a result, most of the ODA foreign countries provide to China in the clean energy and environmental realms is dedicated to technology purchases, demonstrations, and the establishment of technology standards and supporting policy.

Bilateral assistance to China in the environmental arena is often tied, meaning it is restricted to the purchase of technology and services from firms based in the donor country. For the Chinese, finding the most attractive financial package is a primary goal in the search for a supplier. Therefore, tied bilateral assistance is often a decisive factor to the Chinese when awarding contracts to foreign companies for renewable energy and environmental projects.

Most countries have two types of programs to channel bilateral assistance to China. The first type centers on technical assistance programs. These typically provide small grants ranging from \$10,000 to \$3,000,000 for training programs, exchange missions, feasibility studies, environmental centers, capacity building in Chinese ministries and institutions, and environmental education.

The second type of program is concessional finance, or soft loans. Countries lend anywhere from \$3 to \$40 million to help finance larger projects involving equipment purchase and plant construction. About 60 percent of these projects are water treatment, sewage treatment, and water supply facilities.

Figure 2. Environmental Aid to China (1993-1997)



Source: Information compiled by Peter Evans from OECD CRS database and donor budget documents and presented by Peter Evans at “Japan-U.S. Environmental Cooperation: Promoting Sustainable Development in China.” Conference held at the Woodrow Wilson Center 21 November 2001. The Japanese ODA cited in this figure is the portion of overall ODA that supported environmental projects in China.

U.S., Japanese and European Aid to China

Bilateral assistance to China basically follows the pattern of overall ODA flows, with Japan far and away the largest bilateral donor to China’s environmental sector. Under Japan’s Green Aid Plan, the Japanese government set up 30 projects to demonstrate clean coal and energy efficient technologies between 1993 and 1998. The total value of these projects was \$352.7 million—nearly the same amount as the entire Montreal Protocol mechanism. Additional funding was made available via Japan’s Bank of International Cooperation (JBIC). Though most JBIC projects are untied, many environmental projects are deemed commercially nonviable and thereby qualify for exceptionally low rates and long payback periods (.75 percent over 40 years). These projects generally are limited to Japanese firms.

European countries, led by Germany and France, provided \$697.1 million to environmental aid projects in China from 1993 to 1997. Australia and Canada provided another \$50.8 million. (See Table 3) The bulk of bilateral assistance from Japan, Europe, Canada, and Australia went to water supply and sanitation projects. The next largest sectoral recipient was for cleaner energy and energy efficiency projects. The U.S. Trade and Development Agency (TDA) provided \$24 million to U.S. companies for feasibility studies and training activities in China from 1981 until 1989, but TDA was prohibited from operating in China from 1989 until 2001. TDA has now resumed operations in China, and will likely spend a few million dollars in China this year. Other U.S. agencies committed around \$2 million to environment-related services between 1993 and 1997. Much of this funding went to U.S. organizations to pay for the cost of workshops and technical assistance focusing on regulatory and market reforms, rather than technology transfer. Currently, almost all U.S. funding for programs in China comes from departmental budgets, not specific funds

TABLE 3. Bilateral and Multilateral Assistance to China (US\$ Millions)

	1998	1999
Japan	1158.15	1226.0
Germany	321.31	304.6
United Kingdom	55.43	59.3
Canada	52.28	N/A
France	29.76	46.2
All Others (excluding United States)	114.82	N/A
United States	0.40	38.3
Total Bilateral ODA	1732.15	1821.6
Total Multilateral ODA	639.5	512.2

Source: Masahiro Kawai, Shinji Takagi, and Amy McCreedy. (2001). "Japan's Official Development Assistance: Recent Issues and Future Directions." *Asia Program Working Paper*. No. 97 (July). Washington, DC: Woodrow Wilson Center and OECD Development Assistance Committee. On-Line. [Available]: www.oecd.org/dac. ^aIncludes some donor countries not itemized in this table.

appropriated for work in China. The two small exceptions include congressional funding for environmental and civil society work in Tibet (which goes to a U.S.-based NGO) and support for the American Bar Association to set up an environmental governance training program.

The U.S. Ex-Im Bank established a \$100 million clean energy facility in 1999 to finance U.S. exports of renewable energy and energy-efficient technologies, but has yet to disburse any of the funds. As Ex-Im Bank loans are offered at commercial rates, the bank has found it difficult to compete with concessionary rates offered by other countries. Moreover, with the exception of Ex-Im Bank, and the Departments of Commerce and Energy, U.S. government agencies do not have staff on the ground in China who can develop connections with Chinese institutions and assist U.S. companies. Thus, even though American firms may have superior technology, they often find they have neither the financial resources to challenge competitors backed by their country's tied aid programs nor consistent government support. Despite the obstacles discussed above, some U.S. firms have broken into energy and environmental markets in China. (See Box 4)

WTO and Energy and Environmental Policy in China

The impact of China's accession to the World Trade Organization (WTO) on its environment is difficult to assess.⁹ Increased competition with foreign firms should spur Chinese industries to use resources—especially energy and water—more efficiently. However, rising incomes likely will increase consumption of energy and natural resources and will result in greater numbers of private vehicles on Chinese roads. The resulting increase in auto emissions may offset air quality gains made by improving energy efficiency. Moreover, patterns indicate that Chinese are adopting Western-style diets, which could have a significant impact on Chinese agriculture and environmental quality. According to a new food and nutrition development plan released by the State Council last December,

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Box 4. U.S. Businesses Find Success in China

The Chinese government's growing environmental awareness, increasing budgets for energy restructuring, and environmental infrastructure are good news for U.S. firms, the world leaders in these areas. A wide range of U.S. firms are engaged in trade and investment in China's energy and environmental areas, from large multinationals to small niche firms. The first to enter the Chinese market were the oil and gas companies. Virtually all of the major U.S. energy firms—including the ExxonMobil and TexacoChevron Corporations—are active in China, in both upstream and downstream operations. Their operations cover a spectrum of activities, from oil and gas exploration to filling stations to petrochemical production. U.S. firms such as the AES Corporation also have been active participants in China's power sector, with many investing in and selling equipment to electric power generators.

Smaller U.S. firms also have found their entry into the China market aided by multilateral organizations:

- The World Bank has funded 17 environment projects in China, totaling over \$2 billion. This figure does not include water supply and sanitation projects (over \$800 million as of June 2001) and other World Bank projects with environmental ramifications, such as renewable energy and forestry projects.
- The Asian Development Bank (ADB) spent over \$1 billion on environmental projects in China from 1989 to 2000, and plans to spend another \$2.7 billion from 2001 to 2003. U.S. equipment and service suppliers have participated in many of these ADB and World Bank projects. Honeywell International, for example, won a World Bank district heating contract; Ecology and Environment Inc. has won around \$15 million worth of environmental consulting work from ADB and World Bank over the past 10 years.

U.S. government agencies, though hamstrung by legal restrictions and limited budgets over the past decade, also have assisted U.S. firms to win environmental work in China. For example, Dasibi Environmental Corporation of Glendale, California doubled its workforce in 1998 to fill a \$5.2 million order for air quality monitoring systems for 11 cities in China. The sale stemmed from U.S. EPA technical assistance and training to Beijing to assist the Chinese government set up an air-monitoring network. Tetra Tech recently won a contract worth more than \$278,000 from the Shanghai Environmental Protection Bureau to conduct a feasibility study to help the bureau upgrade Shanghai's environmental monitoring systems. The contract was facilitated by a grant from the U.S. Trade and Development Agency.

Many other U.S. firms have successfully undertaken sales and investment in China's environmental/clean energy sectors. A sampling includes:

- ITT Industries' Flygt Pump Company won a multi-million dollar order to provide 195 mixers to a wastewater treatment plant in Zhengzhou;

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Box 4. U.S. Businesses Find Success in China

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- Alliant Energy International, which has been active in China since 1996, has invested over \$30 million in cogeneration plants throughout China;
- U.S.-headquartered BP Solar won a contract to supply 100,000 watts peak of solar modules to the Ali Project Brightness Program in western Tibet;
- Aeromag Corporation has signed an order in principle to sell \$12.5 million worth of wind turbine technology to Chinese customers; and,
- CH2MHill is advising Chinese government officials on how to develop a “green Olympics” in 2008.

Despite these successful examples, U.S. firms generally lag behind European and Japanese competitors in key environmental markets in China. Their underperformance stems from financing constraints, corporate inflexibility, less government support (compared to many top competitors), and in some cases, lack of a true commitment to the Chinese market. Corporate commitment to China may grow, however, with the size of the potential market. According to market research firm AccessAsia, China’s market for environmental goods and services will nearly double over the course of the Tenth FYP, reaching around \$19 billion in 2005.

Sources: The World Bank Group in China: Facts and Figures, the World Bank Office Beijing, July 2001; ADB Market Brief, U.S. Commercial Liaison Office for the ADB, January 2001; and AccessAsia quote comes from *Business China*, April 23, 2001 (An EIU publication)

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China aims to reduce per capita grain consumption while raising the relative proportion of meat, eggs, milk, fish, and vegetables in the Chinese diet.¹⁰ Overall, annual grain output would still need to rise by 14 percent to 570 million tons in 2010 to support such plans. While China's accession to WTO will likely result in greater grain imports as trade barriers come down and Chinese farmers switch production to more lucrative crops, significant increases in animal husbandry could exacerbate already serious water pollution and grassland degradation problems.

Foreign firms are likely to benefit from China's accession to WTO, as import tariffs will decline (average tariff rates on oil and gas equipment will drop by as much as 50 percent). Moreover, the Chinese government will be required to abide by international competitive bidding procedures, and policies that favor domestic production will be abolished. Foreign companies also will be able to distribute and service their own equipment, which may make their products more competitive. Foreign company technologies could help lessen the environmental impacts of some of China's most polluting and energy intensive industries, such as the production of leather, textiles, food and packaging, and pulp and paper.

China's entry into WTO should also ease many of the current barriers to the provision of environmental services, though the licensing approval process may not become any easier. China's environmental services commitments cover sewage services, solid waste disposal services, cleaning services for exhaust gases, noise abatement services, nature and landscape protection services, and other environmental protection services. Environmental monitoring and inspections are excluded. Foreign service suppliers will be able to provide environmental consultation services through cross-border delivery (no commercial establishment in China will be required).

China's WTO commitments should enhance the transparency of the country's legal regime, which should also help foreign energy and environmental firms. Increased transparency may also result in Beijing expanding initiatives aimed at increasing public participation in the adoption of environmental rules and policies. ■

- ¹The air pollution and wastewater treatment data available at: U.S. Embassy in Beijing. (2000). “Environmental objectives and investment requirements for China’s 10th five-year plan.” (November). On-line. [Available]: <http://www.usembassy-china.org.cn/english/sandt/>
- ²U.S. Embassy in Beijing. (2001). “China’s year 2000 ‘State of the environment’ report.” (June). [On-line]. Available: <http://www.usembassy-china.org.cn/english/sandt/>
- ³Center for Resource Solutions. (2001). Renewable energy development in China: The potential and the challenges.
- ⁴Data on natural gas and vehicle and gasoline related pollution controls drawn from: U.S.-China Business Council. (2000). Environmental trends and policies in China: Implications for foreign business. (March). Washington, DC.
- ⁵Euro 1 standards are the auto emission standards that were required in the European Union in 1992.
- ⁶“Zero energy growth by 2010.”(2001). China Daily, (November 11).
- ⁷Ministry of Foreign Affairs of Japan <http://www.mofa.go.jp/policy/other/bluebook/2000/II-3-b.html#2>
- ⁸Japan’s Annual ODA Report 1999. <http://www.mofa.go.jp/policy/oda/summary/1999>
- ⁹One excellent analysis of the potential impact WTO could have on China’s environment is: Ferris Jr., Richard J., Changhua Wu and John Barlow Weiner. (2000). “Environmental implications of China’s accession to the WTO: Policy and law considerations.” Bridges. (June 30). See also Richard J. Ferris Jr. and Hongjun Zhang. (Forthcoming in 2002). “The Challenges of Reforming an Environmental Legal Culture: Assessing the Status Quo and Looking at Post-WTO Admission Challenges for the People’s Republic of China.” Georgetown International Environmental Law Review.
- ¹⁰See U.S. Embassy in Beijing’s EST Update. (2001). December 28. [On-line]. Available <http://www.usembassy-china.org.cn/english/sandt/>

PART 4. Overview of Sino-U.S. Energy and Environmental Cooperation

The First Umbrella Agreement

The initial framework for Sino-U.S. environmental and energy collaboration was the *Scientific and Technology Cooperative Agreement* signed on 31 January 1979 by President Jimmy Carter and Vice Premier Deng Xiaoping. This agreement became an umbrella for subsequent bilateral environmental and energy cooperative protocols and projects. The thirty protocols created under this umbrella agreement over the past two decades have played a major role in building a foundation for joint projects, research, as well as data and information exchange on a broad range of conservation, atmosphere, marine health, pollution, and renewable energy issues.¹ Until recently, these notably low-funded efforts were primarily ad hoc agency-to-agency cooperative initiatives. It was not until 1997 that the United States and China created an interagency forum in an attempt to integrate energy and environmental cooperation toward common goals and to identify priority areas for future bilateral efforts.

U.S.-China Forum on Environment and Development

From 1997 to 2000, Chinese and U.S. government agencies held bilateral talks beneath the umbrella institution the *U.S.-China Forum on Environment and Development* (hereafter the Forum). The Forum was established in March 1997 by then-Vice President Al Gore and then-Premier Li Peng to serve as a venue for bilateral discussions on sustainable development at the most senior political level. To facilitate concrete cooperation, four working groups (energy policy, commercial cooperation, science for sustainable development, and environmental policy) acted as coordinating mechanisms under the Forum. The projects, research, and exchange activities undertaken by the working groups were meant to facilitate cooperative work in three priority areas: (1) urban air quality, (2) rural electrification, and (3) clean energy and energy efficiency. The desire to mitigate greenhouse gases was one of the major issues shaping the selection of these three project priority areas. In addition to numerous new protocols and cooperative agreements, the Forum also produced the U.S.-China Water Resources Management Program, which operates under the Joint Commission Meeting (JCM) of the Science and Technology Agreement.²

While never attracting much news media attention, the Forum has been a unique interagency institution in U.S.-China relations. The Forum put bilateral environment and energy priorities, albeit quietly, on the political agenda in both countries and created a foundation for future collaborative work. Yet while the Chinese side increased its funding and commitment for bilateral environmental efforts with the United States, no specific funding was allocated for the Forum's initiatives on the U.S. side. The participation of senior administrative leaders at the yearly meeting of the Forum pushed U.S. agencies to create and implement more bilateral projects in China, but did not lead to any significant overall increase in U.S. funding for such initiatives. *All* of the collaboration produced by the Forum was funded by agencies cobbling together their own funds. The Forum enabled U.S.

government agencies to learn what other U.S. agencies were doing on energy and environmental issues, but the lack of funding prevented true interagency collaboration to take place. In short, funding shortages and political obstacles in the United States hindered the effectiveness of U.S. agencies participating in the Forum.

The U.S.-China Forum on Environment and Development has met three times since 1997, with the most recent meeting 11-12 January 2000 in Hawaii. Notably, high-level officials in China still support the continuation of the Forum. However, the Bush administration has given no indication—either to the Chinese or U.S. participants—of whether it will continue to participate in the Forum, leading most observers to conclude that the administration has no interest in its activities and that the Forum is now defunct. In the meantime, U.S. and Chinese government agencies are reverting back to ad hoc agency-to-agency activities, often with reduced budgets. Without attention or pressure from the upper levels of the administration, there may be less incentive for agencies to continue international environmental and energy work in China, and the momentum that was gained during the Forum may well be lost. U.S. agencies tend to spend their resources in areas or on issues in which they sense clear political support; since coming to office President Bush has been to China twice, but energy and environmental issues have failed to make his agenda. Though the omission might be understandable in light of the administration's current preoccupation with security and the war against terrorism, an important opportunity has been lost to restate U.S. interest and willingness to cooperate with China in the critical areas of energy and environmental security.

Protocols, Agreements, and Projects

China's growing environmental and energy problems—and the links between these problems and U.S. foreign policy interests—present U.S. policymakers with valuable opportunities to promote simultaneously U.S. interests in the areas of security, economic development, health, humanitarian assistance, and rule of law while undertaking environmental and energy cooperation. Emphasizing environmental and energy cooperation would support goals already contained in the Department of State's mission plan for its embassy and consulates in China.³ An overview of current Sino-U.S. energy and environmental protocols, agreements, and projects is presented below; Appendix A provides additional details.

Energy Cooperation

As noted in a recent study by the National Research Council (NRC) and the Chinese Academy of Sciences,⁴ the energy futures of China and the United States are intertwined. Both are energy hungry nations that import oil from the same international sources and share similar challenges of improving energy efficiency and utilizing clean energy sources. Moreover, the United States and China are major emitters of greenhouse gases and both confront similar problems of pollution from energy production and use.

The Department of Energy (DoE) began cooperation with China in 1979. A Memorandum of Understanding establishing bilateral energy consultations, signed by DoE and the SDPC in 1995, provides the mandate for bilateral energy agreements. Today, DoE cooperates in areas of fossil energy, climate change, fusion energy, energy efficiency, renewable energy, peaceful nuclear technologies, and energy information exchange. There are 19 active DoE cooperative agreements with China. The DoE and U.S. national laboratories also have helped either to create or strengthen energy research centers in China.⁵

DoE and the U.S. Environmental Protection Agency (EPA) have been cooperating with China on energy efficiency and clean technology studies and training programs with their Chinese counterparts for many years. Bilateral energy cooperation between the two countries can help advance a number of U.S. environmental, security, trade, science and technology, and investment goals. China provides a major opportunity to leverage and commercialize U.S. science and technology investments in clean coal, energy efficiency, renewable energy and nuclear technology, since it is one of the largest future markets for deploying such technologies.

Since 1997, DoE and the China's SDPC have co-chaired the Energy Policy Group under the *U.S.-China Forum on Environment and Development*. This group discusses energy policy reforms, deployment of clean technologies, energy security and enhanced opportunities for the private sector. Since the creation of the 1997 bilateral Forum (which in great part was organized to address issues of global climate change), the U.S. and Chinese governments have signed a number of new energy protocols and cooperative initiatives, such as the *Protocol for Cooperation in the Field of Fossil Energy Research and Development* (2000) and the *U.S.-China Oil and Gas Industry Forum* (1998).

Air Quality, Climate, and Oceans

For over twenty years, the United States and China have collaborated on atmospheric and oceans research, exchanges, and projects. In 1979, two umbrella protocols—the *Atmosphere and Science and Technology Protocol* and the *U.S.-China Marine and Fishery Science and Technology Protocol*—were signed and created the framework for nearly thirty Sino-U.S. protocols and cooperative agreements. The U.S. National Oceanic and Atmospheric Administration (NOAA), together with the Chinese Meteorological Administration (CMA) and the State Oceanic Administration, have been the lead agencies in bilateral climate and oceans data exchange, research, and joint projects (including coastal management strategies and weather forecasting).

These agreements and projects not only have promoted successful data exchange, but also have helped improve disaster prediction capability in both countries. The United States and China both have suffered—and will continue to be vulnerable to—economic and social losses from floods, hurricanes, and droughts. The ability to better predict weather and climate variability improves early prediction methods and mitigation strategies for such

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Box 5. Successful Bilateral Cooperation Helps China Build a Nationwide Air Quality Monitoring Network



*Severe air pollution plagues many cities in China.
(Photographer Daniel Dudek)*

Urban residents in China are increasingly faced with smoggy city skies and choking air on roadways. The burning of dirty coal and massive growth in automobile traffic are the major sources of poor air quality and growing health problems in urban areas. In order to address this pressing problem, the U.S. EPA—using minimal funds—has played a key role in facilitating the creation of a nationwide air quality monitoring network in Chinese cities.

The project was implemented through the California Air Resources Board (CARB), which provided training and technical assistance to national and local officials in China on siting, operations and maintenance, and quality assurance for the eleven cities in Phase I. The U.S. EPA provided \$125,000 in support of this project, and the National Association of State Development Agencies (NASDA) provided an additional \$20,000 through its technology grants program. This project enabled China's State Environmental Protection Administration to turn down concessional finance offers from other bilateral donors and instead buy equipment at market rates from an American air monitoring equipment vendor—Dasibi Environmental Corporation of Glendale, California. This project has enabled Dasibi to double the number of its employees. The Chinese partner, not the U.S. government, determined which company to hire to set up the air quality monitoring network. Financing was, and continues to be, a problem, but so far the Chinese have been willing to turn down competing concessional finance offers. EPA offered \$50,000 in funding for Phase II (which covered approximately 40 cities). Phase III will expand the network to nearly 100 cities. Dasibi—has expanded its joint venture for Phase III, allowing Chinese to manufacture significant components, lowering cost and promoting private sector technology transfer.

This project is significant for China's environment in three main areas:

- Creation of an integrated national network with world standard data and data compatibility;
- Improvement of China's ability to develop and implement air quality policies; and,
- Issuance of daily air quality reports to the public that influences policy development.

This project is significant for the United States in three main areas:

- Promotes good cooperation between U.S. government agencies (DoC, EPA, Department of State, and the State of California);
- Facilitates U.S. commercial sales that create jobs; and,
- Recognizes Chinese health concerns as one of the major drivers of the future energy mix in China.

Box 6. China's Transboundary Air Pollution

Twenty years after Deng Xiaoping's decision to "open China to the outside world," the phrase has taken on new shades of meaning. Since China opened its market to outside trade and investment, the subsequent rapid economic growth has led to serious air pollution problems—from the intense coal burning industries that generate sulfate and organic aerosols to the production of ozone depleting substances—that are impacting the world outside China.

While the transboundary dynamics of greenhouse gasses and ozone depleting substances are difficult to track, studies show that pollution from China increasingly is reaching U.S. shores. Research reveals that Chinese pollution is producing acid rain in the Koreas and Japan, while, greater amounts of air-borne dust and anthropogenic aerosols from China are landing in the United States. In December 1998 at the meeting of the American Geophysical Union, Dr. Dan Jaffe of the University of Washington, Bothell announced that in March 1997 and in April 1998 dust from the Gobi Desert made the 5,000-mile journey across the Pacific Ocean to the United States West Coast. Two years later, a research team led by Professor Emeritus Thomas Cahill at the University of California, Davis found that finer-grained contaminants such as sulfate and organic aerosols are also making the trans-Pacific trek. In short, pollution and dust from China could exacerbate U.S. pollution problems and endanger North American pristine areas. In the wake of these discoveries, a community of scholars has emerged with an interest in monitoring and tracking transpacific air pollution. The following is a summary of their preliminary research findings:¹

- There have been five sightings of transpacific Asian borne dust arriving on the West Coast since the initial 1997 discovery.
- Since the 1998 dust storm, Asian pollutants reportedly have reached as far as Utah and Texas, though officials from the National Weather Service have expressed skepticism that the particles that make up pollution could hold together for such a long-distance journey.
- The 1998 dust storm was so severe that the pacific coast skyline turned a "milky white," according to Professor Cahill.
- Trans-Pacific air-borne pollution does not rival the strength of domestic pollution; however, the highest estimates predict Asian air pollution will raise the levels of dangerous emissions (such as ozone) by 10 percent in some regions in the western United States.
- The Pacific Northwest is likely to be the largest recipient of air pollution emanating from Asia, according to the Seattle Times, due to the nature of airflows in the troposphere.
- The transport of trans-Pacific air pollution is most likely to come in March, April and May when atmospheric flows form a "conveyor belt effect" from Asia to the United States West coast.

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Box 6. China's Transboundary Air Pollution

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International Cooperative Efforts

Since the early 1990s, the Japanese government and scientific organizations in Northeast Asia, Europe, and North America have launched projects to better understand the nature of trans-regional air pollution emanating from Asia. The Japanese government initiated the creation of two regional environmental cooperative organizations: *Eco-Asia* (<http://www.ecoasia.org>) and the *East Asia Acid Rain Monitoring Network* (EANET).

Eco-Asia has brought together governments for numerous meetings and workshops with the goal of acting as a leading forum on environmental policy dialogue in the region. EANET brings together Chinese, Japanese, and Korean researchers to create a coordinated, high-quality acid rain monitoring and data exchange system for the region. In light of existing transboundary bilateral work between the United States and China under the *Atmosphere and Science and Technology Protocol* (See Appendix A), there are clearly opportunities for greater U.S. cooperation in these larger cross-boundary pollution forums.

(Editor's Note: Eric Zusman at UCLA compiled and wrote the information in this box)

¹Dan Jaffe, et al. (1999). "Transport of Asian air pollution to North America." *Geophysical Research Letters*, 26(6), 711-714; Terje K. Berntsen, Sigrún Karlsdóttir and Daniel A. Jaffe. (1999). "Influence of Asian emissions on the composition of air reaching the North Western United States." *Geophysical Research Letters*, 26(14), 2171-2174; Daniel J. Jacob, Jennifer A. Logan and P.P. Murti. (1999). "Effect of rising Asian emissions on surface ozone in the United States." *Geophysical Research Letters*, 26(14), 2175-78. For a Web-based discussion of the 1997 and 1998 dust storms see <http://capita.wustl.edu/asia-fareast/index.html>; Richard Monastersky. (1998). "Asian pollution drifts over North America. (dust)." *Science News*, December 12, [On-line]. Available: www.findarticles.com/m1200/24_154/53487386/p1/article.html; Polakovic, Gary. (2002, April 26). "Asia's wind-borne pollution a hazardous export to U.S." *Los Angeles Times*. [On-Line]. Available: <http://www.latimes.com/news/nationworld/world/la-042602asiasmog.story>

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natural disasters. In the long term, such cooperation improves emergency relief efforts in both countries. NOAA and CMA also have undertaken a joint effort to create a Doppler radar network and some of the radars are already in place in China. China is the only country besides the United States that has made a commitment to providing wide coverage of Doppler radar to warn of impending storms.

The U.S. EPA has been particularly active in assisting the Chinese State Environmental Protection Administration (SEPA) develop air pollution control and management efforts. For example, EPA and SEPA worked together in drafting legislation to phase out leaded gasoline. The EPA also has facilitated the creation of an air quality monitoring network in Chinese cities. (See Box 5 on page 44) In addition EPA together with the Shanghai Environmental Protection Bureau has recently concluded an extensive three-year study of energy options and health benefits with in Shanghai.

In the 1990s, Sino-U.S. workshops and studies have been examining the possibilities of using market-based mechanism for sulfur dioxide emissions control in China. The collaboration between SEPA and EPA to improve pollution control in Chinese cities has been a successful partnership that is contributing to the protection of human health in China. Moreover, since Chinese air pollution extends beyond its borders, improvement in air pollution control also mitigates regional tensions over acid rain and particulate pollution from China and lessens the impact of Chinese pollution on the United States. (See Box 6 on page 45)

Agriculture, Natural Resources Management, and Biodiversity

Agriculture and natural resource management, particularly water, have been particularly productive areas of Sino-U.S. collaboration. The protocols and agreements in agriculture, forestry, and water management have facilitated numerous research exchanges and joint studies. Studies and cooperation, particularly regarding water, present clear security and human health benefits. The urgent water shortages and water pollution problems facing China pose potential threats to stability and economic development in China and the region. (See Box 1 on Water Stress and Conflict in China) While China has a long history of innovative water management experience, the U.S. public and private-sector capabilities in water conservation technology, wastewater treatment, and environmental financing mechanisms could play a role in helping to mitigate China's water problems. The bilateral interagency *U.S.-China Water Resource Management Program* was created under the Forum to promote joint water management research and to identify common problems, compare current approaches, and develop a joint program for implementation and research, with the close involvement of the private sector. Despite initial enthusiasm by both U.S. and Chinese participants at an information exchange conference to act as a catalyst for bilateral water cooperation (held in Arizona in 1999), little cooperative work has transpired under this water program due to lack of resources.

China is a country rich in biological diversity, but development and population pressures threaten many forests, rivers, grasslands, animal and plant species, and marine resources. One of the first Sino-U.S. agreements focused on conservation, which remains a much less sensitive topic than climate change for bilateral cooperation. In addition to U.S. agencies, an increasingly large number of U.S.-based NGOs also have set up conservation projects with local and central government agencies in China, as well as with Chinese NGOs.⁶ The Chinese government actually has encouraged the development of Chinese environmental NGOs in the area of conservation and environmental education. Some U.S. government projects have worked with U.S.-based NGOs and Chinese research centers. In bilateral collaboration, the U.S. government could do more to assist China in fostering green civil society by integrating NGO and academic participation in Sino-U.S. projects. (See Box 7 on page 49)

Environmental Technology Trade

In early 2001 the Trade and Development Agency (TDA) reopened its grant assistance program to China. The TDA program in China prioritizes feasibility studies and technical assistance in three sectors: (1) environment (air and water pollution), (2) energy development, and (3) aviation safety/navigation.

In 1992 the U.S. Joint Commission on Commerce and Trade (JCCT) was established with the mission to facilitate the development of commercial relations and related economic matters between the United States and China. The JCCT's Environment Subgroup identifies, organizes, and supports events and programs such as technology demonstrations, training workshops, trade missions, exhibitions, conferences, and seminars that foster environmental and commercial cooperation between the two countries.

Within the U.S. Department of Commerce (DoC), the Environmental Technologies Industries (ETI) office is the principal resource and key contact point for U.S. environmental technology companies. The Market Access and Compliance country desk officer at the DoC helps U.S. companies overcome trade and investment barriers. The China country desk officer informs American companies of rights and benefits under existing trade agreements, and provides comprehensive, up-to-the-minute information and analysis on market opportunities and obstacles.

Environmental Security

In September 1998 the Secretary of Defense and the Vice-Chairman of the Chinese Central Military Commission signed a *Joint Statement on Military Environmental Protection*. This memorandum of understanding provides for the exchange of visits by high-level defense officials and the opening of a dialogue on how to address common environmental problems. In 2000, the U.S. Secretary of Defense and the People's Liberation Army signed

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Box 7. U.S. Environmental NGOs and Foundations in China: Promoting a Green Leap Forward?

While the U.S. government has been inconsistent in its environmental and energy policy relations with China, over the past 10 years U.S.-based environmental and energy nongovernmental organizations (NGOs) have steadily expanded their activities and commitments in the Middle Kingdom. Unlike multilateral and bilateral aid organizations, which have significantly increased their environmental assistance to China over the past 20 years, most of these NGOs are not bringing in large investments and grants for the Chinese government or the domestic research and NGO communities.

A handful of environmental NGOs and foundations began operating in China in the mid-1980s, focusing on environmental education and conservation activities. Some of these early groups included the World Wildlife Fund, the Ford Foundation, W. Alton Jones Foundation, and the International Crane Foundation. In the late 1990s, a larger number of U.S.-based environmental NGOs, and grant-giving organizations such as the Energy Foundation, as well as research centers and universities ventured into energy and environmental collaborative work in China. This latter wave stemmed from both the greater openness of the Chinese political system and, perhaps more importantly, a belated recognition that China will have a profound impact on the global environment in the future.

Today there are nearly 60 U.S. environmental NGOs, foundations, and universities operating or supporting environmental or energy projects in China. These U.S.-based groups have pursued five major categories of activities in China: (1) energy efficiency, (2) biodiversity and conservation, (3) pollution control, (4) environmental education, and (5) NGO and community capacity-building work.

Despite the often small size and perhaps relatively minor impact some U.S. NGO projects may have on ameliorating China's pollution and natural resource crises, these green groups are playing a unique role in introducing new policy implementation and formulation dynamics in China. Specifically, in the process of setting up and implementing their projects, U.S. NGOs have been building networks that bring together (often for the first time) central, provincial, and local government agencies, research centers, and indigenous Chinese civil society organizations. In short, U.S. NGOs have created new lines of communication amongst the governmental and nongovernmental sectors in China. Moreover, U.S. NGOs (and the foundations that support them and their Chinese partners) also have helped to inspire, fund, and train Chinese "eco-entrepreneurs" in both the state and non-state sectors. These eco-entrepreneurs are individuals who create their own environmental organizations or wish to improve the capacity of their government agency, research center, or government-organized NGO (GONGO) to influence environmental or energy policies. Through the support and information from foreign NGOs these eco-entrepreneurs are empowered to help create innovative solutions to strengthen environmental protection in China.

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Box 7. U.S. Environmental NGOs and Foundations in China: Promoting a Green Leap Forward?

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In addition to working with Chinese central government ministries, U.S. environmental NGOs increasingly are partnering with local government agencies, research centers, community groups, and Chinese NGOs. U.S. NGOs also partner with U.S. government agencies and research institutes in China. For example, the DoE and several national laboratories (particularly Lawrence Berkeley National Laboratory and National Renewable Energy Laboratory) have been undertaking energy efficiency projects in China not only with their Chinese counterparts, but also in collaboration with U.S. environmental non-governmental organizations (e.g., Natural Resources Defense Council, American Council for an Energy Efficient Economy, International Institute for Energy Conservation). These projects include activities such as developing energy efficiency standards for buildings, industrial equipment, and consumer appliances, as well as helping Chinese policymakers adopt appropriate incentives to foster environmental improvements.

Many U.S. environmental and energy NGOs find it a daunting task to work in China. Aside from language problems and lack of familiarity with China's culture and political system, some of the major challenges these NGOs face include:

- Lack of capacity of the Chinese NGOs, research centers, or government agencies that work with U.S. groups;
- Lack of counterpart organizations within China to help them do their work;
- Bureaucratic obstacles that make it difficult to register foreign nonprofit organizations; and,
- Lack of government and philanthropic organizations providing financial support for NGOs to do environmental work in China.

The U.S. energy and environmental NGOs in China promote the development of civil society directly and indirectly. For example, the Ford Foundation has funded an NGO that provides legal assistance to pollution victims; Trickle Up has helped women and minorities establish business plans and then providing micro-credit so their communities do not have to cut down forests. Notably, despite previous pledges of various U.S. officials (e.g., President Clinton during his 1998 trip to China) to assist China to develop a civil society, few concrete U.S. government programs have been carried out in this area. One new activity supported by the Department of State is an American Bar Association project to set up environmental governance training sessions in three medium-sized cities in China.

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an *Environmental Protection Information Exchange Agreement*. Through these agreements defense agencies on both sides acknowledge the linkage between environmental protection and national security, as well as the role military organizations can play in situations of environmental catastrophes. Since the Chinese downing of the U.S. Navy surveillance plane in April 2001, collaborative work in the area of environmental security has been inactive, although some other types of DoD and Chinese military exchanges or visits are slowly resuming. ■

¹Appendix A provides details on a number of these protocols and cooperative efforts. Moreover, an inventory of U.S. government environmental and energy projects in China can be found in the China Environment Series issues 3, 4, and 5 (2000, 2001, 2002), which is a publication of the Environmental Change and Security Project at the Woodrow Wilson Center in Washington, DC. [On-line]. Available: <http://ecsp.si.edu>

²The central purpose of the Water Resources Management Program is to create a common understanding of critical water problems faced by both countries and work together toward solutions.

³The mission areas for the U.S. Embassy and Consulates in China include: (1) Engage China to prevent, reduce and remedy environmental degradation; (2) Promote clean technology, including expanded bilateral scientific and technical cooperation in clean and renewable energy, air quality, water quality, and solid waste; (3) Expand opportunities for the U.S. private sector, promote commercialization of technology opportunities; and (4) Facilitate cooperation on good government and the role of nongovernmental institutions in civil society.

⁴National Research Council, Chinese Academy of Sciences, and Chinese Academy of Engineering. (2000). *Cooperation in the energy futures of China and the United States*. Washington, DC: National Academy Press.

⁵For example, the Beijing Energy Efficiency Center (BECon) was established in 1993 in cooperation with three organizations—Battelle, Lawrence Berkeley National Laboratory, and the World Wildlife Fund. Today, it has a fulltime staff of twelve professionals and many consultants. BECon is leading high-level projects for the World Bank and United Nations Development Programme, and has contributed to many world-class reports on China's energy options.

⁶For details on the breadth and depth of U.S. environmental NGOs undertaking work in China, see issues 3, 4, and 5 of the Woodrow Wilson Center's China Environment Series, available on the Web at <http://ecsp.si.edu/>

PART 5. The Hidden Potential of Sino-U.S. Energy and Environmental Cooperation

U.S.–China relations have resembled a roller coaster ride over the past 15 years, at times requiring leaders in both countries to expend considerable effort to keep this critical relationship from derailing. U.S. policies toward China often are shaped by the view that China is a threat, while the Chinese leadership has viewed the United States as hostile and determined to hold China back and hinder its development. In light of long-running disputes over security and human rights issues, it is not surprising that despite growing trade linkages, the U.S.–China relationship is tinged with mistrust. This continued mutual mistrust has hindered open and constructive Sino–U.S. dialogues. Given current geopolitical realities, it is in neither side’s interest—and may be deleterious to anti-terrorism and Korean peninsula peace efforts—to maintain this tension. It is therefore critical for the United States and China to find areas in which they can expand, not contract, lines of communication and cooperation. Energy and environmental collaboration present ideal opportunities for such cooperation and to build confidence in the U.S.–China relationship.

Strengthening Sino–U.S. governmental energy and environmental cooperation also could promote collaboration on environmental agreements at the international level, bolster opportunities for U.S. energy and environmental technology firms and help prevent U.S. isolation from the rest of the international community on environmental issues. Greater bilateral cooperation and information sharing on common environmental problems not only improves bilateral governmental relations, but also could facilitate environmental collaboration among NGOs, research centers, and news organizations in the United States and China. Such networks could better highlight the extent of U.S.–China economic and ecological ties. Cooperation on common environmental and energy challenges could also build confidence in the overall Sino–U.S. relationship and enable the two countries to work together on other issues.

Policy Options

Even if the United States increases environmental and energy collaboration, China’s pollution and energy problems will not disappear overnight, and ultimate responsibility rests with China to shoulder most of the clean-up work. For any U.S. environmental aid and assistance to have an effective impact, the Chinese government and Communist Party also must make a commitment to environmental protection and energy efficiency by committing resources and pushing through difficult structural reforms. Washington could encourage Beijing to be more committed to environmental protection and energy efficiency by developing consistent, coherent policies and eliminating barriers to cooperation on the U.S. side. Initiatives that should be considered include measures to:

- *Remove restrictions* that prohibit USAID and USAEP from operating in China and permit them to focus on energy and environmental issues in the PRC.
- *Remove restrictions* barring the Overseas Private Investment Corporation (OPIC) and its investment funds from working in China.

- *Bolster contacts between U.S. Congress and China's National People's Congress (NPC) on environmental issues through inter-parliamentary exchanges.* For example the House Committees on Resources and Energy and Commerce and the Senate Agriculture, Nutrition, and Forestry and Environment and Public Works Committees could meet with their counterparts in the NPC's Committee on Environmental Protection and Natural Resources Conservation.
- *Encourage the interaction of China's financial authorities with U.S. counterparts at the local and national levels.* This kind of exchange could enable Chinese financial authorities to learn how financial measures can be used to encourage energy efficiency and environmental protection without incurring massive debt.
- *Encourage environmental activities of U.S.-based NGOs, universities, and philanthropic organizations in China.* For example, the U.S. government/USAID/USAEP could provide small grants to NGOs to conduct training and exchanges. In the late 1990s, USAEP supported the Asia Foundation to give grants to help create an environmental NGO-Business Partnership network in South Asia, which could be a model for U.S. government NGO grants in China. The U.S. government also could encourage the Chinese government to make it easier for both domestic and international environmental NGOs to register and operate their organizations in China.
- *Hold interagency meetings* to redesign, fund, and reestablish the U.S.-China Forum on Environment and Development.
- *Encourage cooperation and training between legal professionals* specializing in environmental issues to bolster Chinese implementation of environmental laws and regulations (e.g., train judges, lawyers, businesspeople, and financial/insurance company people on liabilities).
- *Encourage Sino-U.S. city to city or province to state cooperative efforts* in the energy efficiency and environmental protection spheres.
- *Acknowledge the Chinese government's greater cooperation in regional and global environmental forums* such as APEC, UN, PBEC and urge the Chinese government to include Chinese NGOs in these regional meetings.
- *Raise environmental and energy cooperation at high-level meetings.* All Cabinet-level officials should include energy and/or environmental issues on their China agendas.
- *Improve budgetary funding for environmental cooperation.* For example, funds should be used for adding staff, for neither EPA, USAEP, nor USAID have staff in China, while DoE and Ex-Im Bank staffing in China has been sporadic, thus limiting in-house expertise in key U.S. agencies.
- *Continue to support rule of law assistance in environmental spheres in China.* For example, Title V, Subtitle B of the Permanent Normal Trade Relations Act (PNTR Act) provides a

model that allows a limited range of development assistance to China without benefiting Chinese government organizations considered violators of human rights. The PNTR Act permits programs for the Departments of State, Commerce, and Labor to develop commercial, labor, and some general rule of law programs. These programs may include rule of law training, workshops, finance of the operating costs for nongovernmental organizations working in this area, as well as technical assistance to draft commercial and labor codes. Rule of law work could make contributions in the environmental protection spheres, which could greatly strengthen the enforcement of environmental laws and regulations. Under Subtitle B in the PNTR Act the President may prohibit these programs from working with Chinese ministry or any administrative unit that is suspected of human rights violations. Subtitle B therefore strikes a balance between concerns for human rights and collaborating with China in an area of mutual interest. In February 2002 the American Bar Association began working in China with support from the Department of State to set up an environmental governance-training program.

Conclusion

Following all of these recommendations on collaboration with China leads logically to the question of what might happen if the United States does *not* help China improve its environmental protection capability:

- (1) China passes its environmental pollution problems onto the rest of the world, including the United States, which could lead to future conflicts.
- (2) China's future energy demands put pressure on world energy supplies. Increasing demand for oil could lead China to forge closer ties with states in the Middle East that are now hostile to the United States.
- (3) China may act more antagonistically in international forums.
- (4) Chinese citizens would suffer from more health problems due to environmental degradation. Some of the poorest, most isolated people in China—including ethnic minorities, such as Tibetans—will suffer the worst consequences.
- (5) Regional tensions might increase if, for example, China limits the water supplies of neighboring countries, does not control pollution, and creates more red tides and acid rain in the region.
- (6) China may be more likely to take provocative actions in the Spratlys and Paracel Islands to secure energy sources, undermining regional security.
- (7) U.S. companies might “lose” potentially huge markets for energy and environmental technology and services. EU and Japanese companies, with critical support from their governments, have captured much of China's energy and environmental technology

markets already. The earlier a firm gets into China to help set standards and forge strong relationships, the bigger the advantage. Breaking into the Chinese market is particularly important for U.S. firms, since they cannot rely on concessionary financing.

Eliminating barriers to environmental and energy collaboration in order to better assist China onto a sustainable development path is not simply of ecological and humanitarian importance, but also a potential opportunity for the United States to build better relations with the Chinese government. Initiatives that promote environmental collaboration could help to institutionalize new norms of cooperation and build peaceful bilateral government and trans-societal linkages between the United States and China. In other words, building opportunities for dialogue and environmental cooperation between the United States and China at the governmental and nongovernmental levels not only benefits the environment, but also can have positive side effects in the political, economic, and security arenas.

In light of the continued mutual mistrust between the United States and China, energy and environmental cooperation should become a priority of U.S. policy. Such cooperation ultimately is beneficial to the U.S. economy, good for the Chinese populace, and good for the globe. ■



**CONFERENCE PROCEEDINGS:
Green NGO and Environmental
Journalist Forum—**

**A Meeting of Environmentalists From
Mainland China, Taiwan,
and Hong Kong**

Environmental activism in Mainland China, Taiwan, and Hong Kong has been growing considerably over the past decade, but most green activists and environmental journalists in each area have not had opportunities to meet and exchange ideas on their professions. ECSP, Hong Kong University's Centre of Asian Studies, and the University's Journalism and Media Studies Centre organized a forum in Hong Kong in April 2001 to provide opportunities for 65 environmentalists and journalists from the three areas of Greater China to discuss improving both the capacity of environmental nongovernmental organizations (NGOs) and the quality of environmental reporting in the region.

Bilingual proceedings from the forum are now available. The Woodrow Wilson Center received generous support from the United States Institute of Peace for this workshop and publication. For more information or to obtain a copy of the proceedings, please contact ECSP Senior Project Associate Jennifer L. Turner at chinaenv@erols.com or 202/691-4233.



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APPENDIX A Sino-U.S. Protocols, Cooperative Agreements, and Projects on Energy and Environment¹

Energy Cooperation

Protocol for Cooperation in the Fields of Energy Efficiency and Renewable Energy Technology Development and Utilization—This protocol—signed in 1995 by the U.S. Department of Energy (DoE) and China’s State Science and Technology Commission—seeks to utilize and develop renewable energy and energy efficient technology that will help China meet and reduce its energy needs. The protocol contains seven annexes: (1) Rural Energy Development; (2) Wind Energy; (3) Energy Efficiency; (4) Renewable Energy Business Development; (5) Electric and Hybrid-Electric Vehicles Development; (6) Geothermal Production and Use; and (7) Renewable Energy Policy and Planning. A U.S.–China Energy Efficiency Steering Committee (co-chaired by DoE and the SDPC) coordinates DoE’s energy efficiency cooperation with China, which is conducted in ten priority areas including efficiency policy, efficient motor systems, and efficient buildings.

Five of the above annexes relate to renewable energy addressing policy, rural energy, large-scale wind systems, hybrid village power, renewable energy business development, and geothermal energy. There has been extensive cooperation in renewable energy including: (1) the installation of 200 solar home systems in rural areas; (2) renewable energy resource assessments; (3) geothermal heat pump projects; (4) cooperation on a pilot project using a wind/diesel/battery system to electrify 120 households; and (5) workshops and outreach activities, which have helped U.S. companies facilitate business partnerships and develop markets for renewable energy technologies in China.

Protocol for Cooperation in the Field of Fossil Energy Research and Development—This protocol was signed in April 2000 in Washington DC, between DoE and Ministry of Science and Technology (MOST). The protocol focuses on the promotion of scientific and technological cooperation in fossil energy, particularly research and development, demonstration, and deployment. This protocol contains five annexes: (1) Power Systems (DoE, MOST, State Power Corporation of China); (2) Clean Fuels (under negotiations, DoE, MOST, SDPC); (3) Oil and Gas (DoE, MOST, China Petroleum & Chemical Industries Association); (4) Energy and Environmental Technologies (DoE, MOST); and (5) Climate Change (DoE, MOST, Chinese Academy of Sciences, China Meteorological Administration).

Oil and Gas Forum Industry Forum—A U.S.–China Oil and Gas Industry Forum was established in 1998 to promote exchange that will assist China in its efforts to secure reliable and economical sources of oil and natural gas. This forum is helping to identify and facilitate new opportunities for U.S. industry related to China’s petroleum development. The Oil and Gas Industry Forum has held two sessions, one in November 1998 in Beijing and a second session in Houston in July 1999, and a third session met in September 2001 in Beijing.

Natural Gas Development Studies—A team of experts from government and key technical institutes in China and the United States have been assessing the potential for expanding

natural gas production and imports in China. They are examining the environmental and health benefits of increased gas use, as well as the policies and programs needed to achieve the desired levels of natural gas use in China. The assessment—being conducted by EPA and China’s State Environmental Protection Administration, SEPA) may identify opportunities for which credits certified under the Clean Development Mechanism could help finance natural gas projects in various sectors. In addition, the International Energy Agency in Paris, with support from DoE, is conducting a major assessment of China’s natural gas sector.

Protocol on Energy Information Exchange—From 1995 to January 2000, DoE’s Energy Information Administration (EIA) and China’s National Bureau of Statistics (NBS) cooperated under a Statement of Intent (SOI) for information exchange. Under this arrangement, participants met five times to discuss the status of energy supply and demand and to exchange information on methods of data collection and the processing of energy information. EIA has published energy information and the NBS has provided publications on coal, petroleum and electric power in China. A protocol to replace the SOI was signed in January 2000. The protocol expands the scope beyond the 1995 SOI and calls for exchange of information about energy resources and reserves, energy production, energy demand, energy investment, environmental emissions, as well as statistical information about the adequacy of energy resources to meet demands in the future.

Energy and Environment Cooperation Initiative—This initiative created the U.S.–China Forum on Environment and Development meeting in 1997, which aimed to coordinate bilateral energy and environmental cooperation. For more information on the forum see Part IV.

Air Quality, Climate, and Oceans

Atmosphere and Science and Technology Protocol—The U.S. National Oceanic and Atmospheric Administration (NOAA) signed an agreement with the Chinese Meteorological Administration and the State Oceanic Administration in 1979. This agreement provided the framework under which 30 protocols and cooperation agreements were signed. Many of these protocols focus on data and information exchange, as well as cooperation in research and environmental management. Specific areas include: scientific experiments and research on monsoons, mesoscale meteorology, satellite meteorology, atmospheric chemistry, and operational techniques for forecasting torrential rains.

U.S.-China Marine and Fishery Science and Technology Protocol—This protocol was signed in 1979 under the Science and Technology Agreement and was renewed in 1998. In 1999, NOAA officials signed some new side agreements to the protocol, which promotes joint research and projects on marine and coastal management as well as information exchange on the role of global climate change. This protocol also has helped to coordinate Sino-U.S. bilateral efforts in multilateral oceans programs, such as the Tropic Ocean Global Atmosphere project, which aims to better understand the cyclical outbreak of the El Niño phenomenon.²

Global Climate Change and the U.S. Country Studies Program—The United States has worked closely with China on climate change issues through the U.S. Country Studies Program (USCSP) in support of the United Nations Framework Convention on Climate Change. DoE provided financial support and technical assistance (approximately \$2 million) through USCSP for China’s first nationally integrated comprehensive country study dealing with issues and mitigation strategies in climate change. The China Country Study work (conducted from 1994 to 1998) was led by the Ministry of Science and Technology (formerly the State Science and Technology Commission) in cooperation with scientists and analysts from more than 12 ministries and institutions. USCSP also provided support to China on a Climate Change National Action Plan. The United States also is assisting China in developing socioeconomic modeling capabilities to facilitate China’s evaluations of climate change policy adaptations. Currently DoE is working with Tsinghua University, a major advisory source for the government on climate issues, to develop an energy technology systems analysis modeling framework. This framework will help China establish capabilities in analyzing the effects of climate change policy on the Chinese economy. It will also identify important technology opportunities for the mitigation of carbon emissions.

Agriculture, Natural Resource Management, and Biodiversity

U.S.-China Nature Conservation Protocol—Signed in 1986, but repeatedly renewed and expanded, this protocol emphasizes wetland and ecosystem preservation. The activities under this protocol have facilitated joint studies and surveys of wildlife in China, as well as environmental education and biodiversity conservation and management training courses for Chinese foresters.

U.S.-China Agreement on Agricultural Cooperation—Instituted in 1999 and building on the previous 20 years of agricultural exchanges and research, this agreement encourages hi-tech agricultural research in both countries. Under this agreement, the U.S. Department of Agriculture (USDA) and China’s Ministry of Agriculture participate in numerous technical cooperation and assistance initiatives within two main areas listed below:

- (1) *Technical Cooperation and Scientific Exchange* encourages research institutes and agricultural enterprises to collaborate on high-tech research and development, including education symposiums in cooperation with U.S. land grant universities, as well as opportunities for Chinese leaders to visit the United States to observe and study management systems and production technology.
- (2) *Specific Technical Exchanges to Develop the Agricultural Sectors of both the United States and China* promotes a wide range of technical cooperation and assistance initiatives that span a variety of commodities, such as field and horticulture products, meat, dairy, and livestock, as well as aquaculture, biotechnology, natural resources, and environment.

Cooperation Agreement: Habitat Conservation—This agreement includes studies and conservation activities on habitat requirements for migratory birds, sturgeon, mussels, and special status species such as snow leopards and polecats.

Reforestation Agreement—This agreement—headed by the USDA and the U.S. Forest Service—has promoted cooperation for more than ten years on China's reforestation program. The program has included the establishment, monitoring, and genetic screening of North American tree species plantations in China.

Forestry and Grassland Research—USDA and the U.S. Forest Service have conducted long-term research programs in such fields as plant genetic resource studies; conservation of germplasm; exchange of biological control agents; restoration and conservation of grasslands; reforestation; and agricultural economic studies and statistical surveys.

Cooperation Agreement: Hydrology—In 1994 the U.S. National Weather Service, together with the Chinese Ministry of Water Resources, developed a prototype flood prediction system on the Huai River. The model has since been extended to seven other major Chinese rivers.

Memorandum of Understanding: Water—The United States Bureau of Reclamation and the Chinese Ministry of Water Resource have signed a Memorandum of Understanding on water that provides for the exchange of information and techniques to improve water resource management and conservation, particularly in relation to irrigation. A water control demonstration project initiated in Annex I began operation in 1997 and has been extended to 2006.

Environmental Technology Trade

U.S. Joint Commission on Commerce and Trade (JCCT)—Established in 1992, the mission of JCCT is to facilitate development of commercial relations and related economic matters between the United States and China with the direct objective of promoting advancing bilateral commercial agendas. The Department of Commerce and the Chinese Ministry of Foreign Trade and Economic Cooperation (MOFTEC) lead JCCT, which meets annually in a plenary session. JCCT's Environment Subgroup identifies, organizes, and supports events and programs such as technology demonstrations, training workshops, trade missions, exhibitions, conferences, and seminars that foster environmental and commercial cooperation between the two countries. The U.S. government agency co-chairs are U.S. Department of Commerce's (DoC) Office of Environmental Technology Exports and the EPA's Office of International Activities. The Chinese co-chair is SEPA.

Environmental Technologies Industries (ETI) and the Foreign Commercial Service—The Environmental Technologies Industries (ETI) office is the principal resource and key contact point within DoC for U.S. environmental technology companies. ETI's goal is to facilitate and to increase exports of environmental technologies, goods, and services by

providing support and guidance to U.S. exporters. ETI staff covers key countries, with an emphasis on the designated emerging markets, including China. ETI regularly publishes an export market plan for China. The DoC's U.S. and Foreign Commercial Service (FCS) maintains officers and foreign national staff in Hong Kong and five cities in the People's Republic of China: Beijing, Shanghai, Guangzhou, Chengdu, and Shenyang. FCS services include market analyses, business counseling, market and policy information, and introductions to Chinese government officials and business contacts.

Environmental Quality and Health Programs and Projects

Water Pollution Prevention Programs and Vehicle Emissions/Leaded Gasoline Phase-out—The U.S. Environmental Protection Agency (EPA) has several programs targeting pollution protection in specific watersheds in China. EPA also has assisted SEPA in drafting and implementing legislation that phased out leaded gasoline. Additionally, EPA has helped train SEPA officials in methods to control mobile sources air pollution. EPA's work has contributed to the seventeen standards SEPA enacted for vehicular emissions through the 1990s.

Air Quality Management—In the 1990s, EPA and SEPA began examining the possibilities of using market-based mechanism for sulfur dioxide emissions control. Currently, EPA also is working with the Asian Development Bank to deliver training on emissions trading in Shanxi Province. EPA also helped in setting up an air quality monitoring network in Chinese cities. In late 1999, EPA initiated a joint assessment of China's air quality management process with SEPA and the Shanghai Environmental Protection Bureau. The main objective of the assessment was to analyze the various components of the Chinese and U.S. air quality management systems and identify techniques and technologies that could reduce air pollutant emissions in large urban areas—Shanghai was the first pilot area.

Pollution and Human Health—There are a number of studies and research agreements between SEPA and EPA investigating pollution and human health linkages. These include studies on the effects of pollution in specific parts of China, the relationship between coal burning and asthma, and cooperative research on links between environmental factors and cancer.

¹This appendix highlights the main U.S. protocols and agreements with China on energy and environmental issues. Details on specific U.S. government energy and environmental projects in China can be found in the inventories in the Wilson Center's China Environment Series

²For more information on this area of cooperation see "Twenty Years of U.S.-China Cooperation in Atmospheric and Oceanic Science." China Environment Series 1999/2000. Washington, DC: Wilson Center, 74-77.

APPENDIX B Statutory Restrictions on U.S. Aid to China

A. Prohibitions

1. **Section 101 of the Arms Export Control Act** (Symington Amendment) prohibits the provision of economic support fund (ESF) and development assistance (DA) to any country that exports nuclear enrichment materials or technology without complying with certain safeguards. This restriction can be waived if the President determines that termination of assistance would have a serious adverse effect on vital national interests and he has received assurances that the country in question will not be acquiring or developing nuclear weapons. The Speaker of the House and the Senate Committee on Foreign Relations in the Senate must be notified. The Congress then has 30 days to approve or disapprove the waiver.
2. **Section 116 of the Foreign Assistance Act** (FAA) prohibits the provision of assistance (DA) to the government of a country that engages in a consistent pattern of gross violations of internationally recognized human rights, unless the assistance will directly benefit the needy people in such country.
3. **Section 502B of the Foreign Assistance Act** (FAA) prohibits the provision of security assistance (including ESF) to a country which engages in a consistent pattern of gross violations of internationally recognized human rights, unless the President finds that such a significant improvement in its human rights record has occurred as to warrant lifting the prohibition assistance in the national interest of the United States.
4. **Section 549 of the FY2001 Foreign Appropriations Act** (FAP) prohibits assistance (DA and ESF) to a government that provides lethal military equipment to a terrorist government. The President can waive this provision if he determines that furnishing the assistance is important to the U.S. national interest. A justification for the waiver must be submitted to the appropriate congressional committees.
5. **Section 523 of the FY2000 FAP** prohibits the use of appropriated funds to finance “indirectly” (e.g., via multilateral development agencies) any assistance or reparations to China (among other countries), unless the President certifies that withholding the assistance is contrary to the national interest of the United States. The President made the required certification via Presidential Determination in order to allow a continued flow of U.S. funds to multilateral financial institutions and international organizations of which the U.S. is a member.
6. **1989 Tiananmen Sanctions** led to the suspension of Trade and Development Agency (TDA) and Overseas Private Investment Cooperation (OPIC) activities in China. Restrictions on TDA were waived by President Clinton in January 2001 and the TDA is now permitted to undertake energy and environmental work in China. OPIC is still prohibited from operating in or funding projects in China.

B. Notwithstanding Authorities

1. **Section 614 of the FAA** would allow the President to authorize assistance notwithstanding any of the restrictions listed in Part A, above, if the President determines that it is important to U.S. national security interests, and provides prior written justification for his determination to the House committees on Appropriations and Foreign Affairs, and the Senate committees on Appropriations and Foreign Relations.
2. **Normal Trade Relations for the People's Republic of China (10/10/2000) Title V, Subtitle B: Assistance to Develop Commercial and Labor Rule of Law** permits the establishment of three types of technical assistance and rule of law programs. Specifically, (1) the Secretary of Commerce, in consultation with the Secretary of State, is authorized to establish a program to conduct rule of law training and technical assistance related to commercial activities in the People's Republic of China. (2) Similarly, the Secretary of Labor is authorized to establish a program to conduct rule training related to the protection of internationally recognized worker rights in China. (3) The Department of State is authorized to set up a program in China for rule of law training and technical assistance relating to the development of the legal system and civil society generally.
3. **Section 481(a)(4) of the FAA** authorizes the provision of assistance for narcotics control efforts notwithstanding any other provisions of law.
4. **Section 491 of the FAA** permits the provision of disaster assistance notwithstanding any prohibition of law.
5. **Section 522 of the FY2001 FAP** provides that funds made available for child survival activities or AIDS programs may be made available notwithstanding any provision of the law that restricts assistance to a foreign country.
6. **Section 541(a) of the FY2001 FAP** declares that restrictions on assistance to foreign countries in this act or any other act (except those relating to international terrorism or human rights violations) shall not be construed to restrict assistance: (1) in support of certain programs of nongovernmental organizations; or (2) under specified provisions of the Agricultural Trade Development and Assistance Act.
7. **Section 526 of the FY2001 FAP** authorizes the availability of ESF funds to provide general support and grants for nongovernmental organizations located outside China that have as their primary purpose fostering democracy and rule of law in that country (including earmarking amounts to such organizations to support activities which preserve cultural traditions and promote sustainable development and environmental conservation in Tibetan communities). Earmarks ESF funds to the Jamestown Foundation (currently the Robert F. Kennedy Memorial Center for Human Rights) for a project to disseminate information and support research about China, and related

activities. *(Editor's Note: Democracy assistance provided under this section to the Chinese government must go through the National Endowment for Democracy)*

8. **Section 538(b) of FY2000 of the FAP** authorizes the use of foreign assistance funds to support tropical forestry and biodiversity conservation programs. Subject to the regular notification procedures of the House and Senate Appropriations committees energy programs aimed at reducing greenhouse gas emissions may also be funded. This authority is not available, however, with respect to countries that are considered gross violators of human rights under sections 116 and 502B of the FAA.
9. **Section 451 of the FAA** allows for the provision of assistance to meet unexpected contingencies notwithstanding any other provision of law. This authority, however, is capped at \$25 million per fiscal year.

Lee H. Hamilton, Director

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