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DRAFT 06/19/98

List of Background Papers for POTUS Environmental Event in China

- Overview
- Children's Health
- Water Issues
- Air Issues
- Climate Change
- Three Gorges Dam
- Guilin Region

DRAFT
06/19/98

ISSUE PAPER: ENERGY AND ENVIRONMENT

Overview: China's environmental challenges are acute: it has five of the world's worst air-polluted cities; about half of urban-area rivers are unsuitable for irrigation; water shortages are common; and arable land -- already inadequate -- is decreasing. China also has a major impact on the global environment: it is the second largest emitter of greenhouse gases and is also the world's largest producer of ozone-depleting substances. Chinese officials are aware of the adverse local impacts of China's growth, have incorporated environmental protections into national economic plans, and have passed environmental legislation. Enforcement lags, however, and local development often overrides or outpaces these intentions.

China's environmental problems cannot be separated from its energy use. Coal provides 75% of China's energy and will be the dominant fuel for the foreseeable future. Generating capacity has grown rapidly over the past 20 years but per capita consumption is still one-eighth that of OECD countries. Despite ambitious plans to increase electricity generation capacity, China faces severe electricity distribution problems which will hamper efforts to connect every Chinese household to a national power grid. Over 60 million Chinese have no electricity at home, and natural resources are located far from the developed coastal areas where demand is greatest.

Bilateral Cooperation: To strengthen joint efforts on the environment, the Vice President and then Premier Li Peng inaugurated the Environment and Development Forum in March 1997. Under the Forum's Energy and Environment Cooperation Initiative, signed during the October 1997 Summit, we are seeking to promote clean energy and energy efficiency technologies in China, improve urban air quality, and expand rural electrification. For this Summit, we hope to announce some specific steps to implement the initiative: an Export-Import Bank financing facility for clean energy projects; contracts for several commercial energy projects; U.S. private sector participation in, and EPA technical support for, China's Nationwide Air Quality Monitoring Network; a conference on "Financing China's Energy Needs" to promote U.S. trade and investment in the energy field; an Oil and Gas Industry Forum to allow government and industry representatives from the two countries to discuss issues in this sector; and U.S. Energy Department technical cooperation in such areas as renewable energy. In addition, to seek solutions on water pollution and related problems, the

Office of Science and Technology Policy is establishing a "water dialogue" under the Environment and Development Forum.

Some key U.S. government programs (e.g. Trade and Development Agency, Agency for International Development) which could support environmental objectives in China currently do not operate there because of Tiananmen sanctions or other restrictions.

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06/19/98

Background Material on Children's Health

- Various environmental problems create significant children's health issues
- At least 50% of Chinese children are exposed to lead levels higher than that believed to hinder mental development
- Studies of heavily polluted areas suggested significant physiological and mental damage to children
- Most of the lead comes from automobile exhaust
- China's rivers have up to 20 times the lead level of western industrial nations
- pneumonia is largest cause of child mortality
  - 300,000 children per year
  - related to Chronic Obstructive Pulmonary Disease (COPD)
  - children of smokers face additional doubling of risk of COPD

Background

Many of the public health issues in China, to include those that impact children, have environmental overtones. Lead is a good example. With increased numbers of cars in China, lead levels in children has significantly increased. In Shanghai, 65% of children have excessive levels of lead in their blood. The figure in the U.S. is under 5%.

Air pollution leads to significant childhood illness. Airborne particulates and SO_2 dangers are especially harsh for children. Children raised in homes heated by coal stoves suffer a variety of health effects and illnesses, and often have decreased lung capacity.

Water-borne disease is common due to much higher levels of bacterial contamination than seen in the West.

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06/19/98

Background Material on Water Issues in China

- China's rapid industrial development has taken a heavy toll on water resources
- There are two main water concerns in China: pollution and scarcity
  - Nearly every significant body of water in China suffers some form of pollution
  - Scarcity is becoming an increasingly significant problem. Several areas of China have experienced notable water crises. A basic problem is that much of the rain falls in the southern portion of the nation while much of the population lives in the northern sections
    - Two-thirds of the total crop land (northern China) has only one-fifth the total surface water
    - More than half the cities have experienced severe water shortages
- Over half the population drinks water contaminated with human and animal waste
  - Diarrhoeal diseases accounted for 6% of all mortality in 1990
- China's lakes are at risk, with 14.9% of lake-surface having disappeared since the 1950s, with 543 kilometer-sized lakes having completely disappeared. Wetlands and marshes are similarly endangered
- Of the 27 largest cities in China, only six supplied drinking water that met the government's standards; groundwater contamination exceeded state standards in 23 of these cities
- Lakes in intensely farmed areas have, due to excessive use of fertilizers, massive problems with algal blooms ("red tides). These algae release powerful toxins linked to a variety of illnesses including cancers

Background

Water issues may be some of the most difficult for China to overcome. While much attention has been focused on the terrible water quality problems in many areas throughout the country, a very significant if less public problem is water scarcity. Due to population locations vis water location, most populous areas of China have severe shortage problems.

Contamination is widespread. Only [5%] of residential wastes are filtered, and only [17%] of industrial wastes receive treatment. Bacterial levels in water (responsible for a variety

of illnesses) are very high throughout Asia, with levels up to 50 times U.S. levels noted in the region.

DRAFT
06/19/98

Background Material on Air Quality Issues in China

- China, as much of Asia, faces massive air pollution challenges
- Several of the cities with the world's dirtiest air are in China
- 1.1 million Chinese die each year from air pollution-related illnesses
    - one in eight deaths nationally
    - rural rates four times urban rates
    - smoking patterns contribute to mortality (75% of men, 10% of women smoke)
- pneumonia is largest cause of child mortality
    - 300,000 children per year
    - related to Chronic Obstructive Pulmonary Disease (COPD)
    - children of smokers face additional doubling of risk of COPD
- Both indoor and outdoor air quality are major concerns
    - As 70% of nation is still agrarian, coal cook stoves (many unvented to the outside) are used to heat and prepare food in millions of homes
    - For most Chinese, indoor air pollution due to stoves is largest air pollution threat
        - Women with such stoves over 30 years are at 18 times the risk for lung cancer as women without coal stoves
    - In all but most industrialized regions, coal cook stoves are the largest contributors to particulate matter in the air and to SO_2
- Rates of heart disease double in few months per year with highest levels of particulates and SO_2
- City of Taiyuan has Asia's dirtiest air
    - Particulate levels $+500/m^3$ (standard for dirty=100)
- Indoor particulate levels can reach $11,000/m^3$ with unvented cook stoves

Background

China faces extreme air pollution risks. Unlike most western nations with air problems, much of China's difficulty stems from the largely rural population burning coal as a source of both heat and food preparation. China's industrial facilities, while still producers of significant air pollution, have made significant strides in reducing factory-generated air pollution due to changes in economic conditions and policies that reward energy efficient production.

In addition to the variation in pollution sources from rural to urban settings, there is significant variation in pollutants due to region and city. Likewise, seasonal variation is significant as colder months demand higher levels of coal burning to generate heat.

A variety of health problems arise from the air pollution in China. A general class of health issues is known as Chronic Obstructive Pulmonary Disease (COPD). This includes a variety of acute and chronic respiratory ailments. Also problems are heart disease, impaired immune function, fatigue, impaired lung development, neurological deficits and cancer. The rate of heart disease doubles during the few months each year when outdoor levels of particulates and SO_2 are at their highest.

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06/19/98

Climate Change and China
Background Paper for POTUS trip, June 1998

China's participation is critical to mitigating global climate change - and to our efforts to ratify the Kyoto Protocol. China is the world's second largest and fastest-growing emitter of greenhouse gases; it is on track to surpass the U.S. by 2015. It should be noted, however, that on a per capita basis, China's emissions rate is $1/8^{th}$ that of the U.S.

Explicit support by China for climate change efforts, and a visibly active and measurable Chinese program to address climate change, would significantly allay domestic concerns that developing countries are not participating in the global effort to address climate change.

China has consistently opposed binding developing country commitments to address climate change. We need to build the confidence of senior Chinese leaders, particularly the new Premier Zhu Rongji, that active efforts on climate change need not impede economic growth, and if properly designed, can enhance growth. We must stress that China can benefit economically from "flexibility mechanisms" such as the Clean Development Mechanism. We also should emphasize that domestic environmental and economic development benefits from actions taken to limit greenhouse gas emissions. Similarly, we should recognize that China's domestic economic restructuring and environmental efforts have contributed to rapid increases in energy efficiency and helped to slow growth in China's greenhouse gas emissions.

Despite somewhat warmer signals by Premier Zhu in discussions with Secretary Albright and CEA Chair Yellen in May, and China's recent signature of the Kyoto Protocol, Chinese negotiators at the Bonn climate change meetings in early June maintained their recalcitrant position. The G-77/China effectively blocked efforts to allow voluntary commitments to binding targets by developing countries. China, India, and Brazil announced they would not take on emissions targets until [2150], basing their argument on an "equity" principle of total contribution to atmospheric greenhouse gas accumulation. Such a timetable would, of course, ensure failure of the international effort to solve the climate change problem.

The U.S. government is working with China on several fronts to address climate change. Under the Energy and Environment Cooperation Initiative, an outgrowth of the U.S.-China Environment and Development Forum, agencies such as DOE, DOC, OSTP, and EPA are working with the Chinese to improve urban air quality and implement energy-efficient and clean energy technologies. The U.S. Country Studies Program has assisted China to develop a greenhouse gas inventory and national action plan to address climate change.

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06/19/98

THREE GORGES DAM

Background

The Three Gorges Dam would be the largest hydroelectric project ever. Construction, which began in 1994, is expected to take almost two decades. The dam site is in the central Chinese province of Hubei.

The Chinese leadership strongly supports the Dam. Supporters point to flood control and power generation as the primary reasons for building the Dam. Floods in the Yangtze River valley have killed hundreds of thousands of Chinese this century (including more than 1500 in 1996). Power produced by the Dam would exceed a staggering 18 gigawatts. Equivalent power from a coal-fired plant would result in emissions of 50 million metric tons of carbon.

The project is enormously controversial. Within China, the project has generated significant dissent. (Opposition to the Dam helped fuel the protests for democracy at Tianamen Square in 1989). In the United States and other countries, the Dam is a cause celebre with many environmental and human rights groups.

Opponents of the Dam point to the forced resettlement of more than one million Chinese, the inadequate plans to protect water quality in the Dam's reservoir (which will extend for 400 miles), the impacts on endangered species, the flooding of scenic sites that have inspired Chinese artists for millennia, and the risk of seismic impacts. They argue that flood control benefits could more easily be achieved with a series of smaller dams. They argue that investments in energy efficiency (or in smaller dams) would produce more benefits in terms of greenhouse gas emissions than investments in the Dam.

U.S. Government Action

There is a long history of U.S. government involvement with the Dam. Engineers from the Bureau of Reclamation assisted in developing plans for the Dam during the 1970's and 1980's. In the early 1990's litigation by environmental groups seeking to enjoin this assistance was considered by the Supreme Court (and dismissed on procedural grounds). The Bureau of Reclamation stopped work at the Dam in 1993.

In 1994, the Export-Import Bank of the United States (Ex-Im) sought advice from the National Security Council on issues related to the Three Gorges Dam. In a memorandum that was leaked to the press, the NSC advised Ex-Im not to provide assistance, citing environmental, human rights and legal concerns. in 1996, Ex-Im denied requests from several U.S. companies to help finance exports to Three Gorges. Ex-Im found insufficient evidence that the Dam complied with its environmental guidelines, but left open the possibility that such evidence could be provided at a later time.

At present, there is no U.S. government involvement with the Dam.

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06/19/98

Background Material on Guilin Environmental Concerns
Guangxi Province, City of Guilin

- There are three major environmental concerns in the Province of Guangxi in general and the City of Guilin in particular:
    - Acid Rain
    - Waste Disposal
    - The Li River
- Guangxi is one of four areas of China with serous acid rain problems. Estimates are that 50% of rainfall is acid rain.
- For Guilin, the Li River is the single biggest concern
    - The river is at risk from over 100 sugar processing plants, other industrial facilities and from limited treatment of both commercial and residential waste water.
- Environmental policy at the provincial and local levels is still driven by guidance from Beijing. It is unlikely you will be exposed to any environmental programs or policies at the local level that are unique to the area.
- Guilin is heavily dependent on tourism, and thus has put a special emphasis on "Washing the Face of the Li River," meaning dredging, removing pollutants and preventing industrial facilities (especially sugar and paper mills) from dumping untreated waste into the river.

Background

Guilin is a beautiful city in a region of environmental challenges typical of much of China, with one exception. In Guilin, due to its tourist value, air quality has received greater action than in other provinces.

The Province of Guangxi is, as a whole, relatively backwards environmentally compared to other provinces. Only 0.3% of its GDP ($75 million) was spent on environmental issues in 1996-1997. An increase to 1% was projected for 1998, and this may provide an opportunity for U.S. firms to enter this market via technology cooperation and/or equipment exportation.

The region is a significant industrial center, leading the nation in production of zinc and cane sugar, as well as producing a variety of other industrial outputs.

PRELIMINARY WORKPLAN
Urban Air Quality Monitoring Project
Between the State Environmental Protection Administration
of the People's Republic of China
and the Environmental Protection Agency
of the United States

OBJECTIVES:

1) Provide training and assistance to Chinese national and municipal officials in designing their sampling network in eleven cities
2) Provide training and assistance in designing real-time data capabilities for air quality and meteorological measuresments
3) Provide training and assistance in developing a pollution source database
4) Establish an exchange of technical information and non-proprietary software to allow the Chinese to access knowledge necessary to conduct urban air quality forcasting for ozone, total suspended particulates, and nitrogen dioxide
5) Provide technical information and non-proprietary software for urban air quality simulation models for ozone, total suspended particulates and nitrogen dioxide to predict the effects of pollution controls

This technical assistance will be implemented through a partnership between U.S. Environmental Protection Agency, U.S. Department of Commerce, the State of California Air Resources Board, the National Association of State Development Agencies, and the U.S. private sector.

ACTIVITIES:

A. Training in the U.S. for eight PRC national and municipal officials to include:

- 8-day course in Glendale, California to gain understanding of the specific air monitoring instrumentation to be deployed in the eleven cities, including troubleshooting, repair and maintenance skills.

- 5-day course at California Air Resources Board in Sacramento, California to obtain field operations and data handling training, training in forecasting and modeling, and data base management training.

- 2-day course at USEPA, Research Triangle Park, North Carolina, to obtain information and experience on U.S. national program requirements.

B. Technical assistance missions to China by California State officials and their associates who are nationally recognized experts in air quality monitoring. The purpose of these missions will be to provide on-site station evaluation on siting and operation and to provide hands-on training in field operations and data uses for forecasting and modeling. This will include up to three 15-day trips of two experts.

TIMELINE:
Work on this project will commence no later than October, 1998. Timing of training courses and trips will be determined through consultations between parties.

Letter of Intent

On Urban Air Quality Monitoring Project
Between
The State Environmental Protection Administration
of the People's Republic of China
and
The Environmental Protection Agency
of the United States

BEIJING, CHINA

The State Environmental Protection Administration (SEPA) of the People's Republic of China and the Environmental Protection Agency (USEPA) of the United States (hereinafter referred to as "Parties"),

Based on the principles and goals for cooperation initiated by the U.S.-China Forum on Environment and Development, and the priorities for cooperation identified in the U.S.-China Energy and Environment Cooperation Initiative confirmed and supported by the state leaders of the two countries,

In line with the principle of mutual benefit and reciprocity, and supporting the goals of cooperation on science, technology, and trade in the area of urban air quality monitoring and management, announce their intent as follows:

I. SEPA intends to implement the Demonstration Project for China Major Cities' Urban Air Quality Monitoring and Reporting, i.e. the Phase I U.S.-China Urban Air Quality Monitoring Cooperation Project, and intends to purchase automatic air quality monitoring equipment made by U.S. enterprises for eleven cities in this project, with the potential for financial support from the U.S. Export-Import Bank under the most comprehensive financial terms permitted under standard OECD rules and Ex-Im Bank programs and policies.

II. USEPA intends to provide grant funds as authorized by law totaling $145,000 to support the implementation of the above-mentioned project. In conjunction with this grant, USEPA intends to provide technical assistance and personnel training to SEPA for the establishment of the major cities air quality monitoring and reporting systems, as specified in the attached Workplan. In addition, USEPA intends to provide relevant non-proprietary software and technical information to support this project.

III. After satisfactory cooperation in the two areas mentioned above, the Parties intend to implement Phase II of the U.S.-China Urban Air Quality Monitoring Project. SEPA intends to continue to purchase automatic air quality monitoring equipment made by US enterprises with the potential for financial support from the U.S. Export-Import Bank under the most comprehensive financial terms permitted under standard OECD rules and Ex-Im Bank programs and policies. The Parties intend to cooperate with other departments, as appropriate, to provide additional technical assistance to the enterprises involved in this project based on the needs of the enterprises and the availability of resources of the Parties to promote the implementation of Phase II of the U.S.-China Urban Air Quality Monitoring Cooperation Project.

Representative of
State Environmental Protection
Administration of the People's
Republic of China

_____June, 1998

Carol M. Browner
Administrator
United States
Environmental Protection Agency

_____June, 1998

Attachment

DRAFT

Energy and Environment: Opportunities for Biomass Energy in China

Proposed sentences for POTUS speech:

The Department of Energy has been working with China's Ministry of Agriculture to develop biomass energy technologies, which produce electricity and high value fuels from agricultural, forestry, and municipal wastes. Biomass energy can generate income for rural farmers who produce the feedstock, for rural industry that converts the feedstocks into valuable fuels and electricity, and for rural communities that can use this energy to improve their productivity and quality of life.

Biomass energy can also provide important environmental benefits. Converting agricultural wastes to electricity or fuels can reduce open air burning and the intense air pollution that comes with it. Using these wastes to produce electricity reduces the amount of coal that must be burned; this can reduce air pollution and also cut carbon emissions, which contribute to global warming.

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Energy and Environment: Opportunities for Biomass Energy in China

Biomass resources—agricultural and forestry residues—account for roughly one-third of China's rural energy consumption; and 70% of the population lives in rural areas. Most of this biomass is burned for cooking and heating, but some is also utilized in rural industries; increasingly, biomass is burned in the fields to dispose of it and/or kill crop pests, resulting in extensive air pollution. Advanced energy technologies can instead efficiently and cleanly convert these biomass energy resources into valuable fuels and electricity. Biomass energy can then generate income for rural farmers who produce the feedstock, for rural industry that converts the feedstocks into valuable fuels and electricity, and for rural communities that can use this energy to improve their productivity and quality of life. Biomass energy can also provide important environmental benefits. Converting agricultural wastes to electricity or fuels can reduce open air burning and the intense air pollution that comes with it. Using these wastes to produce electricity reduces the amount of coal that must be burned; this can reduce air pollution and also cut carbon emissions, which contribute to global warming.

To promote the effective use of biomass as an energy source, the Department of Energy (DOE) is currently engaged in ongoing cooperative projects with China's Ministry of Agriculture (MOA), as described below. These collaborative projects contribute to the implementation of the US/China Energy and Environment Cooperation Initiative signed in November, 1997.

1. **Exchange of experts on methane-producing anaerobic digestion**. Anaerobic digestors produce methane from animal or plant wastes, which can be used for cooking, heating or electric power generation. By anaerobically digesting animal wastes, this technology addresses some of the environmental challenges of disposing of these high chemical and biological oxygen demand wastes which can damage water ways, while simultaneously improving the fertilizer value and reducing the pathogen content of the digested manures. Improper disposal of animal wastes has been a significant problem in the United States and the U.S. can learn from the Chinese operational experience. This activity will bring together U.S. and Chinese experts at a workshop in China to exchange information, study technology, and define potential business relationships.

2. **Cofiring of straws and stalks with coal**. The increasing surplus of agricultural residues and their disposal by field burning is causing environmental problems. In provinces that have extensive coal fired electricity generation and also have large industrialized grain production, the U.S. can provide technical experts to work with the Ministry of Agriculture to evaluate biomass cofiring in candidate coal-fired power plants.

3. **Village scale biomass thermal gasification power generation project**. Ongoing work is focused on village scale biomass gasifiers and coupling them to Stirling engines or other systems. Feasibility analyses are continuing. The United States encourages support for rural electrification using biomass power systems, including technology assessment of thermal gasification power systems, prefeasibility analysis of potential projects, and socio-economic analysis—including assessment of community needs and interests.

4. **Research on biomass resource availability for energy use**. DOE and MOA have completed the first volume of a major study on biomass with additional volumes to be completed later in the year. These and other results can be incorporated into a Geographic Information System with exchanges of experts for system development and training. Life cycle analysis of environmental impacts can also be developed.

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Additional background: Opportunities for Biomass Energy in Rural China

Bioenergy accounts for roughly 30% of Chinese rural energy consumption, serving the rural population who make up 70% of China's 1.26 billion people. Most of this bioenergy is used for cooking and heating with some used in rural industries known as TVEs (Township and Village Enterprises). As rural incomes have risen, use of fuelwood and straws and stalks from cereal and grain crops has declined as they have replaced their cooking fuel by kerosene, coal and LPG (liquid petroleum gases). In-field disposal of straw and stalks by burning has resulted in extensive air pollution. Joint work by China's Ministry of Agriculture (MOA) and the US Department of Energy (DOE) has been undertaken to develop accurate resource data and to develop technologies for clean efficient conversion of biomass into fuels or electricity to provide heat and electricity for rural populations. As an offset for fossil fuel use, bioenergy also reduces emissions of carbon into the atmosphere, reducing global warming. If these technologies can be successfully developed, this will increase rural incomes, replace fossil fuels, and provide clean and efficient energy for rural development.

1. Exchange of experts on methane-producing anaerobic digestion.

China's increasing demand for meat, and the expansion of agro-industries is creating a significant increase in effluents that have high oxygen demand and affect the quality of water courses and the environment if released without treatment. China has pioneered the use of anaerobic digestion at the household level to treat human and animal excreta; there are over 5 million domestic units in use. Increasing urbanization and the intensification of chicken, pork and beef production has resulted in the development of larger units, with currently over 600 facilities of medium and large scale in use at poultry farms, breweries and dairy feedlots. The product gas from these anaerobic digestors is used for the industrial process, or piped to houses and institutions for use in cooking. While China has made impressive progress in this area, they recognize that developments elsewhere could help them improve their designs by reducing the initial investment and improving the operational performance. The US has advanced controls, sensors and liquid-solid separation technologies that could be of benefit as well as experience with the different types of wastes that modern industrial societies generate - especially the anaerobic conversion of municipal solid waste streams. The USA has built a large power generation industry based on the use of landfill gas. This is the same gas generated by anaerobic digestors. Continued dialogue between Chinese and US experts will open the way to benefits to both countries: the United States bringing advanced technology and the Chinese operational experience to the discussions. In the United States, adoption of some of the design and operational aspects of China's technologies could reduce the cost and increase the accessibility of anaerobic digestion as a pollution prevention technology and energy source especially in the intermediate size ranges. Joint ventures could result in markets for anaerobic digestion technologies in other countries with similar challenges.

2. Co-firing of straws and stalks with coal.

The straw resource of China has been evaluated in the joint MOA and DOE study with projections out to 2010. There is currently an excess supply of straws and stalks which is expected to change very little over the next two decades as grain production is expected to increase with population growth. In the NE provinces and Shandong province the surplus is mainly of corn stalks and wheat straw which is generated in a modern agriculture with extensive use of mechanization. The region is also one in which there is large scale power production from coal. The use of straws and stalks could offset coal use and remove a source of environmental pollution due to field burning of the straw after harvest. In the United States, co-

firing of biomass with coal has been demonstrated to be an effective way of utilizing woody biomass at very high efficiency and offsetting sulfur emissions and reducing fossil fuel carbon dioxide emissions. An increasing number of coal power plants are starting to use biomass co-firing in the United States, and studies are underway to use switchgrass, a crop similar to straws and stalks in co-firing. An evaluation of the Chinese coal burning technology and an assessment of regional straw and stalk availability will allow China's planners to consider the use of straw and stalk co-firing in the Northern provinces.

3. Village scale biomass thermal gasification power generation project.

The joint MOA and DOE studies of the resource base for biomass and bioenergy has also included an evaluation of promising technologies for rural development. These range from the applications of anaerobic digestion through to concepts of Trigeneration in which the biomass would be used to fuel a central facility in a village or industry to provide electricity, gas for cooking, and space and process heat. Early assessments from social surveys of this approach—anaerobic digestion at a central facility and distribution of gas to the community—show that this concept would be well received by consumers. China has developed a thermal gasification system that would serve villages and TVEs with gas from straws and stalks in a similar way. Demonstrations of this concept are underway in many villages in Shandong province. Increasing the capacity of the Shandong systems and producing electricity from small scale high efficiency conversion devices such as internal combustion engines, Stirling engines, small gas turbines, and fuel cells would create the Trigeneration opportunity using the engine waste heat for water and space heating, with very high efficiencies. The United States is developing many of these advanced systems and has a program in small modular generation from biomass. Preliminary discussions on the use of Stirling engines has shown that there are many commercial and intellectual property issues to be resolved, before joint development of village scale biomass power systems will be feasible. While these issues around advanced technologies are addressed, demonstration and evaluation of the concept using available internal combustion engine systems could create a large scale market for village systems using biomass. This would increase the availability of clean power and heat in rural areas.

4. Research on biomass

The MoA/DOE biomass bilateral cooperation under the Energy Efficiency and Renewable Energy Protocol will be published in three separate reports, including 1) Biomass Resource Report, now being completed, 2) Biomass Technology Report, and 3) Biomass Energy Strategy. Each report will be published jointly with covers from China and the USA and with a bilingual text. Because of the large amount of tabular data and the size of the biomass resource data base, reports will also be published in a CD-ROM version, which will be updated as reports become available. This is an important study that can lay the foundation for much broader and more efficient and effective use of biomass energy in the future.

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Energy and Environment: Opportunities for Renewable Energy in China

Proposed Sentences for POTUS Speech:

Renewable energy technologies convert sunlight, wind, and agricultural waste into clean efficient electricity and heat. These technologies offer important benefits for both China and the United States. These technologies have improved dramatically in performance and dropped in cost over the past two decades. Now they are often the lowest cost source of electricity in rural areas. They can provide light and communications for households, helping rural people come into closer contact with the world community. They can provide electricity and heat for rural industry, contributing to rural economic development and slowing migration to crowded urban areas. These technologies are clean, offsetting air pollution and greenhouse gas emissions by the use of fossil fuels. These energy resources are locally available, potentially reducing oil imports. By developing these technologies, the foundation can be laid for a clean sustainable energy future.

I am pleased to announce that the United States is doubling its joint activities with China in the area of renewable energy development, from $500K to $1 million for this year. We look forward to working with the Chinese in this important area of technology development.

DRAFT ONE PAGER

Energy and Environment: Opportunities for Renewable Energy in China

Renewable energy technologies convert sunlight, wind, biomass (e.g. agricultural and forestry residues), geothermal energy (heat energy inside the earth), and other renewable energy resources into electricity and heat. These technologies have improved dramatically in performance and dropped in cost over the past two decades. Now they are often the lowest cost source of electricity in rural areas. They can provide light and communications for households, helping rural people come into closer contact with the world community. They can power rural industry, contributing to rural economic development and slowing migration to crowded urban areas. These technologies are clean, offsetting air pollution and greenhouse gas emissions generated by the use of fossil fuels. These energy resources are locally available, potentially reducing oil imports. By developing these technologies, the foundation can be laid for a sustainable energy future. Highlights of bilateral cooperation activities in renewable energy include:

- Installation of 600 photovoltaic solar home systems for remote households and schools in Gansu Province by the end of 1998 (currently 50% complete). The Ministry of Agriculture is now developing a 10,000 solar home system expansion of this project in western China; DOE is providing technical assistance.

- Analysis of the comparative technical performance and economics of renewable and fossil fuel options for remote household and village power applications in the Inner Mongolia Autonomous Region of China. A PV/wind hybrid pilot project is being implemented involving 240 households. This pilot project is being integrated into an 80,000 household rural electrification program.

- Development of a biomass resource data base, with the first report to be published in June, 1998, and ongoing development of village-scale thermal gasification energy systems using Chinese biogasifiers and advanced U.S. electric generating technologies.

- Training programs at NREL and other organizations for Chinese engineers in wind energy technologies for grid-connected and village minigrid applications.

- Wind resource mapping in several regions of China and technical assistance in assessing and improving wind resource measurement and monitoring techniques in China.

- Implementation of a 40 kW wind/diesel pilot hybrid village power project for rural electrification on the island of Shao Qingdao on the southern coast of Shandong Province.

- Technical assistance on geothermal drilling technology for power plants, geothermal ground-source heat pump technology, electric vehicle development, and solar thermal electric power applications.

In addition to these activities, the U.S. DOE has also been engaged in business development activities in China in support of the U.S. renewable energy industry. Such activities are currently focused on generating information on the business climate, project opportunities, companies interested in pursuing business opportunities, and market information in China for distribution in the United States. DOE and the Chinese State Economic and Trade Commission have also collaborated to develop renewable energy policy initiatives for China and to provide technical assistance to the World Bank and the United Nations Development Program in their renewable energy project development activities in China that include support for capacity building and financing for renewables.

DRAFT FACT SHEET

Energy and Environment: Opportunities for Renewable Energy in China

Bilateral Cooperation Between the U.S. Department of Energy and Chinese Agencies (June, 1998)

In February 1995, the Secretary of the U.S. Department of Energy (DOE), Hazel O'Leary, and the Chairman of the Chinese State Science and Technology Commission (now the Ministry of Science and Technology (MOST)), Song Jian, signed the Energy Efficiency and Renewable Energy Protocol agreement. This Protocol established bilateral cooperation between the United States and the People's Republic of China in the fields of energy efficiency and renewable energy. Under the Protocol, DOE and several Chinese agencies have been actively pursuing a number of renewable energy projects for the past four years. In October 1997, Secretary Frederico Peña in the U.S. Department of Energy signed the U.S.-China Energy and Environment Cooperation Initiative with Mr. Zeng Peiyan, now the Chairman of the Chinese State Development Planning Commission (SDPC) in Beijing. This initiative further strengthens the commitment for bilateral cooperation between China and the United States for renewable energy development, particularly related to rural energy development and the mitigation of environmental pollution and greenhouse gas emissions.

The Energy Efficiency and Renewable Energy Protocol has resulted in six project annexes in the following fields: 1) rural electrification coordinated by the Chinese Ministry of Agriculture (MOA); 2) renewable grid-power development, focusing on large-scale wind power, coordinated by the Chinese Ministry of Electric Power (MOEP), now the State Power Corporation of China (SP); 3) renewable energy business development, including technical support for financing activities, coordinated by the Chinese State Economic and Trade Commission (SETC); 4) energy efficiency, coordinated by the Chinese State Development Planning Commission; 5) electric vehicles, coordinated by the Chinese Ministry of Science and Technology; and 6) geothermal energy, coordinated also by the Chinese Ministry of Science and Technology. On the U.S. side, several of DOE's national laboratories are involved in these annex activities, with the National Renewable Energy Laboratory in Golden, Colorado supporting renewable energy projects.

In the field of rural electrification, some highlights of bilateral cooperation activities are:

- Cooperation with the Solar Electric Light Fund (SELF) in Washington, D.C. and the MOA in a solar home system project in Gansu Province, involving the installation of 600 photovoltaic solar home systems for remote households and schools by the end of 1998 (currently 50% complete), and support for capacity building to develop sustainable mechanisms to help China achieve poverty alleviation goals. The U.S. is providing equipment and technical assistance for the project. The Ministry of Agriculture is now developing a 10,000 solar home system expansion of this project in western China and DOE is providing technical assistance in the design of this expanded project.

- A rural electrification options analysis in cooperation with government agencies and companies in the Inner Mongolia Autonomous Region (IMAR) of northern China, assessing the comparative technical performance and economics of renewable and fossil fuel options for remote household and village power applications. Currently, a PV/wind hybrid pilot project is being implemented in Inner Mongolia involving 240 households, in which DOE is cost sharing with U.S. equipment and technical assistance contributions. This pilot project is being integrated into an 80,000 household rural electrification program in IMAR.

- A biomass resource data base has been developed for agricultural, animal, and MSW biomass resources in China with the MOA, with the first report to be published in June, 1998. A specific objective of the biomass collaboration is the development of village-scale thermal gasification energy systems using Chinese biogasifiers and advanced U.S. electric generating technologies. The collaboration also involves technical assistance from the U.S. in developing strategies for the more efficient use of biomass resources in China for rural energy applications and to mitigate pollution, which is currently a very high priority in the Chinese government.

In the field of renewable energy grid-power development, a major focus has been on supporting large-scale wind farm development in China. The U.S. Department of Energy has been active in playing an advocacy role on behalf of the U.S. wind energy industry, which has developed a number of wind projects in China assisted by U.S. Export-Import Bank financing. Some recent bilateral cooperation activities include:

- A training program at NREL and other organizations for Chinese utility wind power engineers to gain experience in using utility models to assess technical and economic characteristics of utility-interconnected wind systems. A training program at NREL for Chinese engineers in the use of hybrid power engineering design and cost models for village mini-grid and grid-assisted systems.

- Wind resource mapping in several regions of China in collaboration with the Environmental Protection Agency and DOE in the U.S. and the SP in China and technical assistance in assessing and improving wind resource measurement and monitoring techniques in China.

- Current implementation of a 40 kW wind/diesel pilot hybrid village power project on the island of Shao Qingdao on the southern coast of Shandong Province in collaboration with the SP in Beijing and the local utility company in Shandong for remote village applications on coastal islands that are associated with provincial electrification plans.

- The U.S. DOE is also cooperating with the MOST in Beijing in providing technical assistance related to geothermal drilling technology for power plants and geothermal ground-source heat pump technology, electric vehicle development, and solar thermal electric power applications.

The U.S. DOE has also been engaged in business development activities in China in support of the U.S. renewable energy industry. Such activities are currently focused on generating information on the business climate, project opportunities, companies interested in pursuing business opportunities, and market information in China for distribution in the United States. DOE and the Chinese State Economic and Trade Commission have also collaborated to develop renewable energy policy initiatives for China and to provide technical assistance to the World Bank and the United Nations Development Program in their renewable energy project development activities in China that include support for capacity building and financing for renewables. DOE has also assisted Chinese delegations which have visited the United States and has led U.S. missions to China in support of renewable energy bilateral cooperation and business development.

DOE has also provided support and technical assistance to China in activities that support development of environment and global climate change initiatives through the U.S. Country Studies Program. This program has collaborated with Tsinghua University in Beijing to develop a greenhouse gas (GHG) inventory in China and mitigation proposals for GHG reduction. DOE has extended its collaboration with the Asia Pacific Economic Cooperation (APEC) renewable energy working group to include support of projects in China.

China Trip Enviro Deliverables 6/19 mtg

(1) Energy + Env. Initiative

Ex Im Loans - energy related projects (illustrative list)

Commercial projects

- monitoring (AQ) - US supplier → Daley event
- 3 coal projects - US powerplant equipment supplier → "cleaner" would meet U.S. stds more efficient, scrubbers
- ARCO coalbed/methane project (capture methane)

Oil + Gas Forum - promote nat. gas

GCC talks - will make agreement for future talks

Biomass - exchange of experts on anaerobic digestion + control of animal waste
co-firing of ag waste + coal
biomass resource availability study
village scale biomass gasification engine to supply electricity

Statement on a demo energy efficient bldg in Beijing (AIJ project)

DOE China Renewables budget up from $0.5b → $1b

[Henry Kelly → LBC assessment of bldg → China 1/4 US, 1/2 Russia in efficiency]
→ lg defo, opportunities for sinks

GEF - funding energy efficient refrigerators (thru EPA)

(2)

Interior issues

CITES

MMS coop agreement on oil royalties + oil/enviro issues

pandas

GCC - econ effects of Kyoto } EPA proposal
co-control bens
Melinda - late July

United States Department of State

Bureau of Oceans and International Environmental and Scientific Affairs

Washington, D.C. 20520

May 8, 1998

OPTIONAL FORM 99 (7-90) FAX TRANSMITTAL # of pages ▶ 2

To Joe Aldy, CEA / Joe Huang, CSP — From Duncan Marsh

Dept./Agency — Phone # 647-4688

Fax # 395-6870 / 586-3485 — Fax #

NSN 7540-01-317-7368 5099-101 GENERAL SERVICES ADMINISTRATION

UNCLASSIFIED

MEMORANDUM

TO: Energy - Abe Haspel OK
Energy - Denise Dwyer
CEA - Joe Aldy/Randy Lutter
EPA - Clare Breidenich/Jane Leggett
EPA - Marianne Bailey
Commerce - Jane Siegel/Don Forest /Eric Beal
OVP - John Norris OK
OSTP - Deanna Behring
CEQ - David Sandalow OK
CSP - Joe Huang
State/S/P - Alan Remberg
State/EAP/CM - Susan Ruffo
State/G - Nigel Purvis OK
State/E - Anne Pence OK Peter Bass OK
State/EB - Victoria Greenfield
State/L/EAP - Jim Hergan OK
State/L/OES - Sue Biniaz

FROM: State/OES/SEI - ~~Bill Dilday~~ Duncan Marsh
Tel: (202) ~~736-7374~~ 647-4688
Fax: (202) 647-~~2746~~ 0191

FOR ACTION BY COB TODAY, FRIDAY, MAY 8TH

Per the attached note, your clearance/comment is requested on the attached paper outlining possible projects to be proposed ~~new~~ next week by State/EAP's Susan Shirk and NSC's Sandy Kristoff to Chinese officials on building a climate change partnership.

Your immediate attention is appreciated.

Attachment

Proposed Projects to Build a Climate Change Partnership with China

The following actions would help to build a U.S.-China partnership to address climate change, and lay a foundation for more aggressive climate action by China. If the existence of legal authority and sufficient funding can be ensured, we can propose these projects to China as possible deliverables for the Presidential Summit in late June.

- Establish a joint climate change research program. The program could:
  - A. As an initial step, undertake a joint economic modeling effort to analyze the implications for China of the Kyoto Protocol's market-based mechanisms. [EPA and CEA are performing such analysis, and the U.S. Country Studies Program may be prepared to support such joint research.]
  - B. Evaluate the greenhouse gas reduction benefits of existing environmental and energy efficiency programs in China, and of stronger incremental efforts. The Department of Energy has initiated such an evaluation and, with the U.S. Country Studies Program, has proposed to expand the work into a joint effort with China.
  - C. Work with Chinese health and environmental experts to apply a new template for linking energy, environmental and public health analyses to one or more highly polluted major urban areas. This would include development of relevant emissions, concentrations and exposure data sets and the evaluation of business-as-usual and alternative energy scenarios to estimate the local health, environmental and economic impacts of alternative energy and GHG emission scenarios. EPA is exploring possibilities for such a study with contacts in the Ministry of Science and Technology and the Environmental Protection Administration.

- Propose an energy efficiency and renewable energy technology trade mission to China. The Chinese have made clear that technology transfer is important to their ability to pursue climate change strategies. A trade mission would emphasize the commercial viability and sustainability of clean technologies. This mission might be pursued under the US-China Environment and Development Forum or the US-China Energy and Environment Initiative.

- Assist China in implementation of its new Energy Conservation Law. The U.S. Department of Energy has offered to provide such assistance, and a delegation of USG agencies, electric utilities and NGOs has already traveled to Beijing to share their expertise.

ENVIRONMENT ISSUES FOR CHINA PNTR

Background

Principals would like to consider options for addressing potential concerns in the Congress and the public related to the environmental aspects of the China PNTR vote. This issue has three related, but separable components:

- Potential environment issues related of the U.S./China WTO accession agreement (hereafter "accession agreement") itself; and,
- Potential environment issues related to extension of PNTR to China; and,
- Environmental issues in the broader USG dialogue with China.

In November, 1999, President Clinton issued Executive Order 13141, which lays out U.S. policy on environmental reviews of trade agreements. The order is prospective in nature and establishes the basic framework for a process for ongoing assessment and written review of major trade agreements as they are being negotiated. Pursuant to the order, implementation guidelines are being developed by USTR and CEQ. This process is scheduled to conclude in June, 2000.

A copy of the order is attached. The order EO is silent on whether accession agreements per se shall be reviewed, however it sets up a decision rule and criteria for making such a determination and includes a presumption that most trade agreements not categorically included for review shall not be subject to review.

However, the accession agreement was concluded prior to the issuance of the order. This fact combined with the prospective intent of the order means that any form of environmental review of the accession agreement should not be conducted under the order's requirements.

Nevertheless, should the Administration wish to compile and make available information pertaining to environmental issues related to the accession agreement or the Congressional designation of PNTR status for China, certain other options are available. As a strategic matter, the question of whether to make such information available should also be considered. To a limited degree, Administration officials have already made informal overtures to the leadership of the environmental community to

ask them not to oppose the agreement/PNTR vote and to consider the broader benefits of further engagement with China, which would likely serve to bolster cooperation on global environment issues. At this stage, only one national environmental organization, Friends of the Earth, has indicated opposition to the vote. Some environmental leaders may be prepared to give limited validation to broader U.S. engagement with China in the context of the upcoming vote. Most appear likely to remain unengaged in the debate.

Another strategic point to consider is that many environmental organizations have the option of viewing the accession agreement in terms of trade/environment policy or in terms of broader environmental policy engagement with China. Many organizations recognize that engagement with China on issues such as global climate change is of paramount importance.

Option 1. Take no additional steps to compile information or prepare a report or environmental review.

Pros:

- The environmental community is not mobilized on these issues. Taking no additional steps avoids raising expectations of engagement and additional concessions to address environmental concerns.

Cons:

- Leaves the Administration unprepared should concerns arise.

Option 2. Assemble background information on the agreement's provisions, relevant environmental concerns as they might arise as well as information related to broader U.S./China environmental cooperation.

Pros:

- Prepares the Administration to address these issues should they arise.

Cons:

- Would require allocation of staff resources at Commerce, USTR and State and other agencies to compile information.

Option 3. Commit to produce a report to Congress on the nature, scope and importance of broader U.S./China cooperation on environmental issues.

Pros:

- Would proactively address these issues;

- Would frame environmental issues in the context of our overall U.S./China relationship.

Cons:

- Could encourage the environmental community to become more actively engaged and lead to questions about the adequacy and methodology for the report.

- By not analyzing the environmental implications of the accession agreement per se, this could highlight that the Administration did not actively seek to address environmental issues or engage the environmental community during negotiation of the agreement;

Option 4. Commit to produce a report that analyzes the environmental implications of the accession agreement per se.

Pros:

- Responds directly to any question about the environmental impacts of the agreement.

Cons:

- Sets up a dynamic with the environmental community where they will engage on the methodology of the study and the lack of proactive engagement on environment issues during negotiations.

November 16, 1999

EXECUTIVE ORDER 13141 - ENVIRONMENTAL REVIEW OF TRADE AGREEMENTS

By the authority vested in me as President by the Constitution and the laws of the United States of America, and in order to further the environmental and trade policy goals of the United States, it is hereby ordered as follows:

Section 1. Policy. The United States is committed to a policy of careful assessment and consideration of the environmental impacts of trade agreements. The United States will factor environmental considerations into the development of its trade negotiating objectives. Responsible agencies will accomplish these goals through a process of ongoing assessment and evaluation, and, in certain instances, written environmental reviews.

Sec. 2. Purpose and Need. Trade agreements should contribute to the broader goal of sustainable development. Environmental reviews are an important tool to help identify potential environmental effects of trade agreements, both positive and negative, and to help facilitate consideration of appropriate responses to those effects whether in the course of negotiations, through other means, or both.

Sec. 3.
(a) Implementation. The United States Trade Representative (Trade Representative) and the Chair of the Council on Environmental Quality shall oversee the implemen-tation of this order, including the development of procedures pursuant to this order, in consultation with appropriate foreign policy, environmental, and economic agencies.
(b) Conduct of Environmental Reviews. The Trade Representative, through the interagency Trade Policy Staff Committee (TPSC), shall conduct the environmental reviews of the agreements under section 4 of this order.

Sec. 4. Trade Agreements.
(a) Certain agreements that the United States may negotiate shall require an environmental review. These include: (i) comprehensive multilateral trade rounds; (ii) bilateral or plurilateral free trade agreements; and (iii) major new trade liberalization agreements in natural resource sectors. (b) Agreements reached in connection with enforcement and dispute resolution actions are not covered by this order. (c) For trade agreements not covered under subsections 4(a) and (b),

environmental reviews will generally not be required. Most sectoral liberalization agreements will not require an environmental review. The Trade Representative, through the TPSC, shall determine whether an environmental review of an agreement or category of agreements is warranted based on such factors as the significance of reasonably foreseeable environmental impacts.

Sec. 5. Environmental Reviews. (a) Environmental reviews shall be: (i) written; (ii) initiated through a Federal Register notice, outlining the proposed agreement and soliciting public comment and information on the scope of the environmental review of the agreement; (iii) undertaken sufficiently early in the process to inform the development of negotiating positions, but shall not be a condition for the timely tabling of particular negotiating proposals; (iv) made available in draft form for public comment, where practicable; and (v) made available to the public in final form. (b) As a general matter, the focus of environmental reviews will be impacts in the United States. As appropriate and prudent, reviews may also examine global and transboundary impacts.

Sec. 6. Resources. Upon request by the Trade Representative, with the concurrence of the Deputy Director for Management of the Office of Management and Budget, Federal agencies shall, to the extent permitted by law and subject to the availability of appropriations, pro-vide analytical and financial resources and support, including the detail of appro-priate personnel, to the Office of the United States Trade Representative to carry out the provisions of this order.

Sec. 7. General Provisions. This order is intended only to improve the internal management of the executive branch and does not create any right, benefit, trust, or responsibility, substantive or procedural, enforceable at law or equity by a party against the United States, its agencies, its officers, or any person.

WILLIAM J. CLINTON
THE WHITE HOUSE,
November 16, 1999.

DRAFT

Dear Mr. Premier:

China's bold decision November 15 to undertake wide-ranging commitments to enter the World Trade Organization opens the prospect of a 21st century of unprecedented prosperity for the people of China, the United States and the rest of the world. I would like to propose that we embark on an equally bold and ambitious program to redefine, together, how we can balance the goals of economic growth and a clean environment.

The U.S.-China Forum on Environment and Development that you and I co-chair provides an invaluable venue for advancing cooperation that leads to clean economic growth. Two areas in particular -- clean energy and scientific cooperation -- merit our best efforts at the upcoming third session of the Forum in Hawaii.

Strengthening our bilateral clean energy cooperation can further address the threats caused by air pollution and climate change, improve public health, and spur investment in more efficient production technologies. Our science and technology cooperation is advancing joint understanding on a broad array of issues, including fresh water management. Water resource management affects everything from more efficient and cost effective usage in agriculture and industry to basic hygiene and drinking water. We have held a number of useful exchanges on both energy and water issues since the April session of the Forum, and I am pleased that our delegates will continue these discussions in Hawaii.

I am strongly committed to making progress on implementing the Clean Energy Program that was signed in April, and thus open the door for greater trade in environmental technologies. U.S. companies -- which possess world-class technologies to control and, in some cases, virtually eliminate air and water pollution -- are prepared to share information and provide equipment and services. I am confident that their increased commercial participation would contribute significantly to China's already considerable achievements to reduce pollution.

I also hope that at the next meeting of the Forum our governments can discuss common approaches to the Clean Development Mechanism and other initiatives that could promote private sector investment in clean energy projects

in China. I also look forward to discussions among our experts on the paper we sent you concerning market-based mechanisms to control the rate of greenhouse gas emissions.

Clean air and water are, of course, not possible without a strong, scientifically-based system of environmental laws and regulations. At the Forum, I hope we can share experiences in formulating and enforcing effective environmental laws.

Few challenges in the 21st century loom larger than ensuring clean economic growth. We will need steadfast commitment, strong leadership, and active cooperation between governments, academics, business people, and concerned citizens in pursuit of this goal.

I am confident that we can meet this critical challenge and look forward to reviewing the results of a successful third session when our delegations conclude the meeting in Hawaii.

Sincerely,
Al Gore

Memorandum

Date: July 1, 1999

To: Joe Kruger

From: Stephanie Benkovic

Re: Micro China Trip Report...A Full Report Will Follow

- Meetings in Beijing with China's State Environmental Protection Administration (SEPA) were successful and work is proceeding by both EPA and SEPA on the US-China feasibility study on the use of market mechanisms to achieve SO_2 emissions reductions in China. Both EPA and SEPA are pleased with the progress made during the week.

- SEPA offered additional ideas for the overall scope of the project which we discussed and reviewed during the week (attached, though still draft). The scope now includes additional components for capacity building and training on emissions trading for SEPA and other Chinese agencies. This scope is a fluid document and may change as we learn more about what data are available and what needs to be compiled or analyzed.

- The basic idea is to pool the US and Chinese experts together in a workshop to identify available data and prioritize data gaps. These discussions would form the seeds of an assessment report containing the "state of information" for all parameters that need to be examined to design an optimal SO_2 emissions trading program. After the assessment report, recommendations on the framework of an emissions trading program for SO_2 in China will be developed. Throughout this process there will be at least one additional workshop of the US and Chinese experts and perhaps a trip to the US by a group of Chinese for intensive training on emissions trading. More details are contained in the attached draft scope.

- We set a tentative date in early November (8,9 and 10) to hold a workshop in China to gather US and Chinese experts. SEPA has agreed to invite representatives from other Ministries to the workshop including: Ministry of Finance, State Development and Planning Commission, State Economic and Trade Commission, State Electric Power Corporation, Renmin University, and local Environmental Protection Bureaus. The Banks and other academics will be invited as well. Details are still under development.

- SEPA gave a series of presentations on current SO_2 related policies and arranged meetings with the following groups: the research arm of SEPA, Chinese Research Academy of Sciences (CRAES), the State Power Corporation, those responsible for some environmental and stack monitoring, and Renmin University. Renmin University is involved in some of the pilot emissions trading programs currently ongoing in China.

Feasibility Study on the Use of Market Mechanisms to Achieve Sulfur Dioxide Emissions Reductions in China

DRAFT

Work Plan[1]

Task 1: Sino-U.S. SO_2 Emissions Trading Workshop

1. Workshop Content

Topics for U.S. Side:

A. Detailed presentation of the U.S. SO_2 trading program by the U.S. EPA.

1. Description of the fundamental framework of the national SO_2 emissions trading program.

2. Lessons learned in implementing and managing the trading program.

3. Results of the program to date including emissions reductions and trends, the environmental results, actual costs compared with original projections, trading trends, and other economic factors.

B. Presentation by U.S. electric utility on participating in the SO_2 trading program.

1. Discussion of compliance options, e.g., scrubbers, fuel switching, fuel blending, coal cleaning, etc.

2. Discussion of how compliance decisions are made under a market-based emissions trading system.

3. Case studies of cost savings from the trading program.

C. Presentation by coal market expert on the interaction of coal markets and the SO_2 trading program.

1. The role of U.S. railroad deregulation in SO_2 compliance.

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[1]Modeled on content originally outlined in documents received from the U.S. EPA, with additional content from Chinese counterparts.

2. The integration of coal and SO_2 allowance markets.

D. Presentation on the role of emissions brokers and traders in the SO_2 market.

Topics for Chinese side:

A. China SO_2 control strategy.

1. SO_2 pollution situation and related effects.

2. Two control area strategy.

3. Total emissions control strategy.

B. Monitoring and management of source pollution in China.

1. Source pollution monitoring situation.

2. Source pollution monitoring equipment currently in use.

3. Source pollution reporting and emissions permits.

4. Source pollution reporting and emissions levies.

5. Environmental and ambient monitoring. [added by U.S. EPA]

C. SO_2 emissions control strategy for sources in China.

1. SO_2 emissions in the utility sector.

2. Key technology measures used for SO_2 control in the utility sector.

3. Total control strategy in the utility sector, and results of implementation.

4. Restructuring of the utility sector in China. [added by U.S. EPA]

5. SO2 emissions in the industrial source sector.[added by U.S. EPA]

D. Review of existing trading system pilots for air pollution in China.

Basic economic description of pilot cities.

2. Outline of pollution emissions trading pilots in China.

3. Existing issues/problems and recommendations.

E. China's SO_2 levy system.

1. Pollutant emissions levies.

2. Pilot trials for total emission levy for SO_2.

3. Reform of the pollution levy system, and trends in SO_2 levy development.

4. *Can SO_2 emissions trading and the SO_2 levy system coexist? How would existing levy revenue be replaced without a levy system? [added by U.S. EPA]*

2. Key Outputs:

- 2-day conference with presentations.
- 1-day workgroup meeting to identify available data and prioritize data gaps to fill. (Morning sessions in 3-4 small focused groups, afternoon meet together as larger group and share results of workgroup sessions.)

3. Key Sponsoring Organizations:

- U.S. EPA
- SEPA

4. Key Coordinator:

- Planning and Research Division (PRD) of the Chinese Research Academy of Environmental Sciences (CRAES).
- People's University.

5. Participants:

SEPA
Ministry of Finance (MOF)
State Development and Planning Commission (SDPC)
State Economic and Trade Commission (SETC)
State Electric Power Corporation and related enterprise representatives
Environmental Protection Bureau (EPB) representatives from current pilot cities (including Kaiyuan, Taiyuan, Liuzhou, Guiyang, Baotou, and Pingdingshan)
U.S. EPA
U.S. Energy experts
U.S. private sector representatives

6. Workshop Date:

November 8-10, 1999.

7. Workshop Location:

City of Kunming, Yunnan Province; or Beijing

Task 2: Capacity Building and Study of U.S. Pollution Emissions Trading

1. Key Content and Activities:

A. Study U.S. emissions trading.

1. Current understanding of the U.S. pollution emissions trading system among Chinese officials and experts is primarily academic, and most do not have a detailed hands-on understanding of the system. Therefore, a group will be sent to the U.S. to carry out a detailed hands-on study tour.

2. Study tour representation:

- 5-6 government officials
- 5-6 technical experts

3. Study content:

- U.S. emission allowance trading legal and regulatory framework.
- U.S. EPA role: operational procedures, specific operational realities, inspection and supervision.
- How to foster a market-based system.

4. Study location:

- Washington D.C. (proposed by U.S. EPA)

B. Translate and publish materials on the U.S. emission trading system's administration and operation.

1. Based on U.S. EPA recommendations, Chinese experts will translate 1-2 key publications relating to the U.S. emission trading system.

2. Under the direction of U.S. experts, compile training materials to be used by Chinese officials and experts.

2. Key outputs:

- Training of certain Chinese government officials and experts in U.S. emission trading practices.
- Training materials.
- Translated written materials.

3. Key Sponsoring Organizations:

- SEPA
- U.S. EPA

4. Key Coordinator:

- CRAES
- U.S. EPA

Task 3: Assessment of the Nature and Effects of SO_2 Emissions in China

1. Research Content

A. Scientific Issues

1. Review of available scientific research regarding the environmental effects of SO_2, sulfates and sulfate deposition in China, e.g.:

   - Human health effects, acidification, visibility loss, forest and agricultural damage, ground surface acidification, forest and agricultural damage; effects of acidic substances on sensitive and highly-sensitive aquatic and land-based ecosystems; and deposition levels necessary to achieve adequate protection for such systems.

   - materials damage: the role of acid rain and dry deposition of acidic particles in damage to buildings, cultural and automotive metals, stone, building materials, and paint; how dry deposition can increase protection and maintenance costs for buildings and other structures; a summary of the effects of acid rain in China, based on the results of Chinese scientific research.

   - human health impacts: through long-term tansport, SO_2 emissions can form sulfate aerosols which are a main component of inhalable particulates harmful to human health; research will be conducted under the project to evaluate human health impacts of SO_2, and evaluate the various control measures available and their ability to improve human health.

   - visibility impacts: sulfate aerosols are a major factor in visibility; research will be conducted under the project to evaluate visibility damage related to SO_2, and evaluate the various control measures available and their ability to improve visibility.

2. Examination of SO_2 emissions inventory in China, inventory methods, and projected future SO_2 inventory with and without control measures:

   - summarize China's SO_2 emission measurements, statistics and calculation methodologies.

   - calculate China's SO_2 inventory according to grid-based distribution. *[U.S. EPA note: a grid-based system will not be adequate for development of a viable emissions trading system. An inventory of actual sources will be essential.]*

   - Examination of the geographic distribution of SO_2 sources.

- estimate SO_2 emissions under both control and non-control scenarios.

3. Review of information regarding meteorological influences and SO_2 and sulfate transport distances and patterns:

   - SO_2 transport modeling research.
   - Source-receptor relationship.
   - Sulfate deposition.
   - Estimate emissions rate required if different zones/areas to meet critical load.

B. Technical/Economic issues

1. Survey available SO_2 control technologies, and cost of such technologies where available.

   - *Examine the effectiveness of different types of SO_2 control measures in reducing emissions. [added by U.S. EPA]*
   - Review SO_2 control technologies at large-size utilities.
   - Review of SEPA-led engineering pilot projects in SO_2 control technologies (e.g., emissions control technology for small boilers).
   - Review of SO_2 control technologies from abroad.

2. Analyses of costs and benefits of controlling SO_2 emissions for different source sectors.

   - Survey existing Chinese SO_2 control equipment and operation costs.
   - Estimate the costs of future SO_2 control equipment and operation.
   - Compare the costs of various control measures for various sectors with SO_2 emissions.

3. Discussion of the structure, operation and ownership of utility and large industrial sources and potential changes due to restructuring policies.

4. Examination of coal market and transportation issues.

5. Research and investigation of fuel substitution issues.

C. Institutional/Regulatory Issues

1. Examination of emissions measurement techniques:

- investigate foreign and domestic pollution monitoring
- developments/trends in measurement and monitoring equipment.

2. Assessment of the existing infrastructure for measuring, reporting and managing emissions data:

- estimate existing domestic capacities in terms of human resources, scientific instruments, communications, computing equipment, and organizational structure.

3. Review of the legal authority (federal versus provincial) and regulatory structure needed to ensure compliance with a trading program:

- what changes are recommended.

4. Review and evaluation of existing pilot programs for SO2 trading (e.g., People's University pilots undertaken on cooperation with the EDF).

2. *Possible follow-up workshop with U.S. and Chinese experts to review the results of the feasibility study research, prior to the formulation of the study report. [Added by U.S. EPA]*

3. Key Outputs:
- Feasibility report
- *Workshop event and proceedings document to accompany feasibility report. [Added by U.S. EPA]*

4. Schedule:

- Year 2000 and forward

5. Key Sponsoring Organizations:

- SEPA
- U.S. EPA

6. Key Coordinator:

- CRAES
- People"s University

6. Participants:

- Other U.S. and Chinese research organizations (e.g., People's University, etc.)
- May also include multilateral institutions and other financial sponsors

Task 4: Recommendations for an SO_2 Trading Pilot Program

1. Key Content

A. Recommendations for a Chinese pilot trading program would be developed in the following areas:

1. Key challenges to designing and operating an emissions trading program in China.
2. The geographic scope of the pilot trading program.
3. Emission source categories to include in trading program.
4. The type of trading mechanism to use (i.e., credits vs. allowances).
5. Emissions measurement methods.
6. Information management infrastructure.
7. Compliance and enforcement strategies.
8. The role of brokers and traders in the market.

9. Design of a strategy to assess the environmental and economic results of the pilot program.

B. Training workshop to publicize U.S. experience. [Moved from earlier section]

1. During the project, hold a one-week training course to train 50 people from relevant organizations about the U.S. experience.

2. Workshop to be led by Chinese experts who are both knowledgeable about the China SO_2 situation and participated in the U.S. trading system study.

3. Invite U.S. experts to China to provide additional training, to strengthen emissions trading work.

2. Key Outputs:

- Recommendations for pilot trading program

3. Schedule:

- End of 2000

4. Key Sponsoring Organizations:

- SEPA
- U.S. EPA
- Potential multilateral banks
- Potentially other private U.S. organizations

5. Key Coordinator:

- CRAES
- Other U.S. and Chinese research organizations

6. Implementation Structure and Responsibilities:

- SEPA and EPA will jointly develop recommendations for a pilot SO_2 trading program.

Climate Change
China Follow Up
May 6, 1999

State to organize an Annex 1 discussion on bilateral climate activity in China. (State to discuss in Bonn.)

State to pursue second high-level climate change dialogue with China. (Letter from U/S Loy sent to Chinese Environment Minister.)

State and White House to raise with OSTP the feasibility of a bilateral effort to predict the impact of climate change on China. (OES raised w/ OSTP May 6. OSTP to reply shortly.)

State to explore with USIA establishing a visitors program with a climate change focus.

State and Treasury to explore (i) concessional financing with Ex-Im Bank and (ii) opportunities for improved multilateral financing.

EPA to continue and possibly expand bilateral co-benefit climate change initiatives.

EPA and State to explore whether an approach on CDM that would highlight areas of agreement might prove fruitful.

DOE to assess where energy assistance could be most effectively targeted, such as industrial boilers.

CEA, with EPA and DOE, to explore further cooperation on economic modeling.

White House to explore letter from VP to Premier on the financial benefit to China of the flexibility mechanisms and, possibly, on China's unhelpful positions/actions in multilateral negotiations. (Might need to wait in light of recent events.)

Schwengels.Paul @ epamail.epa.gov
12/23/98 11:25:23 AM

Record Type: Record

To: dmarsh @ state.gov, BJEMBST @ public.bta.net.cn

cc: See the distribution list at the bottom of this message
Subject: Follow Up Letter on Climate Technical Work in China.

Duncan Marsh, please pass on to Susan Ruffo.

Thanks very much for your helpful comments and edits on the earlier draft of this letter. I am attaching the final version of the letter which I have sent by FAX.

I also want to respond to some of your questions and comments in this note.

1. The economic modeling project and workshop discussed is the same economic modeling project discussed and agreed to last June.

2. You were correct in pointing out that the original draft was not very clear about the EPA/USG role in the co-control project. I have revised that section to be very clear that this is an EPA project which is a part of the US-China joint climate technical cooperation program.

3. The January 18-19 workshop is already scheduled and US side speakers are confirmed. I will fax you a copy of the invitation letter from Zhou Dadi with details. I have updated this text to reflect this and to thank the SDPC people for their help in setting this up. I would be very pleased if David Bleyle or someone else from the Embassy is able to attend this.

4. As suggested by David, I have revised the letter to be more clear where we are confirming previous agreements with SDPC, where we are asking for a decisions from them, and where we are identifying issues which need to be discussed and resolved during the next visit.

5. As far as the involvement of other Ministries and experts -- In the economic modeling meeting, we understand that along with Energy Research Institute experts, Zhou Dadi has invited representatives from the Chinese Academy of Social Sciences, the Development Research Center of the State Council, Tsinghua University and Peking University. We have asked Zhou Dadi and (in this letter) SDPC to ensure that other relevant Ministries are included. Any further suggestions David or others may have along these lines are welcome.

6. With regard to the technology cooperation project, you are correct that I did not directly ask for a commitment or decision from SDPC on this in the letter. I have revised this to be clear in identifying a number of issues which need to be discussed and proposing that we meet to disucss them in detail in January. Again, I would welcome any suggestions and support David Bleyle can

provide, including participating in these discussions in Beijing in January if that makes sense to you.

I hope that we can set up a little interagency briefing on our China work sometime before I go. I also would like to meet with David Bleyle if possible when I am in Beijing. My schedule is to arrive Sunday evening January 17, and to Depart Friday Morning January 22. Duncan and David, please just let me know what times might work with your schedules.

Thanks for all your help on this. I think we will make a lot of progress with this letter and the next visit to Beijing.

I'll be out of the office until January 4 but will respond to any other comments or suggestions as soon as I get back.

l (See attached file: sdpclet1.wp)

 - sdpclet1.wp

Message Copied To:

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Mr. Ma Aiming and Ms. Li Liyan
Office to Climate Change Policy Coordination Committee
State Development Planning Commission
No. 38, S. Yuetan Street
Beijing 100824
People's Republic of China
Fax: 8610-68576760

December 23, 1998

Dear Mr. Ma and Ms. Li:

I am writing to follow up on our discussions in mid-September, when I visited your office with Richard Garbaccio of U.S. EPA, Ron Benioff of the National Renewable Energy Laboratory, and Changhua Wu of the World Resources Institute. I found this discussion very helpful in clarifying for us the changing structure of the Chinese government efforts on climate change. Thank you very much for this assistance. I also enjoyed some interesting discussions with Ms. Li Liyan and Dr. Zhou Dadi in the technology transfer contact group at COP-4 in Buenos Aires. It has taken me a little longer than I had hoped to get back to you with a more details on our ongoing joint projects, but I now want to update you and ensure your concurrence with activities which are moving ahead in climate technical cooperation.

As we discussed in September, we are most interested in opportunities for continuing and expanding collaboration in three areas: economic modeling of the costs and benefits of greenhouse gas mitigation options, clean energy technology cooperation, and analysis of the health benefits of policies for reducing greenhouse gas emissions. I have proposed below several next steps for building upon the work we have initiated with counterpart organizations in China for each of these three areas. As I mentioned during our meeting, we would also be glad to explore technical cooperation on other climate change issues.

As we discussed in September, we believe that a useful next step in the economic modeling area is a two-day workshop which would bring a number of U.S. technical experts together with Chinese technical experts and interested ministries. This will allow for detailed discussion of experiences to date in the two countries, models and other analytic tools used, key policy questions, and opportunities for improving the quality of analysis and understanding. Since my September visit, I have been working with colleagues at PNNL and Harvard University to plan such a workshop. PNNL has initiated a project with Dr. Zhou Dadi and his colleagues at the Energy Research Institute to prepare for and support this workshop. I expect that Dr. Zhou

Dadi has kept you advised of progress on this effort.

Dr. Richard Garbaccio and I plan to participate in this workshop to be held in Beijing, January 18-19, 1999. We have confirmed that several other U.S. experts will also participate. I have been advised by Dr. Zhou Dadi that he is coordinating his work in planning this workshop with you. I would like to thank you for this assistance and to personally encourage you to participate in the workshop if possible. I think it will be a very useful means for identifying and prioritizing opportunities for ongoing joint technical work on economic analysis of climate policies. We would appreciate any further help you can provide, especially in ensuring that the appropriate representatives from other agencies and ministries are invited.

Based on our earlier discussions, I am proceeding with the understanding that your office in SDPC will serve as the government point of contact for cooperation on economic analysis of climate change policies. I also understand that you are comfortable with ERI as the lead technical institute for organizing this workshop and with Dr. Zhou Dadi as the technical expert point of contact. I you do not agree with this arrangement or have any other issues which need to be discussed please contact me directly via fax at (202) 260-6405 or by email at <schwengels.paul@epa.gov>.

I hope that we will meet during the "China Economic and Environmental Modeling Workshop" to be held January 18-19, and that this will help us define further cooperative efforts in this area. I also hope that we can arrange a separate meeting, or meetings, with you to discuss this and other climate technical work underway, and any additional areas which may be of interest to you. I am attaching a brief summary of the status of the three ongoing projects. I will continue to work through Dr. Zhou Dadi and Prof. Wei Zhihong of Tsinghua University to set up any necessary meetings. Please let me know directly if there is any problem with this arrangement.

I look forward to meeting with you in January and discussing our climate technical cooperation activities in greater detail. Thank you very much for your cooperation.

Sincerely yours,

Paul Schwengels
Climate Change Policy and Programs Division (2175)

Technical Cooperation Project Summaries

Economic Modeling

One of the areas of joint work which is extremely important to both our governments is the development of methods for economic analysis of climate change mitigation options. As we discussed earlier, U.S. EPA has provided support through Harvard University and through the Pacific Northwest National Laboratory (PNNL) for joint work on economic model development projects with Chinese experts. All of this ongoing work and other relevant modeling experience will be discussed in detail at the China Economic and Environmental Modeling Workshop on January 18-19.

I hope that the workshop can reach some clear consensus on priorities for future joint work on economic modeling and that we can discuss further activities after the conclusion of the workshop.

Technology Cooperation

As you are aware, we started work last year in collaboration with the State Science and Technology Commission (SSTC) (now Ministry of Science and Technology, MOST) to develop a climate change technology cooperation framework for China. SSTC asked Tsinghua University to coordinate input from all key agencies, including SDPC, in the development of a draft framework. Tsinghua University has now prepared a comprehensive technology cooperation framework that focuses on five priority clean energy technologies and presented this framework at the Technology Cooperation Agreements Pilot Program (TCAPP) meeting with over 30 international donor representatives that we held in Washington, D.C. on October 9th. At this meeting the donor representatives confirmed their strong interest in using such a framework to plan donor support to meet China's climate change technology needs and stated that such a clear and well justified description of China's technology cooperation priorities was extremely valuable.

The donor representatives also suggested that the U.S., together with the participating countries, should present the work under this project with all five participating countries as a model for the U.S. and other developed countries to help fulfill their obligation to support technology transfer under Article 4.5 of the FCCC. As you know the U.S. delegation made this proposal at COP-4. We hope that the TCAPP work underway in China and other countries will provide useful inputs to the new technology transfer consultative process established in the COP-4 technology transfer decision. At the same time, we are very interested in continuing to work with the team in China to help attract donor support and private investment for the needs identified in this framework.

I have been advised by Dr. Wei Zhihong that you have agreed that SDPC would take on a lead coordinating role for this work and that SDPC may establish a more formal interagency working group to guide further work on China's technology cooperation framework. I would like to propose several important next steps for your consideration:

(1) We would find it helpful if SDPC identified an individual as lead point of contact for this technology cooperation work. We would like to verify that you are comfortable with Tsinghua University continuing to serve as a primary technical point of contact, working with ERI and other technical groups as needed.

(2) We discussed with Professor Wei and Mr. Lei Tijun (State Power Corporation) the need to develop a workplan for the next phase of activities that will focus on attracting private investment for China's technology priorities, and donor and domestic support for actions to address market barriers. Ron Benioff from NREL has been working with Professor Wei on this workplan, and we are very interested in your guidance and hope that you will review the initial draft prepared by Tsinghua University and NREL. This workplan will help determine the type of support that U.S. EPA and U.S. DOE can provide that will be most helpful to you in this next phase.

(3) We would appreciate your assistance in clarifying the appropriate relationship between this technology cooperation framework and the list of technology needs that China prepared in 1996. The technology cooperation framework provides a rigorous justification (based on China's mitigation assessment work and expert opinion from key agency personnel) of five clean energy technologies that hold the most promise for attracting private investment, supporting China's development needs, and reducing greenhouse gas emissions. In this regard, this framework could be considered as a more detailed and focused elaboration of the previous list of technologies. We are very interested in your views on the relationship between this framework and the previous list.

I hope to meet with you and discuss these issues and other details of this project while I am in Beijing in January.

Co-Control Analysis

The US EPA is supporting work on quantifying the joint benefits of strategies which provide climate mitigation and local environment and heath in China, and in several other countries. In China, this work is currently being carried out through the World Resources Institute (WRI), working with guidance from SEPA and other interested ministries, and is drawing on experts from universities, municipal governments, ERI, and other institutes. Our understanding is that SEPA has identified Shanghai as the first location for quantification of the local environmental and health benefits which would come automatically with strategies to reduce fossil fuel use and greenhouse gas emissions.

The technical project team has been identified and work is underway to collect and evaluate available data and to select the models and other analytic tools to be used. During my visit in January, I hope to meet with key officials at SEPA to discuss this project and may also meet with technical experts to discuss the atmospheric dispersion modeling component or other technical aspects of the project. I would also like to discuss the status of this project with you as well and would welcome any advice or comment from SDPC.

1/11/99 ROK/China mtg

ROK

work w/ KEEI - perhaps develop a modeling relationship
technical work - focus on tools, discuss from policy
this is not the technical team promised in ROK
don't foreclose options
discuss modeling + hypothetical policies but try to
avoid T+T issue

China

modeling wshop coordinated w/ Zhou Dadi, ERI + SDPC
technology transfer (TCAPP)
integrate into CTI
COP. 4 tech decision

APEC countries evaluating renewable energy alternatives
w/ bottom up models
- consistency Market
MPEP

China Economic and Environmental Modeling Workshop
18-19 January 1999
Friendship Hotel, Beijing

Draft Agenda

Note: Each presentation session has 15 minutes built-in for questions/discussion

Monday, January 18th
8:30 - 9:00 Welcome and Opening Remarks, ZHOU Dadi and Paul Schwengels

9:00-10:15
Chinese Expert - ZHOU Dadi or SDPC official to discuss thoughts on climate policy (30 minutes) (TBD)

Paul Schwengels - Overview of U.S. Climate Policy Modeling and Decision-Making (45 minutes)

10:15-10:30 **Break**

10:30-12:30

Jae Edmonds - Climate Change and Economic Modeling (**45 minutes**)

Kebin He – Climate and Local Environmental and Health Co-Control Benefits in China (30 minutes)

Dale Jorgenson - The Jorgenson-Wilcoxen Model of the U.S. and its use for Policy Making (**45 minutes**)

12:30-14:00 Working Lunch - Topic: Building a Collaborative Community of Economic Modelers in China

14:00 - 15:30

Phillip Tseng - The Application of Markal-Macro Model in the Analysis of Reducing Carbon Emissions (45 minutes)

Plans for China Markal-Macro – INET, Tsinghua University 20 minutes

JIANG Kejun - Post Kyoto: Analysis from AIM (25 minutes)

15:30-15:45 Break

15:45-16:45

Bob Shackelton - The G-cubed Model (**60 minutes**)

16:45-17:00 Wrap Up - ZHOU Dadi

Tuesday, January 19th
9:00 - 10:30
Richard Garbaccio and Mun Ho - A CGE Model for Analyzing CO2 Emissions Reduction Strategies in China (60 minutes)

ZHAI Fan - Modeling Activities in the DRC (30 minutes)

10:30 - 10:45 Break

10:45-11:45
JIANG Kejun and Ron Sands, The China Second Generation Model (60 minutes)

11:45-13:15 Lunch

13:15 -13:45

HU Xiulian - Modeling Demands for Energy and Environment in China (30 minutes)

13:45 - 15:00

Discussion of Agenda for Future Work

15:00 - 15:30 Discussion and Wrap Up - ZHOU Dadi and Paul Schwengels

Speakers and Affiliation
Jae Edmonds - Battelle Memorial Institute, Pacific Northwest National Laboratory
Richard Garbaccio - U.S. Environmental Protection Agency
Mun Ho - Harvard University
HU Xiulian - Energy Research Institute, State Development Planning Commission
JIANG Kejun - Energy Research Institute, State Development Planning Commission

Dale Jorgenson - Harvard University
Ron Sands - Battelle Memorial Institute, Pacific Northwest National Laboratory
Paul Schwengels - U.S. Environmental Protection Agency
Bob Shackleton - U.S. Environmental Protection Agency
Phillip Tseng - U.S. Department of Energy
ZHAI Fan - Development Research Center, China State Council
ZHOU Dadi - Energy Research Institute, State Development Planning Commission

From: Paul Schwengels, email: <schwengels.paul@epa.gov>
Richard Garbaccio, email: <garbaccio.richard@epa.gov>
Ron Benioff, email: <ron_benioff@nrel.gov>

Results of Technical Team Visit, Beijing, China, September 21-22, 1998

Summary: On September 21-22, a technical team which included as many as 5 US experts participated in 3 working meetings on specific climate change technical cooperation projects with China. There was general positive response to the idea of joint technical work and improving understanding of the details of climate policy options. The visit confirmed Chinese interest, and reviewed progress in three areas -- technology cooperation, environmental co-control benefits assessment, and economic modeling/analysis -- and identified next steps with lead Ministries and key technical institutes interested in these areas.

It also explored possible joint technical and analytic projects in several other areas related to Climate Change, including technical issues in implementing flexibility mechanisms, assessment of possible climate impacts, forestry strategies and more detailed sector strategy studies.

New Chinese Government Structure for Climate Change: The technical team was advised by several different contacts of the recent restructuring of the Chinese inter-ministerial coordination functions for climate change. The new Climate Change Policy Coordination Committee is Chaired by the director General of the State Development Planning Commission (SDPC). It has four subgroups, the most relevant to our work being WG 3 Mitigation Strategies, co-chaired by SDPC and the State Economic and Trade Commission (SETC), and WG 2 Impacts and Adaptation co-chaired by Ministry of Science and technology (MOST) and the State Environmental Protection Agency (SEPA). There seemed to a sense in most of these discussions that our economics work coordinated through the Energy Research Institute (ERI) of SDPC [with active involvement of the State Council's Development Research Center (DRC)] was well connected to the new structure and policy process. Similarly the co-control/megacities project is coordinated through SEPA and Senior Policy Officials concerned about environmental policy and thus well connected. The technology cooperation work however, has been organized in conjunction with MOST. We have been advised that the new structure emphasizes the role of MOST as a coordinator of R&D and Science issues, but reinforces the roles of SDPC and SETC as the implementers of policy and for technology, key players in any real world applications. Thus we are advised and agree that it is essential to involve SDPC and SETC more directly in the technology work. We have also been advised that any intergovernmental cooperation on climate change should be initiated through the SDPC Climate Office which serves as secretariat to the Coordination Committee.

Background: Paul Schwengels and Richard Garbaccio of USEPA, and Ron Benioff of the National Renewable Energy Laboratory, visited Beijing specifically to participate in a series of expert meetings on September 21 and 22, to review ongoing technical work with China, which

involved representatives of Chinese ministries, government research institutes, and universities. Changhua Wu of the World Resources Institute and Jeffrey Logan of the Pacific Northwest National Laboratory, also participated in the technical meetings.

In each meeting, an initial presentation summarized the rationale and areas of interest for technical cooperation between the US and China. The two governments have been engaged for some time in high-level policy discussions aimed at advancing the Climate Convention and Kyoto Protocol process. Our two countries have important leadership roles to play in this process and must work together if there is to be a successful result. In these discussions it has been clear that there are many areas of uncertainty on technical issues that can prevent our clear identification of areas of common ground and opportunities for cooperative progress. It is in the interest of both countries to share technical information, experience, methods and models and to work together at the technical expert level to improve our common understanding of the implications of various options for mitigating greenhouse gases and the full range of impacts on economies, environments and technology.

The three areas of ongoing EPA work with China were highlighted: 1) quantification of local environmental and health co-control benefits of GHG mitigation, 2) national economic modeling and analysis of costs of alternative strategies and levels of GHG commitments including flexibility mechanisms, and 3) the technology cooperation agreements pilot project.

In addition, the technical team sought to determine the level of interest in other possible areas of joint technical work such as impacts of climate change, technical issues in implementing flexibility mechanisms (e.g., CDM), analysis of forest sinks and strategies, and strategy studies at the sector -- transport, electricity-- level.

Economic Modeling: On the morning of September 21, a working meeting on economic modeling was organized by experts from the Energy Research Institute (ERI) of SDPC and chaired by Zhou Dadi, Deputy Director of ERI and Director of the Beijing Energy Efficiency Center (BECon). This meeting was held in the Holiday Inn Downtown Hotel with simultaneous translation. Representatives of ERI, the Chinese Academy of Sciences, the Chinese Academy of Social Sciences, Tsinghua University and Beijing University and the China Meteorological Administration (CMA) attended the meeting. After the introduction by Dr. Zhou Dadi and background overview by Paul Schwengels a significant share of the meeting was devoted to a presentation by Dr. Richard Garbaccio which explained and reviewed the status of the China CGE Model. There was a good technical discussion of this model and a number of technical issues raised by the presentation.

In the discussion it was pointed out that a number of other relevant modeling activities including collaborative efforts between US and Chinese institutions are also underway in China, e.g., the Second Generation Model, MARKAL-Macro, etc. Jiang Kejun of ERI made a short presentation highlighting past work by ERI on economic modeling including work on the PNNL Second Generation Model and application of the China module for country studies, and participation in the Asia Integrated Model (AIM) project with Japan. He also presented suggestions for improving the coordination and communication among Chinese economic modelers on climate

change, and between modelers and the policy process. He supported the idea of a workshop of US and Chinese modelers, and suggested other longer term mechanisms like a Chinese Climate Modeling Forum, web site, clearinghouse for model results, etc.

There was general support for efforts to improve coordination among Chinese modelers and for cooperative work with US experts. Our sense is that a workshop sometime early 1999 would be a very useful next step.

Over lunch with Zhou Dadi we confirmed his and ERI's interest in continuing the economic modeling cooperation and discussed possible next steps. Because of a planned visit by Prof. Dale Jorgenson in mid-January, we agreed to consider organizing a workshop possibly in Beijing around that time. Zhou Dadi discussed the ongoing restructuring within the Chinese government and its climate change organization, as this might relate to proposed technical work. He advised that we meet with the SDPC Office of Climate Change Coordination to discuss all of our technical work, and that the TCAPP work in particular, needed stronger connections to the SDPC and to SETC, as well as to MOST, to be effective in the new organization. We subsequently arranged a meeting with two representatives of this Office in SDPC, described above.

Environmental and Health Co-Control Benefits: This working meeting was hosted by Mr. Wu Baozhong, Advisor to the Minister of Environment, at SEPA headquarters. After initial overview remarks by Mr. Wu and Paul Schwengels, technical presentations were made by Changhua Wu of WRI, and by Chinese experts in emissions inventories, atmospheric modeling, health effects and economic valuation, as well as a representative of the Shanghai Academy of Sciences. The capabilities of and information already assembled by this team are impressive. There is still some uncertainty as to whether the Chinese Team will choose to work in Shanghai or Beijing as the first venue for the co-control/megacities project, but capabilities are substantial in either location, and the quantified benefits of reductions in fossil fuel use are likely to be large.

Technology Cooperation Agreements Pilot Project (TCAPP): The workshop on the Chinese draft Technology Cooperation Framework, hosted by Prof. Wei Zhihong, of Tsinghua University, Technical Director of the TCAPP project, was extremely constructive and productive. The Chinese team is very competent, and has identified five technology areas in which there is strong market potential, large potential impact on GHGs and a strong technical base of in-country expertise. The discussion helped to sharpen and better define the framework and the presentations to be made in the October 9, TCAPP Donors' Workshop in Washington. While the frameworks for cooperation in individual technology areas are very strong technically, there is a need for better treatment of the policy/institutional barriers to clean technology markets, and the potential domestic and international actions which could address these barriers. This discussion reinforced the notion that key economic development agencies (e.g., SDPC, SETC, Ministry of Finance, etc.) need to be more engaged in the TCAPP process if it is to move forward effectively.

In a later dinner meeting with Prof. He, a Vice President of Tsinghua University, a major topic of discussion was the need for support to Tsinghua to update and implement the Chinese MARKAL/Macro model. We were advised that a proposal had been made to DOE in late 1997, and reiterated during Prof. Wei's visit in February 1998. The Tsinghua officials seem to believe

that DOE has agreed to support the work through its Brookhaven National Lab., but no funding has actually been provided for this. We will need to work out some resolution of this problem (with DOE and others) or it will continue to be a distraction in our future economic modeling cooperation.

State Development Planning Commission: At the suggestion of several Chinese contacts the technical team scheduled a meeting with representatives of the new Climate Change Policy Coordination Office in SDPC. The SDPC staff reiterated the new structure for climate change coordination which had been presented several times, and emphasized that the SDPC Office's key role as a clearinghouse for all climate change cooperation with other governments. We discussed the work already underway in three areas – economic modeling, co-control benefits and technology cooperation agreements pilot project – as well as the possibilities that technical cooperation might be initiated in other areas of mutual interest.

SDPC staff acknowledged that they are just gearing up for their new roles and are stretched very thin. They may take some time to fully address our interests in technical cooperation work. They indicated they were comfortable with our moving ahead in areas where work was already underway, but requested that we keep the SDPC Climate Office informed, and that we work through their office to initiate any new government-to-government technical work.

We spent a fair amount of time discussing the TCAPP project and our interest in having SDPC more directly involved. While the staff representatives we met with were not prepared to make commitments on the spot, they were interested and agreed without assessment that this was an important role for them. They also stress that their office was involved in preparation of the Chinese Technology Needs Submission to the UNFCCC in December 1996, and provides key staff to the Chinese delegation for negotiation on technology transfer issues in the Convention. In the next phase of our TCAPP work in China, we will need to work with SDPC and others to reconcile in some way the technology priorities identified in the TCAPP framework with the past technology needs submission.

Development Research Center of the State Council:

Richard Garbaccio met with Li Shantong, the director of the DRC's Department of Development and Forecasting, and researchers Hou Yongzhi and Zhai Fan of the same department to discuss the China CGE modeling work. Although the DRC is not currently involved in any collaborative projects with either the EPA or Harvard University, they have long been active in building CGE models of the Chinese economy.

Chinese Academy of Social Sciences, Institute of Quantitative and Technical Economics:

Richard Garbaccio also met with a group of researchers from the Institute of Quantitative and Technical Economics (ITQE) of CASS. They discussed a project currently funded by the EPA to prepare a multi-sector database for the estimation of production functions. Parameters estimated from the data will be inputs to the China CGE model being developed jointly by the EPA and Harvard University and by the GCUBED, multi-country CGE model of McKibbin and Wilcoxen

Conclusion: Progress was made in the three ongoing technical areas. A follow-up letter documenting progress and proposing specific next steps is needed in each area. If EPA or the USG wishes to move ahead on other technical areas – forestry, flexibility mechanisms, etc. – it is recommended that a letter proposal be sent to the SDPC Climate Office requesting their assistance in identifying the correct government ministry partners and initiating work.

Contacts

State Development Planning Commission,
Office to Climate Change Policy Coordination Committee

Ma Aimin, Deputy Division Director
Li Liyan, Section Chief (Chinese FCCC Negotiator for Technology Transfer)

Economic Modeling Meeting

Energy Research Institute
Zhou Dadi, Deputy Director (also Director of the Beijing Energy Efficiency Center)
Hu Xiulian, Director Center for Energy Environment and Climate Change Research
Jiang Kejun, (made a presentation on ERI economic modeling and ways of improving coordination among economic modelers on Climate Change issues in China)
Guo Yuan

Wang Bangzhong, Director, Division of Coordination on Climate Change, China Meteorological Administration – to be detailed into the Climate Change office of SDPC

Wang Qiwen, Associate Dean, Guanghua School of Management, Peking University, Beijing

Ma Gang, Research Fellow, Institute of Quantitative & Technical Economics, Chinese Academy of Social Sciences

Ju Yingyun, Director, Energy Systems Analysis Division, INET, Tsinhua University

Co-Control/Megacities Project Meeting, SEPA

Wu Baozhong, Advisor to the Minister of Environment, SEPA

Liu Xueyi, Research Professor, Energy Research Institute, SDPC

Kebin He, Professor and Director, Air Pollution Control Division, Dept. of Environmental Science and Engineering, Tsinghua University

Wang Yi, Professor, Research Center for Eco-Environmental Statistics, Chinese Academy of Sciences

Li-Hua Wang, MD, Professor Department of Environmental Health, Beijing Medical University

Liu Shusheng, Deputy Director, Center for Climate Impact Research, SEPA

Chen Changhong, Deputy Chief Engineer, Shanghai Academy of Environmental Sciences

Technology Cooperation Agreements Pilot Project, Review Meeting, Tsinghua University

Lei Tijun, Department of Planning, National Electric Power Company

Wei Zhihong, Director, Global Climate Change Institute, Tsinghua University

Shi Pengfei, Hydropower Planning General Institute, National Electric Power Company

Guo Jiang, Planning and Consultation Division, China Energy Conservation Investment Corporation

Huang Shengchu, Coalbed Methane Clearinghouse

Zhu Chao, Coalbed Methane Clearinghouse

Wang Shumao, Energy Research Institute, SDPC

Wang Bangcheng, Energy Research Institute, SDPC

Liu Bin, Global Climate Change Institute, Tsinghua University

Guo Jingfei, Global Climate Change Institute, Tsinghua University

Abe - Wei Wei Wang @ univ in China, or China Academy of Sciences
→ has contacts in China

State Planning + Development Commission - could influence
Ministry of Foreign Affairs

1) near term + long term strategies
(2010) (2020)

Est. a C Reduction Strategy for China
" M.D. Levine et al, Lawrence Berkley Natl Lab
Draft 12/3/97

2) highlight existing efforts by Chinese
(eg, energy efficiency goal in 5yr plans)

3) what can we push besides Target-trading in next plan

4) project-specific

trans
dem progs

China

goal - 2 mtgs/yr on GCC - formalize a climate exchange
work under Sci + Tech agreement + Energy + Env Initiative
EPA view
- urban air quality
- transportation
  21st c. tech & to industry potential
- wq / ag practices
- sinks

Objectives (long-term)
1) growth target
2) Article 10

★ State Dev Research Center - economists → Zhu

Floods

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ACTION EAP-01

INFO	LOG-00	ACDA-08	ACDE-00	AGRE-00	AID-00	AIT-03	CEA-01
	CIAE-00	COME-00	CTME-00	C-00	DINT-00	DODE-00	ITCE-00
	SRPP-00	DS-00	EB-00	EXME-00	E-00	FBIE-00	UTED-00
	FRB-00	H-01	TEDE-00	INR-00	IO-00	ITC-01	LAB-01
	L-01	ADS-00	NSAE-00	NSF-01	OES-01	OIC-02	OMB-01
	OPIC-01	PA-00	PM-00	PRS-00	P-00	SP-00	SSO-00
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FM AMEMBASSY BEIJING
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USDOE WASHDC PRIORITY
HQEPA WASHDC PRIORITY
DEPT OF TREASURY WASHDC PRIORITY
AMCONSUL SHANGHAI PRIORITY
AMCONSUL SHENYANG PRIORITY
AMCONSUL GUANGZHOU PRIORITY
AMCONSUL HONG KONG PRIORITY
AIT TAIPEI PRIORITY 8012
AMCONSUL CHENGDU PRIORITY

UNCLAS SECTION 01 OF 03 BEIJING 014341

SENSITIVE

DOE FOR MARK MAZUR, PO/ABE HASPEL, USCSP JOE HUANG

DEPT FOR EAP/CM, OES/SEI, OES/EGC

WHITE HOUSE FOR TODD STERN, CEA/JOE ALDY AND STEVE POLASKY

EPA FOR OPPE/DAVID GARDINER

TREASURY FOR RAY SQUITERI

E.O. 12958: N/A
TAGS: SENV, KSCA, PGOV, ENRG, CH
SUBJECT: CLIMATE CHANGE: MOST PROPOSES MEETING TIME; DISCUSSES PRC'S COORDINATING COMMITTEE CHANGES

REF: A) STATE 135551, B) BEIJING 12753, C) BEIJING 13535, D) BEIJING 10946, E) BEIJING 13727, F) BEIJING 12046

BEIJING 01 OF 03 14341

1. (U) SENSITIVE BUT UNCLASSIFIED. PLEASE PROTECT ACCORDINGLY.

2. (SBU) SUMMARY. In an August 14 meeting to discuss plans for the upcoming meeting between the USG climate change delegation and the Ministry of Science and Technology (MOST), MOST officials proposed that the meeting take place Tuesday, September 1 at 10:00 a.m. ESTCOUNS proposed general topics for discussion. The MOST officials responded that one issue of great importance to them is continued progress on the energy efficient building demonstration project, which, if successful, they said can serve to build support in other agencies for climate change action.

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3. (SBU) The MOST officials also informed ESTCOUNS of significant recent changes in the composition and function of the PRC's Climate Change Coordination Committee. These changes include: the transfer of the chair from the China Meteorological Administration to the State Development and Planning Administration; the addition of the State Economic and Trade Commission to the group; the establishment of an office in SDPC for the group; the clearer separation of functions within the group; and the clearer definition of agency leadership for particular issues. END SUMMARY.

MEETING SET FOR SEPTEMBER 1
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4. (SBU) ESTCOUNS and ESTOFF met on August 14 with officials from the Ministry of Science and Technology (MOST) to discuss plans for the upcoming meeting between MOST and the USG interagency climate change delegation which will visit Beijing September 1-3 (REFTELS A, B, C). Attending on the MOST side were Mr. Wang Weizhong, former Director of the Ecology and Environment Division in the Department of S & T for Social Development, and now Director-General of China's Agenda 21 Administrative Office; Mr. Sun Hong, Wang's replacement as Director of the reconstituted Natural Resources and Environment Division; and Mr. Chen Futao, Director for America and Oceania of MOST's Department of International Cooperation.

5. (SBU) We agreed that the meeting between MOST and the USG climate change delegation will take place at MOST on Tuesday, September 1 at 10:00am. Vice Minister Deng Nan will host the meeting. When ESTCOUNS inquired whether the delegation might be able to meet with Minister Zhu Lilan, the officials responded that it was Deng Nan who is in charge of climate change for MOST and who has a much better understanding of this issue, and that they felt there would be no added benefit from a meeting with Minister Zhu. (NOTE: In ESTOFF's judgment, Deng Nan is a suitable counterpart because of her clear familiarity with and interest in the issue, and the respect she receives in the Ministry and the government as the daughter of Deng Xiaoping. END NOTE.)

CHANGES IN THE PRC'S CLIMATE CHANGE COORDINATION COMMITTEE

BEIJING 02 OF 03 14341

6. (SBU) Wang shared with us the following changes which have taken place in the central government's inter-agency Climate Change Coordination Group, some of which had previously been reported (REFTEL D):

-- The State Development Planning Commission (SDPC) has replaced the China Meteorological Administration (CMA) as the Chair of the Group, and the coordination office has been moved to the SDPC.

-- The State Economic and Trade Commission has been added to the Group. Otherwise, the membership is unchanged. (NOTE: This stands in marked contrast to the polite

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rebuff of "We don't do climate change" we received when we approached SETC on August 4 to set up a meeting with the climate change delegation. When we mentioned this to the MOST officials, they suggested that the SETC officer may not have been familiar with SETC's new responsibilities. END NOTE.)

-- Zeng Peiyan, Chair of the SDPC, is Director of the Group. First Deputy Director is SDPC Vice Minister Liu Jiang. There are four Second Deputy Directors: VM Deng Nan of MOST, an SETC Vice Chair, a CMA Vice Administrator, and a SEPA Vice Administrator.

-- The Climate Change Coordination Group has four main focus groups, listed below along with their lead agencies:

A. Science of Climate Change
led by CMA and China's Academica Sinica
B. Climate Change Impacts and Adaptation
led by MOST and SEPA
C. Economic Impacts
led by SDPC and SETC
D. Negotiating Group
led by MOFA and MOST

-- The coordinating group will have an office in the SDPC's Department of Regional Economic Development, with Mr. Song Xiaxu as office director. Other ministries, including MOST, will also be represented in that office.

TOPICS FOR DISCUSSION IN SEPTEMBER MEETINGS

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7. (SBU) Without providing anything on paper, ESTCOUNS presented a general list of topics which the USG delegation might wish to discuss in September. These included the Clean Development Mechanism (CDM); emissions trading; sinks; emissions forecasting; investigation of the relationship between greenhouse gas reduction and local air quality; and economic modeling of impacts of climate change and the costs and benefits of policies to address climate change. In response, Wang outlined the agencies which would have primary responsibility for those topics, and suggested that the delegation might choose to tailor its discussions with each agency accordingly:

-- CDM - MOST
-- Emissions trading - SDPC and SETC
-- Sinks - CMA and Academica Sinica; MOST contributing
-- Emissions Forecasting - uncertain
-- GHG reductions and air quality relationship - SEPA

BEIJING 03 OF 03 14341

8. (SBU) Wang also said that MOST was interested in discussing technology transfer issues. Regarding the CDM, he said MOST is interested in its economic, greenhouse gas reduction, and technology transfer aspects.

NEED TO MOVE AHEAD ON THE ENERGY-EFFICIENT BUILDING DEMONSTRATION PROJECT

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9. (SBU) Wang added that there is one issue MOST will want to discuss: the energy-efficient building demonstration agreement between MOST and USDOE (signed in early July, REFTEL F), which Wang referred to as being under the Activities Implemented Jointly (AIJ) program. (NOTE: It's not clear to post that the USG perceives this project to be under AIJ. END NOTE.) Wang said that this project can play a significant role in showing that the concept of bilateral cooperation to address GHG reductions can be made a reality. Through the project, we would be able to discover and address problems not just in AIJ, but in the CDM and even emissions trading. Wang commented that these mechanisms were all closely related: "it's really just one topic." Wang, repeating a theme expressed previously by MOST officials, noted an overemphasis on meetings in the past and few concrete results or projects, and stated that this project is a chance to do some "real" work.

. (SBU) Wang explained that if this project succeeds, it would be much easier to move forward on climate change cooperation. Not all ministries shared the view of the need to address climate change. This project could serve to convince other Ministries of the worthiness of such cooperation, Wang said.

10. (SBU) Noting that Mr. Lu Xuedu of his office is currently working in the Washington office of the U.S. Country Studies Program (USCSP), Sun said that one of Lu's main responsibilities is helping this project to go forward successfully.

11. (SBU) In addition to informing us of Wang's and Sun's new positions, the three officials confirmed the other changes that are reported in REFTEL E. To repeat, Professor Gan Shijun has retired from his position as Director General of the Department of S&T for Social Development at MOST, and been replaced by Gan's former deputy, Liu Yanhua.

12. (SBU) Post looks forward to receiving soon further guidance from Department on the proposed topics of discussion. In our efforts to attain a meeting with SDPC Chair Zeng Peiyan, SDPC has requested that we provide them a more elaborate list of topics before they forward our request to their principals.

MORIARTY

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ACTION EAP-01

INFO	LOG-00	ACDA-08	ACDE-00	AID-00	AIT-03	AMAD-01	CIAE-00
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	M-00	NRC-01	NSAE-00	NSCE-00	NSF-01	OES-01	OIC-02
	PM-00	PRS-00	SP-00	SSO-00	SS-00	T-00	USIE-00
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AMCONSUL SHENYANG PRIORITY
AMCONSUL SHANGHAI PRIORITY
AMCONSUL GUANGZHOU PRIORITY
AIT TAIPEI PRIORITY 8011
AMCONSUL CHENGDU PRIORITY
USDOE WASHDC
USDOC WASHDC
HQEPA WASHDC

UNCLAS BEIJING 014325

DEPT FOR EAP/CM, OES/EGC REIFSNYDER, WICKWIRE

EPA FOR OIA BAILEY, YANG, AND OPPE - FITZGERALD

DOE FOR PO/HASPEL, DIXON

DOC FOR NOAA OGP/HALL, BUIZER

E.O. 12958: N/A
TAGS: SENV, KSCA, TRGY, CH
SUBJECT: REORGANIZATION IN CHINA'S MINISTRY OF SCIENCE AND TECHNOLOGY

SENSITIVE BUT UNCLASSIFIED. PLEASE PROTECT ACCORDINGLY.

1. (SBU) SUMMARY. DURING A JUNE VISIT TO BEIJING TO REVIEW PROGRESS ON CHINA'S CLIMATE CHANGE COUNTRY STUDY AND NATIONAL ACTION PLAN, DR. JOSEPH HUANG OF THE U.S. COUNTRY STUDIES PROGRAM (USCSP) MET WITH OFFICIALS FROM CHINA'S MINISTRY OF SCIENCE AND TECHNOLOGY'S DEPARTMENT OF SCIENCE AND TECHNOLOGY FOR SOCIAL DEVELOPMENT. THE MOST OFFICIALS SHARED WITH HUANG ANTICIPATED PERSONNEL CHANGES IN THEIR DEPARTMENT; THIS CABLE SUMMARIZES HUANG'S REPORT OF THOSE ANTICIPATED CHANGES. THE CHANGES HAVE NOT BEEN CONFIRMED SINCE HUANG'S MEETINGS. END SUMMARY.

2. (SBU) DURING HIS BEIJING VISIT TO REVIEW CHINA'S PROGRESS ON ITS CHINA COUNTRY STUDY AND NATIONAL ACTION PLAN, DR. JOSEPH HUANG, REGIONAL DIRECTOR FOR ASIA AND ISLAND NATIONS AND THE PROJECT OFFICER FOR CHINA IN THE U.S. COUNTRY STUDIES PROGRAM (USCSP), MET ON JUNE 28 WITH DR. GAN SHIJUN, DIRECTOR GENERAL OF THE DEPARTMENT OF SCIENCE AND TECHNOLOGY FOR SOCIAL DEVELOPMENT IN THE MINISTRY OF SCIENCE AND TECHNOLOGY (MOST, FORMERLY THE STATE SCIENCE AND TECHNOLOGY COMMISSION (SSTC)), MR. WANG WEIZHONG, THE SPECIAL ASSISTANT TO THE DIRECTOR GENERAL AND DIRECTOR OF THE ECOLOGY AND ENVIRONMENT DIVISION, AND MR. LU XUEDU, DEPUTY DIRECTOR OF THE SAME DIVISION.

3. (SBU) IN INFORMAL DISCUSSIONS, THE MOST OFFICIALS DISCUSSED THE ANTICIPATED CHANGES IN THEIR DEPARTMENT

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THROUGH GOVERNMENT DOWNSIZING. THOUGH NOTHING WAS CERTAIN YET, GAN EXPECTED TO RETIRE FROM HIS CURRENT POST AND BECOME PRESIDENT OF THE SEMI-PRIVATE CHINA PUBLICATIONS IMPORT-EXPORT COMPANY. WANG WOULD LEAVE MOST TO TAKE ON TWO POSTS: DIRECTOR-GENERAL OF THE ADMINISTRATIVE OFFICE OF CHINA'S AGENDA-21 SUSTAINABLE DEVELOPMENT OFFICE, AND DIRECTOR-GENERAL OF THE NATIONAL CENTER FOR LIFE SCIENCES AND TECHNOLOGY. THAT OFFICE, WHICH PREVIOUSLY WAS SUPPORTED BY ONLY THE SSTC, WILL INCREASE ITS STAFF AND WILL BE SUPPORTED BY THREE GOVERNMENT AGENCIES: MOST, THE STATE DEVELOPMENT PLANNING COMMISSION, AND THE STATE ECONOMIC AND TRADE COMMISSION. LIKE MANY OTHER MOST OFFICIALS FEARING LAYOFFS AND REASSIGNMENT, LU'S POSITION IN THE DEPARTMENT WAS NOT YET SETTLED.

4. (SBU) THE MOST OFFICIALS TOLD HUANG THAT THEIR DEPARTMENT OF S&T FOR SOCIAL DEVELOPMENT WILL TAKE ON ADDITIONAL RESPONSIBILITIES OVER CLIMATE CHANGE, ENVIRONMENT, MEDICINE AND AGRICULTURE. MOST LIKELY, DR. LIU YANGHUA, THE CURRENT DEPUTY DIRECTOR GENERAL TO GAN, WOULD BE THE NEW DIRECTOR GENERAL. DR. LIU WAS THE PREVIOUS DIRECTOR OF THE INSTITUTE OF GEOGRAPHY IN THE CHINESE ACADEMY OF SCIENCES BEFORE JOINING GAN'S DEPARTMENT.

5. (SBU) COMMENT. THOUGH MOST OFFICIALS DENY THIS, MOST'S TRANSFORMATION FROM A COMMISSION UNDER THE STATE COUNCIL (IT WAS PREVIOUSLY CALLED THE STATE SCIENCE AND TECHNOLOGY COMMISSION) TO A MINISTRY IS WIDELY VIEWED AS A DOWNGRADE OF STATUS AND AUTHORITY. HOWEVER, MOST DOES RETAIN SIGNIFICANT AUTHORITY OVER A VARIETY OF S&T ISSUES, INCLUDING MANY TECHNICAL ASPECTS OF THE CLIMATE CHANGE ISSUE. END COMMENT.

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ACTION OES-01

INFO	LOG-00	ACDA-08	ACDE-00	AID-00	CIAE-00	DINT-00	DODE-00
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	INR-00	IO-00	L-01	ADS-00	M-00	NSAE-00	NSF-01
	OIC-02	PM-00	PRS-00	SP-00	SSO-00	SS-00	T-00
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INFO WHITE HOUSE WASHDC
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AMCONSUL GUANGZHOU
AMCONSUL SHANGHAI
AMCONSUL SHENYANG
AMCONSUL CHENGDU

UNCLAS SECTION 01 OF 02 BEIJING 014342

WHITE HOUSE FOR OSTP, OVP

DOE FOR OTT/HEITNER

E.O. 12958: N/A
TAGS: TRGY, SENV, CH
SUBJECT: CHINA'S ELECTRIC/HYBRID VEHICLE AND ALTERNATIVE FUEL VEHICLE PROGRAMS

UNCLASSIFIED

BEIJING 01 OF 02 14342

1. SUMMARY: ESTCOUNS RECENTLY ATTENDED A SERIES OF MEETINGS AND ACTIVITIES RELATED TO JOINT US-CHINA COOPERATION IN ELECTRIC VEHICLE RESEARCH. CHINA IS INTERESTED IN DEVELOPING ELECTRIC VEHICLES AS ONE WAY TO REDUCE CAR EXHAUST IN HEAVILY POLLUTED URBAN CENTERS AND HAS ESTABLISHED A R&D PROGRAM TO DEVELOP AN EV WITH CHINESE CHARACTERISTICS AND MODERN TECHNOLOGY BY THE YEAR 2000. END SUMMARY.

2. U.S. DOE AND CHINA'S MINISTRY OF SCIENCE AND TECHNOLOGY (MOST) SIGNED AN MOU ON ELECTRIC VEHICLE RESEARCH IN NOVEMBER 1997 AND ESTCOUNS RECENTLY ATTENDED SEVERAL DAYS OF MEETINGS AND ACTIVITIES IN BEIJING TO WORK OUT HOW THE COOPERATION MIGHT PROCEED. A DOE TEAM, LED BY A REPRESENTATIVE OF DOE'S OFFICE OF TRANSPORTATION TECHNOLOGIES IS PREPARING A TRIP REPORT WITH DETAILS OF THE MEETINGS AND AN AGREED UPON ACTION PLAN. THIS CABLE IS A BRIEF DESCRIPTION OF WHERE CHINA IS TODAY IN THEIR ELECTRIC VEHICLE RESEARCH.

3. BACKGROUND: AS ANYONE WHO HAS VISITED CHINA'S CITIES OR READ MANY PRESS REPORTS KNOWS, CHINA HAS SEVERE AIR POLLUTION PROBLEMS. WHILE IN MANY CASES THE POLLUTANTS ARE EMITTED BY FACTORIES OR POWER PLANTS WHICH BURN COAL TO GENERATE POWER OR RUN INDUSTRIAL BOILERS, A GROWING CONTRIBUTOR TO POLLUTION IN MANY CITIES IS EXHAUST FROM INTERNAL COMBUSTION ENGINES. CHINESE LEADERS RECOGNIZE THE ECONOMIC DRAIN THAT RESULTS FROM AIR POLLUTION; LOSS OF PRODUCTIVITY FROM RESPIRATORY ILLNESS, CROP LOSS FROM ACID RAIN, ETC. AND ARE VERY INTERESTED IN FINDING SOLUTIONS, PARTICULARLY IN CROWDED URBAN AREAS. CHINA IS ALSO A NET PETROLEUM IMPORTING COUNTRY AND MUCH OF THIS

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DEMAND IS DRIVEN BY THE INCREASING NUMBER OF CARS, TRUCKS AND MOTORCYCLES WHICH CROWD CITY STREETS. ELECTRIC OR HYBRID VEHICLES (VEHICLES RUN ON ELECTRIC BATTERIES WITH A SMALL GAS OR METHANOL BURNING ENGINE TO CHARGE THE BATTERIES AND PROVIDE ADDITIONAL POWER AT TIMES OF PEAK DEMAND) COULD USE POWER GENERATED BY COAL, OF WHICH CHINA HAS AN AMPLE SUPPLY, INSTEAD OF RELYING ON IMPORTED OIL.

4. CHINA IS EXPERIMENTING WITH SEVERAL PROGRAMS TO TRY TO FIND ALTERNATIVES TO CONVENTIONAL INTERNAL COMBUSTION ENGINE VEHICLES. WITHIN THE LAST YEAR SEVERAL CITIES HAVE STARTED PILOT PROJECTS USING COMPRESSED NATURAL GAS OR LIQUEFIED NATURAL GAS BUSES, AND IN JUNE OF THIS YEAR CHINA INAUGURATED AN ELECTRIC VEHICLE DEMONSTRATION PROJECT WITH SEVENTEEN (17) VEHICLES OF VARIOUS SIZES IN SHANTOU CITY-NAN AO ISLAND, AN AREA IN NORTHERN GUANDONG PROVINCE.

5. THE SHANTOU-NAN AO DEMONSTRATION AREA HAS FIVE TOYOTA RAV-4EV'S, TWO GENERAL MOTORS EV-1 CARS AND THREE GENERAL MOTORS S-10 PICKUPS, SEVEN OTHER ELECTRIC VANS AND PICK-UPS WERE RETROFITTED BY CHINESE COMPANIES. AN ADDITIONAL VEHICLE IS BEING TESTED WHICH IS JOINTLY PRODUCED BY A CHINESE FIRM IN THE TEST AREA AND A U.S. COMPANY, AMERICAN ELECTRIC AUTOMOBILE COMPANY (AEAC). AEAC HAS A CONTRACT TO PRODUCE TWO VANS OF 4.6 METERS (APPROX. 15 FEET) AND ONE SMALL BUS OF 6 METERS (19.7 FEET), BUT ONLY ONE OF THE VEHICLES IS CURRENTLY READY FOR TESTING. NAN AO ISLAND IS ALSO A DEMONSTRATION PROJECT SITE FOR WIND ENERGY, ALMOST ALL OF THE POWER ON THE ISLAND IS PRODUCED BY WIND TURBINES AND THE AUTHORITIES ARE PRESUMABLY INTRODUCING ELECTRIC VEHICLES TO TAKE ADVANTAGE OF THIS INEXPENSIVE SOURCE OF POWER.

6. MOST OFFICIALS IN THE MEETING ADMITTED THAT THERE IS GREATER INTEREST IN THE VANS AND PICK-UPS IN THE TEST AREA, SINCE THESE ARE MORE USEFUL AS MULTI-PURPOSE VEHICLES. THE PASSENGER VEHICLES PROVIDED BY TOYOTA AND GM ARE LARGER AND MORE EXPENSIVE THAN THE AVERAGE CHINESE CONSUMER WOULD WANT OR COULD AFFORD.

7. FOR PASSENGER CARS THE CHINESE EV PROGRAM'S GOAL IS TO DESIGN A PROTOTYPE ELECTRIC CAR WITH CHINESE CHARACTERISTICS AND 1990'S WORLD LEVEL TECHNOLOGY BY THE YEAR 2000, WITH SMALL SCALE COMMERCIALIZATION TO BEGIN IN THE FIRST DECADE OF THE NEXT CENTURY. ACCORDING TO MINISTRY OF SCIENCE AND TECHNOLOGY OFFICIALS, LEADERS OF THE STATE COUNCIL AND CPC CENTRAL COMMITTEE HAVE EXPRESSED SIGNIFICANT INTEREST IN THE EV PROJECT, VICE-PREMIER LI LANQING WAS SPECIFICALLY MENTIONED AS A

PROPONENT OF THE PROGRAM. THE EV PROGRAM WAS INITIATED UNDER THE EIGHTH FIVE YEAR PLAN (1990-1995) AND RESEARCH HAS CONTINUED UNDER THE CURRENT, NINTH FIVE YEAR PLAN(1995-2000).

8. THE PROJECT HAS BEEN DIVIDED INTO TASKS AND RESEARCH AND DEVELOPMENT ASSIGNED TO SPECIFIC ORGANIZATIONS AS FOLLOWS:
--MOST HAS SIGNED A CONTRACT WITH AN ITALIAN COMPANY, I.D.E.A. FOR JOINT WORK ON AN AERODYNAMIC BODY DESIGN.
--DONG FENG MOTOR CORPORATION -- OVERALL DESIGN AND TEST OF A VEHICLE BASED ON A CITROEN CHASSIS, WITH SPECIFIC EMPHASIS ON POWERTRAIN SYSTEM.
--FIRST AUTO GROUP -- DESIGN AND DEVELOP A PROTOTYPE

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BASED ON A RED FLAG CHASSIS (RED FLAG IS A LARGE SEDAN EQUIVALENT TO A U.S. CHRYSLER AND NEW RED FLAGS USE CHRYSLER ENGINES)
--AERO-SPACE INDUSTRY CORPORATION -- ACT AS LEAD ORGANIZATION IN POWERTRAIN SYSTEM AND DESIGN AND CONTROL UNIT DESIGN.
--CHINA AUTOMOTIVE TECHNOLOGY AND RESEARCH CENTER -- PARTICIPATE IN OVERALL DESIGN, DEVELOPMENT, AND TESTING.
--ELECTRIC RESEARCH INSTITUTE OF CHINESE ACADEMY OF SCIENCES -- ELECTRIC MOTOR AND MOTOR-CONTROL SYSTEM RESEARCH.
--COMPUTER DESIGN INSTITUTE OF QINGHUA (TSINGHUA) UNIVERSITY -- R&D OF ON-BOARD CHARGER, BATTERY MANAGEMENT SYSTEM, AND
RESIDUAL ENERGY INDICATOR.
--TIANJIN INSTITUTE OF POWER SOURCES(AFFILIATED WITH CHINA POWER SOURCE INDUSTRY ASSOCIATION) -- ADVANCED BATTERY AND FUEL CELL RESEARCH, INCLUDING NICKEL METAL HYDRIDE AND LITHIUM ION BATTERIES AND DIRECT FUEL CH3OH FUEL CELLS.
--ZHONGSHAN NICKEL HYDROGEN BATTERY TEST BASE -- NICKEL HYDROGEN BATTERIES.
--DALIAN PHYSI-CHEMICAL RESEARCH INSTITUTE OF CHINA'S ACADEMY OF SCIENCES/FUYUAN COMPANY -- FUEL CELLS
--BAODING GOLDEN SAIL BATTERY COMPANY -- NEW LEAD ACID BATTERIES.

9. THERE IS A PARALLEL PROJECT ON RETROFITTING BUSES FOR ELECTRIC POWER LED BY THE NEW COMMITTEE ON SCIENCE AND TECHNOLOGY IN THE NATIONAL DEFENSE (COSTIND). MOST OF THE RETROFITTED BUSES WILL BE USED ON BUS ROUTE 114 IN BEIJING, ALTHOUGH SOME OF THE BUSES WILL BE SOLD TO HONG KONG.

10. MOST OFFICIALS AT THE MEETING ACKNOWLEDGED THAT THE EV PROGRAM HAS A LONG WAY TO GO. CHINESE URBAN CENTERS ARE MORE COMPACT THAN MANY CITIES IN THE U.S. SO A 160 KILOMETER RANGE BETWEEN CHARGES WOULD BE USEFUL FOR DELIVERY VEHICLES OR SMALL BUSES, HOWEVER, THE INFRASTRUCTURE NECESSARY; E.G. CHARGING STATIONS, REPAIR FACILITIES, IS NOT AVAILABLE AND WOULD TAKE YEARS TO CONSTRUCT. ANOTHER SHORTCOMING IN CHINA IS THAT ELECTRIC UTILITIES ARE NOT INVOLVED IN THE PROGRAM, IN CONTRAST TO THE U.S. WHERE UTILITIES ARE STRONG PROMOTERS OF EV'S TO INCREASE THE DEMAND FOR POWER. CHINA IS ALSO JUST BEGINNING TO SET UP STANDARDS FOR EV'S AND REGULATIONS TO GOVERN THEIR USE. UNDER CURRENT LAW THERE IS NO PROVISION FOR EV'S, SO USERS MUST APPLY FOR SPECIAL PERMITS TO REGISTER AND OPERATE THEM.

11. POST COMMENT: WHILE IT WAS CLEAR IN THE MEETING THAT CHINA IS INTERESTED IN ALTERNATIVE FUEL VEHICLES, ESPECIALLY EV'S AND HYBRID VEHICLES, IT WAS ALSO EVIDENT THAT INTRODUCTION OF THESE VEHICLES WAS A LONG TERM PROJECT. ESTCOUNS DOESN'T EXPECT TO SEE MANY EV'S ON THE STREETS OF BEIJING IN THE NEXT FEW YEARS, NOR DOES HE EXPECT BEIJING'S AIR TO GET NOTICEABLY CLEANER AS A RESULT OF THIS PROGRAM.

SASSER

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ACTION OES-01

INFO	LOG-00	ACDA-08	ACDE-00	AGRE-00	AID-00	AIT-03	AMAD-01
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AMEMBASSY KUALA LUMPUR PRIORITY
AMCONSUL HONG KONG PRIORITY
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AMCONSUL SHANGHAI PRIORITY
AMCONSUL GUANGZHOU PRIORITY
AIT TAIPEI PRIORITY 7903
AMCONSUL CHENGDU PRIORITY

UNCLAS SECTION 01 OF 02 BEIJING 013187

DEPT FOR OES/EGC REIFSNYDER, WICKWIRE

EPA FOR OPPE/GARDINER, MCGARTLAND, FITZGERALD

DOE FOR PO/HASPEL, DIXON

DEPT PASS USAID FOR OGP/HALES, SEABRIGHT

DOC FOR NOAA OGP/HALL, BUIZER

E.O. 12958: N/A
TAGS: SENV, KSCA, CH
SUBJECT: CLIMATE CHANGE: U.S. COUNTRY STUDIES PROGRAM PROGRESS REVIEW FROM BEIJING

BEIJING 01 OF 02 13187

1. SUMMARY. DR. JOSEPH HUANG, OF THE U.S. COUNTRY STUDIES PROGRAM (USCSP) AND U.S. INITIATIVE ON JOINT IMPLEMENTATION (USIJI) SECRETARIAT OFFICE, VISITED BEIJING FROM JUNE 26 TO JUNE 29 TO REVIEW PROGRESS ON CHINA'S CLIMATE CHANGE COUNTRY STUDY AND NATIONAL ACTION PLAN. ON JUNE 27, HUANG MET WITH COUNTRY STUDY PROJECT STAFF AND KEY SCIENTISTS AT TSINGHUA UNIVERSITY WORKING ON PROJECTS IN THE CHINA COUNTRY STUDY AND NATIONAL ACTION PLAN. THE FINAL REPORT OF THE CHINA COUNTRY STUDY HAS BEEN COMPLETED AND REVIEWED BY PRC MINISTRIES AND USCSP, AND THE ENGLISH TRANSLATION IS UNDERGOING POLISHING IN THE USCSP OFFICE. PUBLICATION IS EXPECTED IN AUGUST. HUANG WAS TOLD THE DRAFT REPORT FOR THE NATIONAL ACTION PLAN WILL BE SUBMITTED FOR THE PRC GOVERNMENT REVIEW PROCESS BY MID-AUGUST. IF THERE ARE NO DELAYS, THE DRAFT NATIONAL ACTION PLAN WILL BE SUBMITTED TO THE USCSP OFFICE BY OCTOBER. END SUMMARY.

2. DR. JOSEPH HUANG, REGIONAL DIRECTOR FOR ASIA AND ISLAND NATIONS AND THE PROJECT OFFICER FOR THE CHINA COUNTRY STUDY AND ACTIVITIES IMPLEMENTED JOINTLY (AIJ) ACTIVITIES IN THE U.S. COUNTRY STUDIES PROGRAM (USCSP), VISITED BEIJING FROM JUNE 26 TO JUNE 29, AS PART OF AN

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EXTENDED TRIP TO REVIEW USCSP ACTIVITIES IN ASIAN COUNTRIES AND ATTEND THE 8TH ASIA-PACIFIC SEMINAR ON CLIMATE CHANGE IN PHUKET, THAILAND.

3. HUANG HELD MEETINGS ON JUNE 27 WITH THE CHINA CLIMATE CHANGE COUNTRY STUDY PROJECT OFFICE STAFF AND WITH SCIENTISTS AND ANALYSTS AT TSINGHUA UNIVERSITY WORKING ON THE NATIONAL ACTION PLAN. THE FINAL REPORT OF THE CHINA COUNTRY STUDY HAS BEEN COMPLETED AND REVIEWED BY ALL MINISTRIES AND DEPARTMENTS INVOLVED. U.S. CSP HAS ALSO REVIEWED AND COMMENTED ON THE DRAFT. THE MODIFIED COPY OF THE FINAL REPORT IS NOW IN THE OFFICE OF THE U.S. CSP FOR POLISHING IN ENGLISH. THE POLISHING WORK IS EXPECTED TO BE FINISHED BY THE END OF JULY AND THE REPORT WILL BE READY FOR PUBLISHING IN AUGUST.

4. ACCORDING TO THE PROJECT OFFICERS, CHINA'S NATIONAL ACTION PLAN EMPHASIZES ENERGY EFFICIENT TECHNOLOGIES ASSESSMENT. ALL INDIVIDUAL TASKS IN THE STUDY HAD BEEN COMPLETED AND WERE READY TO BE ASSEMBLED TOGETHER. THE DRAFT REPORT FOR THE NATIONAL ACTION PLAN WOULD BE DONE WITHIN A MONTH, BY MID AUGUST. AFTER IT IS APPROVED BY THE PRC GOVERNMENT REVIEW PROCESS, THE FINAL REPORT OF THE CHINA NATIONAL ACTION PLAN WILL BE SUBMITTED TO THE U.S. CSP OFFICE BY OCTOBER, 1998, IF THERE ARE NO UNEXPECTED DELAYS.

5. IN A SEPARATE MEETING, OFFICIALS FROM THE MINISTRY OF SCIENCE AND TECHNOLOGY CONFIRMED THIS GENERAL SCHEDULE FOR THE TWO REPORTS, AND DISCUSSED ANTICIPATED PERSONNNEL CHANGES IN THEIR MINISTRY (REPORTED SEPTEL). PARTICIPATING IN THIS MEETING WAS MR. LU XUEDU, THE DEPUTY DIRECTOR OF THE CLIMATE CHANGE AND ENVIRONMENT DIVISION, WHO HAS BEEN TABBED TO VISIT THE U.S. CSP OFFICE FOR THREE MONTHS AS A VISITING ANALYST. IN LARGE PART DUE TO JOB UNCERTAINTY FROM THE CURRENT RESTRUCTURING, LU REQUESTED THAT HIS SCHEDULED DEPARTURE FOR WASHINGTON BE DELAYED FOR TWO WEEKS, UNTIL THE END OF JULY. (NOTE: LU DEPARTED FOR WASHINGTON ON JULY 29.)

6. HUANG AND ESTOFF ALSO MET ON JUNE 29 WITH SCIENTISTS AND ANALYSTS AT TSINGHUA UNIVERSITY FROM THE NEWLY ESTABLISHED GLOBAL CLIMATE CHANGE INSTITUTE (TO BE REPORTED SEPTEL).

7. HUANG MADE A COURTESY CALL TO THE ENVIRONMENT, SCIENCE AND TECHNOLOGY COUNSELOR AND OTHER EST OFFICERS IN THE EMBASSY ON JUNE 30 BEFORE LEAVING FOR KUALA LUMPUR, MALAYSIA.

BEIJING 02 OF 02 13187

MCCAHILL

US Country Studies Program
China: 1993-1998

Background: Both the US and China are signatories to the 1992 U.N. Framework Convention on Climate Change. The US announced the US Country Studies Program (US CSP) to provide financial and technical assistance to developing and transition countries to help them meet their UNFCCC commitments. The Chinese Government elected to participate in the US CSP near the end of 1993.The US supported China Country Study was officially launched in October 1994. The study was extended in 1996 to include the work on China's Climate Change Action Plan.

Objectives: The China CSP is designed around the following four tasks:

1. Inventory of major GHG emissions,
2. Assessment of vulnerability and adaptation of climate change,
3. Identifications for climate change technologies and their socioeconomic implications,
4. Socioeconomic evaluation for China's response policies to climate change.

China's National Action Plan is focused on evaluating energy efficient technologies and cost-effective mitigation measures. The CSP results have been included in China's Ninth 5-year Plan.

Organization and Coordination: The oversight body of the China CSP is the State Environment Committee and the State Climate Change Coordination Group. Chaired by Dr. Song Jian, the former State Councillor and Chairman of the State Science and Technology Commission, major activities of both were directly reported to the China State Council. The supervision of the China CSP is under Vice-Minister Deng Nan, Ministry of Science and Technology (MoST). The CSP National Coordinator is Prof. Gan Shijun, formerly a Director General of MoST. The Scientific Coordinator is Prof. Wu Zhongxin of Tsinghua University. Other participating Agencies and NGO's include: State Development and Planning Commission, State Environmental Protection Administration, China Meteorological Administration, State Oceanic Administration, Chinese Academy of Sciences, the Tsinghua University, coal and power companies, and many others.

Funding: The total US support from October 1994 till August 1998 is about two million US dollars (including the China CSP, National Action Plan and Visiting Analyst Program), with additional support about one-third to half of that amount on technical assistance.
Current Status: The China Country Study is completed. The draft final report has been submitted to the US CSP for technical review and is expected to be published by October, 1998.

Additional Accomplishments:
1. China has published numerous reports on CSP and also hosted an international mitigation technology workshop sponsored by the US CSP in November, 1997 with great success.
2. Through CSP, the US has helped China to elevated the climate change issue to the senior level officials and trained more than 100 more Chinese analysts from over 15 state ministries and NGO's to the largest climate change analysis in ever conducted in China.
3. Under the Visiting Analyst Program in CSP, the US has invited Mr. Wang Weizhong from the Ministry of Science and Technology to visit and work in the US CSP for six months. Mr. Wang is now the Director General of the China Agenda 21 Office, playing an important role in climate change and environment. His Deputy, Mr. Lu Xuedu is now visiting the US CSP for three month.

U.S. Country Studies Program
Korea Activities: 1994-1998

Background: Since 1994 the U.S. Country Studies Program (CSP) has offered informal technical assistance to Republic of Korea. For example, in 1995, approximately 5 senior analysts from Korea Energy Economics Institute (KEEI) and Ministry of Trade, Industry and Energy (MoTIE) attended a two-week U.S. CSP Training Workshop on Assessing Greenhouse Gas Mitigation Options at LBNL, Berkeley, CA. Korean colleagues were given highly specialized training, handbooks, sophisticated economic models and other tools to help them meet their commitments under the U.N. FCCC. No formal financial assistance was offered under U.S. CSP since Korea is not considered a developing country. U.S. CSP helped build human and institutional capacity in a number of Korean academic, governmental and non-governmental institutions (see list below).

U.S.-Korea Multilateral Workshops: In 1995 the U.S. CSP and KEEI, MoTIE with cooperation from the Asian Development Bank co-managed and co-sponsored "Regional Workshop on Greenhouse Gas Emissions Inventory and Mitigation Strategies for Asian and Pacific Countries", Seoul. The workshop was a venue to: (a) present results of inventory and mitigation assessments, (b) discuss methodologies and data issues, (c) exchange knowledge between experts and analysts, and , (d) build consensus for climate change mitigation efforts among Asian and Pacific countries. The workshop results and information formed the basis for each participating country's national climate change action plan and in some instances, their National Communications. About 100 participants from approximately 20 countries attended. Senior officials from MoTIE participated in the workshop. The results of this workshop were published by The Royal Swedish Academy of Sciences in *Ambio,* 1996.

In 1998, U.S. CSP helped Korea present results from climate change vulnerability and adaptation assessments in the Pacific Congress for Marine Science and Technology, Seoul.
The Congress was led by Minister of Marine Affairs and Fisheries, Dr. Sun Kil Kim.

Potential Joint Implementation activities: MoTIE and KEEI have expressed interest in the activities of U.S. Initiative on Joint Implementation (IJI). Senior officials have been briefed on U.S. IJI and preliminary discussions reveal that S. Korea may want to develop one or more projects under the U.N. FCCC AIJ pilot. Institutions in Korea that have expressed interest in AIJ projects include: KEEI, MoTIE, Kim Dae-jung Peace Foundation for the Asia Pacific Region, Forestry Research Institute, Korea Environment Institute, Korean Federation for Environmental Movement, Korea Electric Power Corporation, Institute of Pusan Environmental Studies, Citizens for Coalition for Economic Justice, and others.

Recommendation: Assistant Secretary Kimble and delegation should explore development of specific joint implementation projects with Korean officials. The analytical and programmatic basis for this cooperation exists, and, Korea may benefit from "learning by doing".. The U.N. FCCC AIJ national focal point is the Environment Cooperation Division, Ministry of Foreign Affairs.

BACKGROUND PAPER
ENVIRONMENTAL CHANGE AND HUMAN HEALTH

As a result of the worst floods in decades, on August 24, 1998, China's state media issued warnings that epidemics had emerged as a threat and incidence of intestinal disease, dysentery, hepatitis, and colds were higher than last year. In addition to the shortage of medicine, the high risk of epidemics is due to massive relocations, crowded conditions and poor sanitation.

This situation illustrates a consequence of changed environmental conditions. Opportunistic organisms that directly or indirectly prey on human health gain ground when natural safeguards are eroded by human activity, or are disrupted by drought or floods. Environmental conditions, coupled with biological factors that include the evolution of pathogens and the prevalence of the insects and rodents that carry disease, can exert profound effects on human health and well-being. Thirty diseases new to medicine, like HIV, toxic E. coli, and hantavirus, have emerged in the last 20 years. In the same period, age-old scourges such as cholera, plague, yellow and dengue fever, and tuberculosis, have resurged in many parts of the world.

In China, an aggressive campaign over the past 50 years to improve primary health care and tackle infectious disease has been successful. Since 1949, the average life span in China has risen from 35 years to the current 70 years. Infectious diseases, while still a serious problem in some parts of the country, claim the lives of only 0.0004 percent of the population each year.

Over the coming decades, however, China's deteriorating environment threatens to undermine the gains that rising incomes would otherwise bring. Since the economic reforms of 1978, China has experienced dramatic industrialization and rising energy use against a backdrop of population growth and unprecedented urbanization.

This rapid industrialization, urbanization, and economic growth are contributing to respiratory diseases and chronic illnesses like cancer. Levels of particulate air, pollution from energy and industrial production in several of China's megacities, such as Shanghai and Shenyang, are among the highest in the world, leading to corresponding problems of lung disease in their populations.

China also suffers from a number of diseases associated with inadequate drinking water quality and sanitation. For the past two decades, diarrheal diseases and viral hepatitis, both diseases associated with fecal pollution, have been the two leading infectious diseases in China. The incidence of dysentery has risen since 1994, in part because of the deterioration of water quality.

Though social conditions and enlightened public health measures impact the spread of infectious disease, ecological stability is necessary to keep opportunistic disease carriers and pathogens under control. Climate change, combined with biodiversity loss and other environmental stresses, will almost certainly aid the prevalence and spread of infectious disease, largely through effects on the prevalence and distribution of pests and pathogens.

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SECTION 01 OF 02

SENSITIVE

WHITE HOUSE FOR CEQ SANDALOW, CEA YELLEN, OVP NORRIS AND
OSTP BEHRING

USDOE FOR INTERNATIONAL AFFAIRS, USCSP BOB DIXON

DEPT FOR EAP/CM, OES/EGC, OES KIMBLE

EPA FOR OIA BAILEY

E.O. 12958: N/A
TAGS: SENV, ENRG, TRGY, KSCA, CH
SUBJECT: DOE, MST ENERGY-EFFICIENT BUILDING
DEMONSTRATION AGREEMENT SIGNED
EZ05:

REF: A) BEIJING 10946

1. (SBU) SUMMARY. ON JULY 9, THE U.S. DEPARTMENT OF
ENERGY AND CHINA'S MINISTRY OF SCIENCE AND TECHNOLOGY
AGREED TO A STATEMENT OF WORK TO DEVELOP A JOINT
DEMONSTRATION PROGRAM FOR APPLYING ENERGY-SAVING
TECHNOLOGIES TO COMMERCIAL BUILDINGS IN CHINA.
AMBASSADOR JAMES SASSER SIGNED ON BEHALF OF THE

*** UNCLASSIFIED ***

DEPARTMENT OF ENERGY, AND VICE MINISTER MADAME DENG NAN SIGNED FOR THE MINISTRY OF SCIENCE AND TECHNOLOGY (MOST). THE CHINESE SIDE CAME OUT IN FORCE, WITH MOST OF THE AGENCIES INVOLVED IN CLIMATE CHANGE ISSUES REPRESENTED. FROM THE INTER-AGENCY REPRESENTATION AND THE DISCUSSION THAT PRECEDED THE SIGNING CEREMONY, IT WAS CLEAR THAT THE CHINESE ARE VIEWING THIS AGREEMENT AS A SIGNIFICANT ACTION TO ADDRESS CLIMATE CHANGE. END SUMMARY.

2. (U) ON JULY 9 AT THE DIAOYUTAI GUEST HOUSE IN BEIJING, THE U.S. DEPARTMENT OF ENERGY AND CHINA'S MINISTRY OF SCIENCE AND TECHNOLOGY AGREED TO A STATEMENT OF WORK TO DEVELOP A JOINT ENERGY-EFFICIENCY BUILDING DEMONSTRATION PROGRAM. AMBASSADOR JAMES SASSER SIGNED ON BEHALF OF THE DEPARTMENT OF ENERGY, AND VICE MINISTER MADAME DENG NAN SIGNED FOR THE MINISTRY OF SCIENCE AND TECHNOLOGY (MOST). THIS AGREEMENT HAD ORIGINALLY BEEN EXPECTED TO BE SIGNED ALONG WITH THE OTHER U.S.-CHINA GOVERNMENTAL AND COMMERCIAL CONTRACTS ON JUNE 30 DURING THE SUMMIT VISIT, BUT WAS DELAYED.

3. (U) PARTICIPANTS: THE CHINESE SIDE CAME OUT IN FORCE, WITH THE PRIMARY AGENCIES INVOLVED IN CLIMATE CHANGE ISSUES REPRESENTED. ASIDE FROM VM DENG, MOST OFFICIALS INCLUDED DIRECTOR GENERAL DR. GAN SHIJUN, ASSISTANT DIRECTOR GENERAL MR. WANG WEIZHONG, AND MR. LU XUEDU, ALL FROM THE MOST DEPARTMENT OF SCIENCE AND TECHNOLOGY FOR SOCIAL DEVELOPMENT, WHICH DEVELOPED THE AGREEMENT WITH DOE, AND MR. JIN XIAOMING, DEPUTY DIRECTOR GENERAL FOR INTERNATIONAL COOPERATION AT MOST, AND MR. CHEN FUTAO, DIRECTOR OF MOST'S NORTH AMERICA DESK. OTHER AGENCIES REPRESENTED INCLUDED MOFA'S OFFICE OF TREATIES AND LAW (MR. LIU ZHENMIN), SDPC, SETC, AND CHINA METEOROGICAL ADMINISTRATION. THE VICE PRESIDENT OF QING HUA UNIVERSITY MR. HE JIANKUN AND PROFESSOR LIU DESHUN OF QING HUA UNIVERSITY'S INSTITUTE OF CLIMATE CHANGE RESEARCH ALSO ATTENDED. WITNESSING THE SIGNING FOR THE U.S. WERE ESTCOUNS DAVID BLEYLE, ESTOFF DUNCAN MARSH AND FSN ESTOFF QIAN QIHONG (INTERPRETER).

4. (U) USIS WILL DISTRIBUTE A PRESS ANNOUNCEMENT ON THE SIGNING.

DISCUSSION FOCUSES ON CLIMATE CHANGE EFFORTS:

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5. (SBU) THE SIGNING CEREMONY WAS PRECEDED BY A DISCUSSION BETWEEN AMBASSADOR SASSER AND VICE MINISTER DENG ON A VARIETY OF ENVIRONMENTAL ISSUES, INCLUDING CLIMATE CHANGE. DENG CHARACTERIZED THE AGREEMENT AS AN

WORKING PAPERS

IMPORTANT STEP IN ADDRESSING CLIMATE CHANGE. SHE REITERATED SOME OF THE POINTS SHE HAD MADE IN THE PREVIOUS WEEK'S DISCUSSION WITH CEA CHAIR JANET YELLEN ON CLIMATE CHANGE (REFTEL A), BUT SEEMED NOTICEABLY MORE OPEN TOWARD COOPERATION THIS TIME. DENG AGAIN NOTED THE TREMENDOUS GAINS MADE IN ENERGY EFFICIENCY -- PRODUCTIVITY INCREASES DOUBLING THE PACE OF ENERGY CONSUMPTION INCREASES DURING THE 1990S -- AS ONE OF CHINA'S MAJOR CONTRIBUTIONS TO THE CLIMATE CHANGE SOLUTION, AND THAT THROUGH FOCUSED CHINESE GOVERNMENT EFFORTS, THIS TREND IS LIKELY TO CONTINUE IN THE FUTURE. SHE POINTED OUT AGAIN THAT THE ACTIVITIES IMPLEMENTED JOINTLY (AIJ) PROGRAM ALREADY HAS AN ESTABLISHED SET OF RULES, WHEREAS THE CLEAN DEVELOPMENT MECHANISM (CDM) DOES NOT, BUT SUGGESTED THAT WE NEED TO WORK TOGETHER TO

SENSITIVE

WHITE HOUSE FOR CEQ SANDALOW, CEA YELLEN, OVP NORRIS AND OSTP BEHRING

USDOE FOR INTERNATIONAL AFFAIRS, USCSP BOB DIXON

DEPT FOR EAP/CM, OES/EGC, OES KIMBLE

EPA FOR OIA BAILEY

E.O. 12958: N/A
TAGS: SENV, ENRG, TRGY, KSCA, CH
SUBJECT: DOE, MST ENERGY-EFFICIENT BUILDING DEMONSTRATION AGREEMENT SIGNED

REF: A) BEIJING 10946

DEVELOP RULES FOR THE CDM. SHE REPEATED HER STATEMENT OF THAT MEETING -- BUT SEEMINGLY WITH MORE CONVICTION -- THAT CHINA, THOUGH IT WAS NOT ONE OF THE DEVELOPED COUNTRIES UNDER THE KYOTO PROTOCOL THAT CAN PARTICIPATE IN EMISSIONS TRADING, IS WILLING TO WORK WITH OTHER COUNTRIES TO HELP DEVELOP THE RULES FOR A TRADING SYSTEM. DENG SAID MOST WOULD WELCOME FURTHER MEETINGS WITH THE USG TO DISCUSS THE CDM AND EMISSIONS TRADING.

6. (SBU) COMMENT. FROM DENG'S COMMENTS AND THE INTER-AGENCY REPRESENTATION, IT WAS CLEAR THAT THE CHINESE ARE VIEWING THIS AGREEMENT AS SUBSTANTIAL COOPERATION ON CLIMATE CHANGE-RELATED RESEARCH.

7. (SBU) COMMENT. IN HER JUNE 29 MEETING WITH CEA CHAIR YELLEN (REFTEL A), ONE OF DENG'S SUGGESTIONS WAS THAT WE

CONCLUDE THIS ENERGY-EFFICIENT BUILDING AGREEMENT AS SOON AS POSSIBLE. (NOTE: THE CHINESE HAD ANTICIPATED THAT THE AGREEMENT WOULD BE SIGNED DURING THE SUMMIT, AND WERE DISAPPOINTED THAT THE U.S. WAS NOT ABLE TO AGREE TO THIS. END NOTE.) WITH THE JULY 9 SIGNING, DENG'S REQUEST WAS PROMPTLY GRANTED, WHICH MAY BE THE REASON FOR HER APPARENT INCREASED OPENNESS TOWARD COOPERATION ON BROADER CLIMATE CHANGE ISSUES. IN CHINESE TERMS, WE HAVE GIVEN HER SIGNIFICANT FACE. CERTAINLY, THE TONE OF HER DISCUSSION WAS MORE POSITIVE THAN IN THE YELLEN MEETING, EVEN WITH THE PRESENCE OF MOFA CLIMATE CHANGE NEGOTIATOR LIU IN THE ROOM AGAIN. IN THIS MEETING, DENG AGAIN DEMONSTRATED HER CONSIDERABLE KNOWLEDGE OF THE CLIMATE CHANGE ISSUES.

8. (U) THIS CABLE REFERS TO ELEMENTS OF THE KYOTO PROTOCOL TO THE UN FRAMEWORK CONVENTION ON CLIMATE CHANGE. MORE INFORMATION ON THE PROTOCOL AND THE CONVENTION CAN BE ACCESSED AT HTTP;/WWW.UNFCCC.DE/ AND AT HTTP;/WWW.STATE.GOV/WWW/GLOBAL/OES/ .

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Date: 5/18/00 Number of pages: 3 (incl cover)

Fax to:
Joe Aldy

Organization:

Fax Number:
(202) 395-6870

___ As Requested
✓ Per Conversation
___ Per Memorandum

___ For Action
___ For Comments
___ For Your Information

Message:

From: Malcolm Shealy Fax Number (703) 762-8082

Phone No: (703) 874-1686

5/18/00

Joe,

Feel free to modify or discard these as you see fit. If you have questions please give me a call. I should be here until 5:45PM this evening. It would be nice if you could FAX us a courtesy copy of your memo to Ted so that if Ted calls while you are away we are talking from the same notes. Thanks.

--Malcolm

Additional Points on Chinese Energy/ Carbon Emissions

Models that can address the impact of a carbon tax on carbon emissions in China are in their infancy. A number of the models used in the recent EMF analysis were of necessity based on old data, and were relatively highly aggregated. Due to limitations in available input/output data, some were unable to include key fuels, such as natural gas and hydroelectricity.

Preliminary carbon tax model results vary widely, with the impact of global trading ranging from a 3% reduction in Chinese carbon emissions to a 20% reduction. (See the appendix for specifics.)

None of the models can as of yet evaluate the tradeoff between CDM and emissions trading. However, we probably don't need a model to determine which approach is best.

Some forecasts for Chinese carbon emissions have dropped significantly in the last year or so. The lower forecasts are driven by lower economic growth rates, combined with a decline in coal consumption and slowing of growth in electricity consumption due to SOE reform. Even without carbon trading, one forecast for carbon emissions is lower than 1,000 mmtc in 2010. This assumes the Chinese follow through with stated plans for development of natural gas, nuclear, hydro, and renewables. The 1,000 mmtc forecast is lower than any of the models in the EMF study.

Electric generating technologies vary widely in the cost per ton of carbon removed. Relative to a standard coal-fired plant, advanced coal-based technologies such as IGCC and fluidized bed have the highest cost per ton of carbon removed--on the order of $200/ton. The cost is high because using the advanced technologies roughly doubles the capital cost of a coal plant, while removing only a little carbon. Natural gas fueled electric plants are much less expensive, on the order of $50/ton of carbon removed. Nuclear, wind, and hydroelectricity offer the least expensive way of removing carbon, with costs on the order of $20-$30/ton removed.

Would the below be useful at all for background?

China should continue to experience a large "windfall" increase in energy efficiency as SOEs are reformed and China comes to rely more on market forces and foreign technology. This windfall translates into slow growth in carbon emissions as energy use continues to grow significantly more slowly than the economy. This windfall depends primarily on market liberalization. Benefits from carbon trading would be above and beyond these.

China may also experience a surge in energy demand (and so in carbon emissions) as its population becomes more prosperous. This would be further down the road than the SOE reform.

"No-Lose" Targets for Developing Countries

"No-lose" targets for developing countries could serve as a mechanism that could address developing countries' concerns about targets constraining economic development while allowing them to take on quantitative targets that could provide the basis for trading. A no-lose target would effectively provide a quantitative goal for developing countries, but with a differentiated compliance regime: if a developing country has emissions in excess of the no-lose target, there would be no penalty for non-compliance.

- *Target Level.* A no-lose target could cover the first commitment period. This kind of target could be a fixed growth target (e.g., percentage of a base year) or an indexed growth target. The targets would be set above current emission levels but below projected BAU emissions. We recommend that the no-lose target be more stringent than a target with downside risk (e.g., a binding growth target with a compliance regime comparable to Annex B targets' compliance regime).

- *Trading No-Lose Target Credits.* An evaluation of performance at the end of the commitment period could serve as the basis for trading. With no-lose targets, credits would be generated only during an ex post evaluation and there would be no downside risk if efforts to abate emissions were not successful; thus, a developing country would never be a buyer of emissions allowances. The developing country may sell the emissions representing the difference between its actual emissions and its non-binding cap. These no-lose target credits could be sold during the "true-up" period at the end of the first commitment period to those Annex I countries needing additional emissions allowances to meet their targets. Alternatively, these credits could be banked for use in the second or subsequent commitment periods.

Further Issues for Discussion

- Which countries should be the focus for this approach?
- How does this approach interact with efforts to get non-Annex I countries to take on binding targets in the first commitment period?
- How does this approach interact with efforts to get non-Annex I countries to take on binding targets for the second commitment period?
- Other issues?

SBrown@abare.gov.au
05/02/2000 01:55:24 AM

Record Type: Record

To: Joseph E. Aldy/CEA/EOP

cc:
Subject: RE: China

Joe,
thanks for your inquiry about our Chinese modeling work. To give you some quick answers about our Chinese results I can tell you that we use our own GDP forecasts and primary energy demand is a model result. Of the results you were after from our EMF paper:

Key Chinese results from EMF-16 Special Issue

			1995	2000
2010				
Reference case				
GDP	1992 US$ million		656	960
1714				
Carbon dioxide	000 tonnes	2849	3964	6846
Energy consumption	exajoules	33	46	79
Global trading				
GDP	1992 US$ million		656	958
1703				
Carbon dioxide	000 tonnes	2849	3608	5482
Energy consumption	exajoules	33	42	64

With this version of the model I can't disaggregate energy consumption as you've asked. I can with the latest version of the model, however, that has an energy module based on 1995 IEA data to which our model's projections are applied. If you think it would help you I could put together, as close as possible to your specifications, our Chinese energy baseline. At this stage we haven't undertaken a global trading scenario with the latest version of the model.

Regards,
Steve Brown

TO: Joe Aldy, Council of Economic Advisors
FROM: Mun Ho and Richard Garbaccio
DATE: May 8, 2000
RE: Results from our China model simulations

This is in reference to your e-mail of April 30 asking for information about and output from our model. Here are some notes, followed by a table with model outputs:

1) Ours is a one-country model, and hence does not analyze issues such as "global carbon permit trading."

2) What we have done is to project a base case (BAU) and alternative cases where emissions are 5%, 10%, and 15% lower than the base case in every year. The carbon tax required to achieve this is best understood in terms of the effects on the prices of coal and oil.

   It is most dangerous to try to convert these to US$ without a detailed set of reference prices. In other words, if you ask the question "What would China be willing to cut if offered a price of *P* dollars/ton of carbon?" then the answer is a very complicated one depending on how the government chooses to value that *P*. We have deliberately not done this.

3) We should state again that in the top down structure of our model, there are only four energy related sectors – coal extraction, petroleum and gas extraction, petroleum refining, and electricity generation. These are the sectors available in the Chinese sources we use to construct our data base (primarily the 1992 input-output table). There is no explicit consideration of hydro, nuclear, or other technologies – these are all subsumed in the electricity generation sector. This sector is modeled in a simple manner with a generous estimate of the elasticities of substitution (i.e. to produce electricity it is relatively easy to substitute energy for capital on the one hand, and relatively easy to substitute coal for oil on the other). While this is not realistic in the short run, the longer term true elasticities for China are unknown as far as I am concerned. Hence the reasonableness of our results (or those of any other similar model) should be examined with this in mind.

4) When we did the simulations reported in the paper you have, we had only 1992 data and we ran the simulation forward from that. That is, the estimates in the table below for 1995 are the model's and not actual 1995 data.

5) The prices reported from the model are relative to the model's numeraire. So they should really only be used to calculate percentage changes.

6) The base case for our model (and any other model) depends on many exogenous assumptions. When these were made in 1996-97 or so, they were based on what were then thought to be fairly optimistic guesses about productivity growth and energy saving. These have turned out to underguess the actual performance of the reduction in energy use. We should stress, however, that we think simulation results such as these should only be used to estimate percentage changes between the base and alternative cases. Similarly, the aim of

this work was not to provide base case scenarios. This was done in an earlier paper by Ho, Jorgenson, and Perkins (available at www.ksg.harvard.edu/tep/).

Selected China Model Output

	1995		2000		2010	
	BAU	5% Reduction Case	BAU	5% Reduction Case	BAU	5% Reduction Case
GDP (bil. 1992 *yuan*)	3,459	3,461	5,054	5,060	9,229	9,252
Carbon emissions (mil. tons)	780	741	1,029	977	1,531	1,454
Coal price	0.815	0.865	0.617	0.655	0.430	0.458
Carbon tax per ton ('92 *yuan*)		8.55		8.36		8.52
Coal consumption (mil. tons)	1,257	1,181	1,641	1,541	2,406	2,256
Oil consumption (mil. tons)	171	170	225	224	347	345
Electricity consumption (Twh)	944	936	1,510	1,500	3,207	3,193

dd: 80, 2nd Section, Renmin South
Chengdu 610012, Sichuan, China
-Mail: ajjhsw@shell.scsti.ac.cn
ttp://www.chengdujinjianghotel.com

China gets US$13.44m loan to check air pollution

By JIANG CHEN
China Daily staff

The United States and China signed a US$13.44 million subsidized-loan agreement yesterday for air-quality monitoring to help China improve urban air quality.

The loan will be used to buy advanced air-quality monitoring equipment from the California-based Dasibi Environmental Corporation.

Officials from China's State Environmental Protection Administration said the loan will help set up automated monitoring systems in 33 seriously polluted big cities. This move, they say, is necessary to report and forecast daily air quality.

The contract is the second and biggest Sino-US environmental programme to date. China and the United States signed the first air-monitoring agreement in 1998,when US President Bill Clinton visited China.

That year the United States loaned US$5.12 million and donated another $145,000 to set up air-quality monitoring systems.

Zhu Guangyao, vice-minister of China's State Environmental Protection Administration, said at yesterday's Beijing signing ceremony that promoting environmental co-operation between the two nations is in the interest of both and will significantly help the planet's environment.

He said he hopes the two countries further expand economic and technological co-operation and thereby improve overall friendship.

ard

"Richels, Richard" <RRichels@epri.com>
08/20/99 12:11:39 PM

Record Type: Record

To: Joseph E. Aldy/CEA/EOP

cc:
Subject: RE: one more thing

Joe,

Sorry for the delay.

1300 million tons.

Cheers,

Rich

> -----Original Message-----
> From: Joseph_E._Aldy@cea.eop.gov [SMTP:Joseph_E._Aldy@cea.eop.gov]
> Sent: Thursday, August 19, 1999 7:01 AM
> To: RRICHELS@epri.com
> Subject: one more thing
>
> Richard,
>
> Could you do one more favor? We may do a table with various model
> results,
> and I think it might be more appropriate to present emissions reductions
> as
> a percentage of 2010 BAU instead of absolute numbers. Could you email me
> your estimate for China 2010 BAU?
>
> Thanks again for all of your help.
>
> Joe
>

SBrown@abare.gov.au
08/24/99 08:42:34 PM

Record Type: Record

To: Joseph E. Aldy/CEA/EOP

cc:
Subject: RE: ABARE-GTEM model results for China

Joe,
thanks for your Email. We've only run the global emissions trading scenario in the context of the EMF model comparison exercise so I can only provide you with results for the CO2 only version of GTEM. Here are the numbers you were after:

1) China's 1990 emissions of carbon dioxide were 2167 MT. At 2010 emissions are projected to be 6845 MT CO2.

2) The carbon price under the global trading scenario is $US 24.84.

3) China's emissions are projected to decline by 19 per cent relative to the reference case at 2010 under the global trading scenario.

4) Chnia's GDP is projected to decline by around 0.6 per cent relative to the reference case at 2010 under the global trading scenario.

If you need any other information just let me know.

Regards,

Steve Brown

-----Original Message-----
From: Joseph_E._Aldy@cea.eop.gov [mailto:Joseph_E._Aldy@cea.eop.gov]
Sent: Tuesday, 24 August 1999 23:52
To: sbrown@abare.gov.au
Subject: ABARE-GTEM model results for China

Stephen Brown,

We are pulling together research on the economic effects of emissions abatement in China for some of our climate change work. I noticed in your recent Energy Journal article that you have completed several Annex I trading scenarios, but you did not present any global trading cases (or

other scenarios that would include abatement by China). In addition, I noticed in your report "Economic Impacts of the Kyoto Protocol: Accounting for Three Major Greenhouse Gases" on the ABARE website that you present results only from Annex I trading. However, the Weyant and Hill overview piece in the Energy Journal provides results from ABARE-GTEM for a global trading scenario. We would very much appreciate any summary data you could provide from your global trading scenario. Specifically, the data we would like for the China module in your model include:

2010 China BAU/reference CO2 emissions (or alternatively, 1990 emissions, since your report on the website provides the 1990-2010 emissions growth rate)
2010 carbon price under Kyoto Protocol with global trading
2010 China CO2 emissions under Kyoto Protocol with global trading
2010 China GDP measure under Kyoto Protocol with global trading
The same information for all three major greenhouse gases, if it is easily accessible.

Thank you for any assistance you can provide on this matter.

Joe Aldy
Council of Economic Advisers
Old Executive Office Building, Room 319
Washington, DC 20502
202-395-1455
202-395-6870 (FAX)
joseph_e._aldy@cea.eop.gov

Mikiko <mikiko@nies.go.jp>
08/24/99 09:32:37 PM

Record Type: Record

To: Joseph E. Aldy/CEA/EOP

cc:
Subject: Re: AIM model results for China

Dear Mr. Joe Aldy

Followings are the data you requested.

2010 China BAU/reference emissions
1.126 GtC
2010 carbon price under Kyoto Protocol with global trading
38US$(year 1992) /ton Carbon
2010 China emissions under Kyoto Protocol with global trading
1.094 GtC
2010 China GDP measure under Kyoto Protocol with global trading
GDP BaU 1199.51 Billion US$ (year 1992)
Global Trading 1194.86 Billion US$ (year 1992)

Sincerely yours,
Mikiko Kainuma

>Mikiko Kainuma,
>
>We are pulling together research on the economic effects of emissions
>abatement for China for some of our climate change work. I noticed in your
>recent Energy Journal article an analysis you undertook that includes
>China: global trading. We would very much appreciate any summary data you
>could provide on this scenario, especially by the end of this week given
>the tight deadline we are operating under. Specifically, the data we would
>like for the China module in your model include:
>
>2010 China BAU/reference emissions
>2010 carbon price under Kyoto Protocol with global trading
>2010 China emissions under Kyoto Protocol with global trading
>2010 China GDP measure under Kyoto Protocol with global trading
>
>Thank you for any assistance you can provide on this matter.
>
>Joe Aldy
>Council of Economic Advisers
>Old Executive Office Building, Room 319

>Washington, DC 20502
>202-395-1455
>202-395-6870 (FAX)
>joseph_e._aldy@cea.eop.gov
>
>
>

Mikiko Kainuma
Global Environment Division
National Institute for Environmental Studies
16-2, Onogawa, Tsukuba
305-0053 Japan
Tel: +81-298-50-2422
Fax: +81-298-50-2524
E-mail: mikiko@nies.go.jp

Mikiko <mikiko@nies.go.jp>
08/25/99 09:03:57 PM

Record Type: Record

To: Joseph E. Aldy/CEA/EOP

cc:
Subject: Re: AIM model results for China

Dear Joe,

As for 2010, The Former Soviet Union is still the major exporting country of carbon emission rights, 0.346 GtC that was 0.413 GtC in Annex I trading. The price of carbon is 65$ in case of Annex I trading.

The emisison of non-Annex I countries is limited by their BaU emissions, however
that of FSU is limitted by the 1990 emissions which is higher than BaU (hot air).
Up to 2030, more than half of emission rights will be traded between FSU and other Annex I countries.

In case of global trading, China, India, Laten America and other countries will export emissions, so the carbon price will decrease compared to Annex I trading case,

Mikiko

> that China could abate emissions a significant amount below 2010 BAU (for
> example, 15-25% below BAU), even at relatively low carbon prices
> ($25-$50/ton). In your analysis, you found very modest emissions
> reductions (about 3% below 2010 BAU) at $38/ton. What do you see as the
> key factors in the Chinese economy that limit the potential for China to
> abate carbon emissions? How does your model account for pre-existing
> distortions in the Chinese economy, taxes and subsidies, as well as the
> partially planned nature of the economy? Finally, what non-Annex I
> countries/regions in your model are the major low-cost abaters that help
> lower the price of carbon when moving from Annex I trading to global
> trading?
>
> Thank you for your time in helping me better understand your analysis.
> Have a good day.
>
> Joe
>
>
>
>
>

>
> (Embedded
> image moved Mikiko <mikiko@nies.go.jp>
> to file: 08/24/99 09:32:37 PM
> PIC11861.PCX)
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>
>
>
>Record Type: Record
>
>
>To: Joseph E. Aldy/CEA/EOP
>
>cc:
>Subject: Re: AIM model results for China
>
>
>
>
>Dear Mr. Joe Aldy
>
>Followings are the data you requested.
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> 1.126 GtC
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>2010 China GDP measure under Kyoto Protocol with global trading
> GDP BaU 1199.51 Billion US$ (year 1992)
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>Sincerely yours,
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> >Mikiko Kainuma,
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> >recent Energy Journal article an analysis you undertook that includes
> >China: global trading. We would very much appreciate any summary data you
> >could provide on this scenario, especially by the end of this week given
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> >like for the China module in your model include:
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> >2010 China BAU/reference emissions
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> >2010 China emissions under Kyoto Protocol with global trading
> >2010 China GDP measure under Kyoto Protocol with global trading
> >
> >Thank you for any assistance you can provide on this matter.

> >
> > Joe Aldy
> > Council of Economic Advisers
> > Old Executive Office Building, Room 319
> > Washington, DC 20502
> > 202-395-1455
> > 202-395-6870 (FAX)
> > joseph_e._aldy@cea.eop.gov
> >
> >
> >
> ----
> Mikiko Kainuma
> Global Environment Division
> National Institute for Environmental Studies
> 16-2, Onogawa, Tsukuba
> 305-0053 Japan
> Tel: +81-298-50-2422
> Fax: +81-298-50-2524
> E-mail: mikiko@nies.go.jp
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Fax: +81-298-50-2524
E-mail: mikiko@nies.go.jp

Joseph Guenther Boyer <joseph.boyer@yale.edu>
09/01/99 10:41:02 AM

Record Type: Record

To: Joseph E. Aldy/CEA/EOP

cc:
Subject: RE: RICE results for China

Joseph:

Sorry to be so late on this. I put all my emails on the backburner last week, and then they slipped my mind. Here are the numbers you asked for. These represent the output of the RICE model that underlies the Energy Journal article you mentioned.

2010 China Reference case emissions: 1336.8 MMtC
2010 Carbon price with Kyoto Protocol, global trading: $18.17 per tonne
2010 China emissions with Kyoto Protocol, global trading: 1155.2 MMtC
2010 China GDP with Kyoto Protocol, global trading: $1643.09 billion. (This is in 1990 US dollars, converted using market exchange rates)

I will be happy to answer any further requests, and next time the reply will be more expeditious.

Joe Boyer
joseph.boyer@yale.edu

Department of Economics
Yale University
28 Hillhouse Ave
New Haven, CT 06511
(203) 432-3581

PS: I would be interested in hearing about any working paper or publication that you guys put together on the the economic effects of emissions abatement in China. I'd appreciate it if you could send me a notification by email if you produce a paper for circulation. Thanks.

-----Original Message-----
From: Joseph_E._Aldy@cea.eop.gov [mailto:Joseph_E._Aldy@cea.eop.gov]
Sent: Tuesday, August 24, 1999 9:57 AM
To: joseph.boyer@yale.edu
Subject: RICE results for China

Joseph Boyer,

We are pulling together research on the economic effects of emissions abatement for China for some of our climate change work. I noticed in your recent Energy Journal article that your global trading analysis includes China. We would very much appreciate any summary data you could provide on this scenario, especially by the end of this week given the tight deadline we are operating under. Specifically, the data we would like for the China module in your model include:

2010 China BAU/reference emissions
2010 carbon price under Kyoto Protocol with global trading
2010 China emissions under Kyoto Protocol with global trading
2010 China GDP measure under Kyoto Protocol with global trading

Thank you for any assistance you can provide on this matter.

Joe Aldy
Council of Economic Advisers
Old Executive Office Building, Room 319
Washington, DC 20502
202-395-1455
202-395-6870 (FAX)
joseph_e._aldy@cea.eop.gov

Joseph Guenther Boyer <joseph.boyer@yale.edu>
09/17/99 04:43:39 PM

Record Type: Record

To: Joseph E. Aldy/CEA/EOP

cc:
Subject: RE: RICE results for China

Joseph:

The RICE BAU GDP for China from that paper was $1649.4 billion. We include the permit revenue in GDP, so in the global trading case, the GDP goes up -- the permit sales more than offset the loss in GDP due to carbon abatement.

Joe Boyer
joseph.boyer@yale.edu

Department of Economics
Yale University
28 Hillhouse Ave
New Haven, CT 06511
(203) 432-3581

-----Original Message-----
From: Joseph_E._Aldy@cea.eop.gov [mailto:Joseph_E._Aldy@cea.eop.gov]
Sent: Friday, September 03, 1999 2:45 PM
To: Joseph Guenther Boyer
Subject: RE: RICE results for China

Joe,

Thanks a lot for sending the modeling results. It would be great if you could also provide the 2010 BAU GDP forecast for China, so we can compare GDP with and without Kyoto. Since the weekend is upon us, please feel free to respond when you have the time next week. We do not actually plan to use the GDP number, but I am curious to know the direction of GDP under global participation. (While most models indicate China can abate a significant number of tons below 2010 BAU at relatively low carbon prices, they tend to vary in terms of GDP effects.) Regarding the use of this information, let's touch base by phone next week, and I can describe to you our project. Thanks again.

Joe

(Embedded
image moved Joseph Guenther Boyer <joseph.boyer@yale.edu>
to file: 09/01/99 10:41:02 AM
PIC07898.PCX)

Record Type: Record

To: Joseph E. Aldy/CEA/EOP

cc:
Subject: RE: RICE results for China

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I will be happy to answer any further requests, and next time the reply will
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joseph.boyer@yale.edu
Department of Economics
Yale University
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(203) 432-3581

PS: I would be interested in hearing about any working paper or publication that you guys put together on the the economic effects of emissions abatement in China. I'd appreciate it if you could send me a notification by
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2010 carbon price under Kyoto Protocol with global trading
2010 China emissions under Kyoto Protocol with global trading
2010 China GDP measure under Kyoto Protocol with global trading
Thank you for any assistance you can provide on this matter.
Joe Aldy
Council of Economic Advisers
Old Executive Office Building, Room 319
Washington, DC 20502
202-395-1455
202-395-6870 (FAX)
joseph_e._aldy@cea.eop.gov

Embassy of the United States of America
Beijing, China
美国驻华大使馆

Environment, Science & Technology Section
环保科技处

To: Joe Aldy
6 pages

Fax

传真

Date: 5/17/00

To:

Name/姓名: Jonathan Fritz
Office/部位: EAP/CM
Fax No.: (001)(202)647-6820

From:

Name: *Robert A. Armstrong (阿强)*
Phone/电话: *(86)(10)6532-3831, ext 6344*
Fax/传真: *(86)(10)6532-6423*

Number of pages (including cover): 6

Message:

Attached is "bottom line" from MOST on Joint Statement. They appear to have met all our demands except the specific numerical targets in para 4. Please give us a "yeah" or "nay" by OOB here so we can start moving on the mechanics of getting it signed. I think this is the best we're going to do.

Robert

MINISTRY OF SCIENCE AND TECHNOLOGY OF CHINA

15-B Fuxing Road, Beijing, 100862, China, TEL 0086-10-6851-4054, FAX 0086-10-6851-2163

Attention	:	Robert A. Armstrong, Acting Counselor, US Embassy
FAX number	:	6532-6423
Date	:	17 May 2000
From	:	Lu Xuedu
FAX number	:	0086-10-6851-2163
Number of pages	:	5
Subject	:	**RE: Joint Statement**

Dear Mr. Armstrong:

Thank you for your letter to Mr. Jin Xiaoming.

We have taken serious consideration of the views from Washington, DC sent by you on 16 May 2000. To show our sincerity and willingness to cooperate with your government to sign the Joint Statement, we are going to accommodate most of the concerns from Washington, DC by making much compromise. Attached please find the new text. The changes includes following elements:

1. In paragraph 1, "and taking actions to combat climate change " is added.
2. In paragraph 2, the last part of the last sentence was deleted. We believe that it is not necessary to single out the SO2 emission trade system drawing experience from US.
3. In paragraph 6, a new sentence is added to respond to the concern No. 4 in your letter, and

4. Also in paragraph 6, the sentence with regard to Kyoto Mechanisms has gone back to your original text so as to address your concern.

With regard to the concern No. 2 in your letter, we can not promise any specific number on energy efficiency and renewable energy because we have not made any decision yet on this kind of issue. We can not promise what we have not decided.

I have to make it clear that the above-mentioned compromise is our bottom line. If the revised text is still unacceptable to US and therefore we can not sign this Join Statement by the next Friday 20 May, it seems that it would not be necessary for two sides to revisit this matter again after that date.

Sincerely,

Lu Xuedu
Deputy Division Director
Department of Rural and Social Development
Ministry of Science and Technology of China
15-B Fuxing Road, 100862, Beijing, P.R.China
FAX 86-10-6851-2163
TEL 86-10-6851-4054
Email lvxd@mail.most.gov.cn

Joint Statement on Cooperation on Environment & Development Between the United States and China

1. The United States and China agree that meeting development needs in a sustainable manner is one of the most important challenges of the 21st century. They underscore the central role energy plays in economic development, as well as the human health and environmental risks associated with unsustainable use of energy and natural resources. They note that the development and deployment of cleaner and more efficient energy technologies will contribute significantly to improving local air quality and protecting the global environment. The United States and China recognize that countries could achieve sustained economic growth while protecting the environment and taking actions to combat climate change.
2. The United States and China note that their common desire to promote clean energy and protect the environment has guided past cooperation and joint initiatives. They accord high importance to the US-China Forum on Environment and Development and commit to further their cooperation in the fields of clean energy, environmental protection, science and technology and commercial cooperation. The two nations will also continue to cooperate on efforts to strengthen the Chinese environmental regulatory regime to encourage pollution control and abatement.
3. The United States and China recognize the potential of Chinese accession to the WTO to broaden and accelerate the transfer of environmentally-sound technologies, goods and services, thereby advancing clean energy and environmental protection goals.
4. The two countries are taking many initiatives on their own to mitigate the impact of energy production and use on the environment. China plans to expand significantly the use of natural gas in China's energy supply and increase the utilization of coalbed methane and clean coal technologies. China also plans to increase significantly the generation of power from renewable energy sources. China's recent structural reforms and removal of certain fossil fuel subsidies have already resulted in economic and environmental benefits; further economic reforms should result in additional

environmental benefits.

5. The United States is committed to a clean energy future and to the goal of reducing greenhouse gas emissions. To this end, the United States pursues a program of research and development, public education, promotion of energy efficient products and practices, and targeted tax incentives. Specific actions during the past year include issuance by the President of an executive order mandating reduction in energy use in federal buildings by 30% below 1990 levels by the year 2010; issuance by the President of a directive that sets a target to triple the use of bio-energy in the U.S. over the next decade--a result that would lead to a reduction of 100 million metric tons of carbon; issuance by the President of a directive to require 20% reduction in petroleum use in the federal vehicle fleet by 2005; and, establishment by the Department of Energy of a goal of increasing to 5% the share of U.S. electricity generated by wind power by 2020.

6. The United States and China reaffirm their strong support for international efforts to combat global climate change under the UN Framework Convention on Climate Change and its Kyoto Protocol, in accordance with the principle of common but differentiated responsibilities. The two countries express the willingness to entertain new and creative thinking and approaches to cooperation between developed and developing countries on climate change. The two countries intend to work together and with other countries toward early agreement on the elements of the Kyoto mechanisms, including the Clean Development Mechanism, which could offer opportunity for mutually beneficial cooperation between developed and developing countries. They recognize, in particular, that the Clean Development Mechanism could provide important opportunities for economic growth and environmental protection.

7. China and the United States reaffirm their commitment to sustainable management and protection of natural resources and endangered species. China is taking aggressive steps to combat deforestation, including banning of logging in southwest China, an ambitious tree-planting and reforestation program in the Yangtze basin, in the Beijing metropolitan area, and elsewhere. The two countries have a long history of cooperation in this area, and affirm their intention to work together to assure that any increased trade

flows will not undercut natural resource management and species protection programs.

8. The United States and China believe that energy and environment constitutes one of the most important areas of cooperation between the two countries. The joint initiatives taken by the two sides will give practical shape to that vision. By making clean energy widely available through development and application of new technologies and strengthening efforts to protect our environment and this planet's biodiversity, China-U.S. cooperation will contribute in significant measure towards further securing the welfare and quality of life of the peoples of the two countries. It will also be a vital contribution towards preserving the riches of our planet for future generations.

10~10U	China	GDP	GDP	GDP	GDP	GDP	GDP	GDP	GDP	GDP	GDP	GDP	GDP	
		1992	2000	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050	
	BaU	36.236	68.427	91.612	119.95	134	149.48	166.54	185.32	206.01	228.77	253.8	281.33	
	GT	36.236	68.427	91.513	119.49	133.58	149.13	166.25	185.12	205.9	228.75	253.87	281.49	
GtC/year	China	CO2	CO2	CO2	CO2	CO2	CO2	CO2	CO2	CO2	CO2	CO2	CO2	CO2
		1990	1992	2000	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
	BaU	0.5768	0.649	0.897	1.014	1.126	1.152	1.178	1.205	1.234	1.263	1.293	1.324	1.357
	GT	0.5768	0.649	0.897	1.006	1.094	1.105	1.116	1.127	1.139	1.151	1.163	1.176	1.19
Total prima	EJ/year	China	TPS	TPS	TPS	TPS	TPS	TPS	TPS	TPS	TPS	TPS	TPS	TPS	TPS
			1992	2000	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050	
		BaU	28.469	40.157	46.053	51.943	53.54	55.154	56.784	58.436	60.112	61.816	63.55	65.322	
		GT	28.469	40.157	45.681	50.561	52.112	53.706	55.327	56.974	58.644	60.342	62.075	63.832	
Fossil fuel	EJ/year	China	FOS	FOS	FOS	FOS	FOS	FOS	FOS	FOS	FOS	FOS	FOS	FOS	FOS
			1992	2000	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050	
		BaU	27.994	38.943	44.235	49.361	50.581	51.843	53.149	54.503	55.911	57.374	58.897	60.484	
		GT	27.994	38.943	43.875	47.902	48.469	49.049	49.641	50.25	50.881	51.54	52.238	52.973	
	EJ/year	China	COL	COL	COL	COL	COL	COL	COL	COL	COL	COL	COL	COL	COL
			1992	2000	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050	
		BaU	22.584	29.936	32.974	35.501	35.842	36.177	36.503	36.823	37.137	37.443	37.743	38.035	
		GT	22.584	29.936	32.722	34.62	34.551	34.469	34.373	34.265	34.146	34.021	33.892	33.759	
	EJ/year	China	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS
			1992	2000	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050	
		BaU	0.544	0.788	0.904	1.006	1.042	1.078	1.113	1.147	1.18	1.213	1.245	1.276	
		GT	0.544	0.788	0.896	0.973	0.996	1.019	1.039	1.059	1.078	1.095	1.111	1.126	

	EJ/year	China	OIL 1992	OIL 2000	OIL 2005	OIL 2010	OIL 2015	OIL 2020	OIL 2025	OIL 2030	OIL 2035	OIL 2040	OIL 2045	OIL 2050
		BaU	4.866	8.219	10.357	12.853	13.696	14.589	15.533	16.533	17.594	18.718	19.908	21.173
		GT	4.866	8.219	10.257	12.309	12.921	13.561	14.228	14.926	15.657	16.424	17.235	18.088

Total prima	EJ/year	China	TPS 1992	TPS 2000	TPS 2005	TPS 2010	TPS 2015	TPS 2020	TPS 2025	TPS 2030	TPS 2035	TPS 2040	TPS 2045	TPS 2050
BaU	Total	Others	28.469	40.157	46.053	51.943	53.54	55.154	56.784	58.436	60.112	61.816	63.55	65.322
	Oil+Gas	Oil	27.994	38.943	44.235	49.36	50.58	51.844	53.149	54.503	55.911	57.374	58.896	60.484
	Gas+Cc	Gas	23.128	30.724	33.878	36.507	36.884	37.255	37.616	37.97	38.317	38.656	38.988	39.311
	Coal	Coal	22.584	29.936	32.974	35.501	35.842	36.177	36.503	36.823	37.137	37.443	37.743	38.035

EJ/year		China	TPS 1992	TPS 2000	TPS 2005	TPS 2010	TPS 2015	TPS 2020	TPS 2025	TPS 2030	TPS 2035	TPS 2040	TPS 2045	TPS 2050
GT	Total	Others	28.469	40.157	45.681	50.561	52.112	53.706	55.327	56.974	58.644	60.342	62.075	63.832
	Oil+Gas	Oil	27.994	38.943	43.875	47.902	48.468	49.049	49.64	50.25	50.881	51.54	52.238	52.973
	Gas+Cc	Gas	23.128	30.724	33.618	35.593	35.547	35.488	35.412	35.324	35.224	35.116	35.003	34.885
	Coal	Coal	22.584	29.936	32.722	34.62	34.551	34.469	34.373	34.265	34.146	34.021	33.892	33.759

SGM

China	GDP	(1992$)		AEA		Total Energy			AEA		Oil	
	BAU	$15.80	$25.60	$23	relative to BAU	BAU	$15.80	$25.60	$23	relative to BAU	BAU	$15.80
1985	395421.2	395421.2	395421.2	395421.2	100.0%	23.7	23.7	23.7	23.7	100.0%	3.9	3.9
1990	597713.5	597713.5	597713.5	597713.5	100.0%	30.6	30.6	30.6	30.6	100.0%	7.3	7.3
1995	903584.1	903584.1	903584.1	903584.1	100.0%	38.7	38.7	38.7	38.7	100.0%	11.3	11.3
2000	1332098.2	1332098.2	1332098.2	1332098.2	100.0%	46.9	46.9	46.9	46.9	100.0%	14.1	14.1
2005	1950918.3	1950961.7	1950614.3	1950706.4	100.0%	56.0	55.9	49.5	51.2	91.5%	17.0	16.9
2010	2749273.9	2749187.0	2749621.3	2749506.1	100.0%	65.5	56.6	52.5	53.6	81.8%	19.2	18.2
2015	3724863.3	3724429.0	3725558.1	3725258.6	100.0%	76.1	63.6	59.6	60.6	79.7%	21.6	20.3
2020	4838904.4	4839078.1	4841293.0	4840705.4	100.0%	85.9	70.7	66.6	67.7	78.9%	23.0	22.0
2025	6213302.5	6213867.1	6216820.2	6216036.7	100.0%	96.0	78.8	74.3	75.5	78.7%	22.7	22.8
2030	7794335.8	7793597.5	7796377.0	7795639.6	100.0%	105.7	86.4	81.6	82.9	78.4%	19.7	21.9
2035	9551691.0	9546262.3	9547825.8	9547411.0	100.0%	116.1	93.9	88.9	90.2	77.7%	13.4	18.5
2040	11631376.2	11629899.7	11629074.5	11629293.4	100.0%	127.2	102.3	97.2	98.6	77.5%	11.2	11.9
2045	14359587.0	14366405.4	14369706.0	14368830.3	100.1%	138.2	113.4	108.1	109.5	79.2%	10.6	10.0
2050	17779839.2	17786744.4	17791391.3	17790158.5	100.1%	150.5	123.7	119.0	120.2	79.9%	10.7	9.8

	AEA		Coal			AEA		Natural Gas			AEA	
$25.60	$23	relative to BAU	BAU	$15.80	$25.60	$23	relative to BAU	BAU	$15.80	$25.60	$23	relative to BAU
3.9	3.9	100.0%	18.2	18.2	18.2	18.2	100.0%	0.5	0.5	0.5	0.5	100.0%
7.3	7.3	100.0%	21.5	21.5	21.5	21.5	100.0%	0.7	0.7	0.7	0.7	100.0%
11.3	11.3	100.0%	25.2	25.2	25.2	25.2	100.0%	0.9	0.9	0.9	0.9	100.0%
14.1	14.1	100.0%	30.3	30.3	30.3	30.3	100.0%	1.1	1.1	1.1	1.1	100.0%
16.2	16.4	96.6%	36.3	36.2	30.6	32.1	88.5%	1.3	1.3	1.3	1.3	97.4%
17.6	17.8	92.5%	43.1	35.3	31.8	32.7	75.8%	1.6	1.5	1.5	1.5	93.4%
19.9	20.0	92.4%	50.9	39.8	36.3	37.2	73.1%	1.8	1.7	1.6	1.7	91.9%
21.8	21.8	94.7%	59.0	45.0	41.1	42.1	71.5%	2.0	1.8	1.8	1.8	91.8%
22.8	22.8	100.6%	69.1	51.9	47.4	48.6	70.4%	2.1	2.0	1.9	2.0	92.4%
22.4	22.3	113.2%	81.4	60.0	54.7	56.1	68.9%	2.2	2.1	2.1	2.1	93.0%
19.9	19.5	145.6%	97.8	70.6	64.3	65.9	67.4%	2.3	2.2	2.2	2.2	93.7%
13.9	13.4	119.1%	110.9	85.4	78.2	80.1	72.2%	2.4	2.3	2.3	2.3	93.7%
9.8	9.9	93.5%	122.4	98.1	93.1	94.4	77.1%	2.6	2.4	2.4	2.4	93.0%
9.7	9.7	91.0%	134.3	108.5	103.9	105.1	78.3%	2.7	2.6	2.5	2.5	93.0%

Hydro			AEA	
BAU	$15.80	$25.60	$23	relative to BAU
1.0	1.0	1.0	1.0	100.0%
1.1	1.1	1.1	1.1	100.0%
1.2	1.2	1.2	1.2	100.0%
1.3	1.3	1.3	1.3	100.0%
1.4	1.4	1.4	1.4	100.4%
1.6	1.6	1.6	1.6	101.0%
1.7	1.8	1.8	1.8	101.7%
1.9	1.9	2.0	1.9	102.2%
2.1	2.1	2.2	2.2	102.1%
2.4	2.4	2.4	2.4	102.0%
2.6	2.6	2.6	2.6	102.3%
2.6	2.8	2.8	2.8	105.3%
2.7	2.8	2.8	2.8	104.5%
2.8	2.8	2.8	2.8	103.1%

CO2 emissions			AEA	
BAU	$15.80	$25.60	$23	relative to BAU
509	509	509	509.3	100.0%
648	648	648	647.7	100.0%
808	808	808	808.4	100.0%
979	979	979	979.5	100.0%
1173	1171	1023	1062.3	90.6%
1379	1172	1079	1103.5	80.0%
1610	1319	1226	1250.9	77.7%
1829	1473	1377	1402.5	76.7%
2068	1655	1548	1576.2	76.2%
2316	1836	1719	1749.8	75.5%
2607	2036	1907	1941.1	74.5%
2887	2283	2144	2181.1	75.5%
3153	2559	2434	2467.1	78.2%
3443	2807	2694	2723.9	79.1%

4/27/00

BAU Assumptions

1995 2000? 2010

GDP forecasts

Primary energy demand

Carbon emissions

If possible:

- Hydro generation
- Nuclear generation
- ~~Coal~~ Renewables generation
- Natural gas consumption
- Electricity consumption
- Oil consumption
- Coal consumption

Grams--greatH
ÇAmish

Dear Joe:

This is a quick response to your request.

Our base year is 2000, and essentially all the year 2000 estimates come from the 1998 IEO.

We have followed conventional wisdom (EIA, IEA and World Bank) in estimating that Chinese GDP will double between 2000 and 2010. We then use the MERGE model to break down total energy demands between electric and nonelectric.

---- 14524 PARAMETER CHREP Chinese report table

	base year	BAU	Global trading
	2000	2010	2010
cgdp	1.005	1.961	1.947
ctpe	45.734	60.729	54.169
ccarb	0.978	1.200	1.052
chydro	0.255	0.413	0.413
cnuc	0.013	0.069	0.069
celec	1.076	1.711	1.524
cgas	0.900	1.783	1.546
coil	9.700	12.148	8.160
ccoal	29.400	38.705	36.004

---- 14526 cgdp, GDP - trillion dollars - constant 1990 purchasing power

---- 14527 ctpe, Total primary energy consumption - exajoules

---- 14528 ccarb, Carbon emissions - billion tons of carbon

---- 14530 chydro, Hydro generation - trillion KWH

---- 14531 cnuc, Nuclear generation - trillion KWH

---- 14532 cnhr, Non-hydro renewables generation - trillion KWH

---- 14533 celec, Electricity consumption - trillion KWH

---- 14535 cgas, Natural gas consumption - exajoules

---- 14536 coil, Oil consumption - exajoules

---- 14537 ccoal, Coal consumption - exajoules

The Economics of Greenhouse Gas Emissions Abatement in China, A Preliminary Analysis
U.S. Council of Economic Advisers
September 1999

The Economics of Greenhouse Gas Emissions Abatement in China, A Preliminary Analysis
Executive Summary

An international greenhouse gas emissions market would offer substantial economic opportunities for China. Under an efficient international market, low-cost opportunities to reduce greenhouse gases in China would attract foreign direct investment for energy and industrial abatement technologies, allowing China to generate billions of dollars in revenues annually through the sale of emissions credits or allowances to countries with higher abatement costs. Results from a range of economic models indicate that by taking on an emissions target and actively participating in international emissions trading, China would be able to sell emissions allowances valued at $4 to $14 billion annually.

Participating in an international greenhouse gas emissions market would also help China gain new technology transfer and investment resources to reduce the high levels of local air pollution, resulting in substantial public health benefits. Efforts to abate carbon dioxide emissions will likely result in significant reductions in emissions of local air pollutants, such as sulfur dioxide and particulate matter, since both kinds of emissions are by-products of fossil fuel combustion. Local air pollution levels in many urban areas in China are several times higher than World Health Organization recommended levels. This pollution is a significant threat both to China's economy (especially the agriculture and forestry sectors) and to its citizens. As epidemiological research has shown, current pollution levels increase mortality rates, the incidence of chronic illness, and the number of hospital and emergency room visits. One study, for example, estimates that the mortality rate in Shenyang increases by 2 percent for every 100 micrograms per cubic meter more sulfur dioxide in the air. China's position as a low-cost producer in a global greenhouse gas emissions market offers a promising avenue for attracting investment in the energy and industrial technologies necessary to significantly address the high levels of local air pollution.

The Kyoto Protocol's market-based provisions include the Clean Development Mechanism (CDM) and international emissions trading. These provisions allow countries with low emissions abatement costs to take advantage of the opportunity to abate emissions and to sell certified emissions reductions or tradable allowances to higher-cost countries. Just as in the production of commodities or the sale of financial assets, low-cost producers could attract foreign direct investment to finance their emissions abatement industry.

Through the CDM, a country with a greenhouse gas emissions target under the Protocol can invest in projects that abate emissions in countries without targets, thereby generating emissions credits or allowances that can be transferred to the first country and used to help meet its target. The additional economic value of the emissions allowances that a project generates provides an incentive for investment, meaning that the CDM can leverage investment in clean energy and other similar projects that would not likely happen otherwise.

International emissions trading holds even greater promise as a vehicle for transferring capital and technology and for stimulating cost-effective emissions abatement. Under the Kyoto Protocol, each

country with an emissions target has, in effect, an emissions "budget" – a total amount of greenhouse gases that it is allowed to emit into the atmosphere over a given period of time. A country with an emissions target can transfer a portion of its emissions budget to another such country. The incentive to trade these emission allowances stems from the large differences in the marginal costs of emissions abatement across countries. Countries that have relatively inexpensive ways to control greenhouse gases have incentives to reduce emissions by more than their targets require, because they can sell tradable allowances that they will not need. Countries facing the most expensive emissions abatement measures have the incentive to buy less costly allowances from others. Thus, trading allows the international community to achieve the same overall reduction in emissions at significantly lower cost. At the same time, both buyers and sellers stand to reap significant gains. Countries buying allowances save in abatement costs while countries selling allowances receive additional financial in-flows and increased technology transfer.

The Kyoto Protocol stipulates that a country must have a greenhouse gas emissions target in order to participate in trading. Since the Kyoto Conference, several developing countries have expressed an interest in emissions targets. At the same time, it is broadly recognized that any such targets must be made compatible with developing countries' legitimate needs and objectives for sustainable development. One way to do so would be for a country to set its target above current emissions levels, but below what emissions are forecast to be without additional abatement policies during the Protocol's first commitment period (2008 to 2012). Such an "emissions growth target" could provide for continued economic development, but with a lower emissions growth rate. To mitigate the risk that a target could end up being too stringent (or too lax), a target could be indexed to a country's economic performance between now and the 2008-2012 commitment period.

China stands to reap substantial benefits by participating in an international emissions market. Over the past two decades, China's economy has grown at an impressive rate and it is now the world's 7th largest. At the same time, its energy consumption has more than doubled and its greenhouse gas emissions have grown substantially. While China is making impressive strides towards lowering its greenhouse gas emissions intensity (emissions per unit of output), a variety of economic analyses and modeling efforts indicate that there are still many low-cost emissions abatement opportunities in China. Some analyses suggest that China has lower abatement costs than virtually any other country in the world.

By participating in a global emissions market, China would greatly benefit both its economy and its environment. Results from a range of economic models indicate that by taking on an emissions target and actively participating in international emissions trading, China would find it economic to reduce emissions 14 percent to 24 percent below projected 2010 emissions levels and would be able to sell emissions allowances valued at $4 to $14 billion annually. Gains from trade would vary greatly depending on the extent to which China's growth target varied from the business as usual projection.

The Economics of Greenhouse Gas Emissions Abatement in China, A Preliminary Analysis

Over the past two decades, China has experienced an impressive rate of economic growth. Between 1978 and 1997, the size of the economy increased from the 18th largest to the 7th largest in the world (in market exchange rate terms), per capita incomes increased by nearly 450%, and energy consumption more than doubled. Like virtually all countries in the world, economic growth was accompanied by the growth of greenhouse gas emissions, especially carbon dioxide.

Emissions of greenhouse gases from all countries pose a risk to the global climate. Scientific evidence suggests that through the emissions of greenhouse gases there is a "discernible human influence on global climate" (Houghton et al 1996, p. 5). Further, continued accumulation of greenhouse gases in the atmosphere poses significant risks, including rising sea levels, greater frequency of severe weather events, shifts in agricultural growing conditions, threats to human health from increased range of diseases, changes in availability of freshwater supplies, and damage to ecosystems.

International efforts to address these risks in Rio de Janeiro in 1992 and Kyoto in 1997 recognize the need to abate greenhouse gas emissions while sustaining economic development. Specifically, the Kyoto Protocol calls for the abatement of greenhouse gases and the design of mechanisms that will facilitate the transfer of capital and technology to the countries where emissions can be abated at least cost. A country that can abate greenhouse gas emissions at lower cost than others has the opportunity to attract investment for technology that abates emissions and can then sell emissions credits or allowances to countries with higher abatement costs. Effectively, the Kyoto Protocol provides the potential for low-cost abating countries to create an export industry – whose export products are emissions abatement – that could be financed through foreign direct investment.

What is the potential for a fast-growing economy such as China's to create and benefit from the export of emissions allowances? The economic literature indicates that China has the opportunity to abate more greenhouse gas emissions at a lower cost than any other country. Selling these abated emissions through the Kyoto mechanisms could attract billions of dollars per year to finance state-of-the-art technology in energy generation and industrial production. In addition, abating carbon dioxide, for example by improving combustion efficiency of coal power plants, would reduce emissions of local air pollutants that carry significant economic costs through lost worker days, additional health care expenses, and premature mortality. The potential is clearly available for China to be better off economically through the development of an emissions abatement export industry.

This paper provides a preliminary overview of this potential drawing from economic research on China conducted by academic, industry, and government analysts from around the world. First, the paper presents a description of the trade-oriented mechanisms in the Kyoto Protocol that will promote capital and technology flows to support emissions abatement. Second, it reviews the literature on the potential economic gains associated with participation in the Kyoto mechanisms. Finally, it describes the potential improvement in public health associated with abating emissions of local air pollutants that usually accompany carbon dioxide abatement.

I. Opportunities to Participate in Kyoto Flexibility Mechanisms

The Kyoto Protocol establishes three mechanisms that, if designed and implemented efficiently, could provide the foundation for a global emissions market. Through international emissions trading (Article 17), joint implementation (Article 6), and the Clean Development Mechanism (Article 12), an emissions reduction would generate emissions credits that have economic value in the international emissions market. Since greenhouse gas emissions have the same climatic consequences regardless of where they occur, the least-cost approach to addressing the risks of climate change would be to reduce emissions wherever such reductions are cheapest. This implies that emissions abatement has the economic property of a commodity, which facilitates the evolution of a market where entities that demand emissions abatement (e.g., those with relatively high abatement costs) can funnel capital and/or technology to suppliers of emissions abatement. In such a market, countries with low emissions abatement costs could take advantage of the opportunity to "produce" emissions abatement and to "export" certified emissions reductions or tradable allowances to other higher-cost countries. Just as in the production of commodities or the sale of financial assets, low-cost producers could attract foreign direct investment to finance their emissions abatement industry.

This potential evolution of an international emissions market reflects some of the experiences and lessons learned from the international trade in a variety of financial assets, goods, and services. The concept of gains from trade is basically the same as it is for trade in goods and services. For example, Frankel (1999) notes that developing countries could "specialize in installing clean new-technology power-generation capacity, while industrialized countries specialize in producing the capital goods that go into those plants" (p. 4). Alternatively, industrialized and developing countries could cooperate on the development of these new technologies (President's Committee of Advisors on Science and Technology 1999). Toman et al (1998) also note that "[t]hose countries which find themselves with lower abatement costs and more generous emission ceilings can generate a valuable commodity to export" (p. 3). Thus, developing countries would export emissions abatement, and use their export revenues to import, among other things, these new energy technologies.

The gains from trade in emissions allowances occur as a result of the large differences in marginal abatement costs across countries. Weyant and Hill (1999) note that "if the marginal cost in any country participating in a trading regime is higher than in any other participating country, it is advantageous to both countries for the higher cost country to buy emissions rights at a price that is between the two marginal costs" (p. xvii). However, before reviewing the estimated marginal costs across countries, it is important to understand how the Kyoto Mechanisms, specifically the Clean Development Mechanism and international emissions trading, could serve as the necessary foundation of an international emissions market. Further, it is important to recognize that developing countries do not need to take on emissions targets to participate in the Clean Development Mechanism, but emissions targets are a prerequisite for international emissions trading. While trading involves the adoption of an emissions target, it also provides greater opportunities for attracting investment, abating emissions, and selling more emissions allowances than the Clean Development Mechanism. Both mechanisms provide the economic incentive for firms in developed countries to invest in China.

A. The Clean Development Mechanism

The Clean Development Mechanism (CDM) was incorporated in the Kyoto Protocol to 1) promote sustainable development; 2) contribute to the Framework Convention's climate objective of stabilizing greenhouse gas concentrations at a safe level; and 3) assist the industrialized countries with Kyoto Protocol emissions targets in complying with their commitments (Toman et al 1998). Developing countries participating in CDM projects do not have their own quantitative emissions targets like developed countries. The CDM allows developed and developing countries to work together to design and implement projects in developing countries that abate greenhouse gas emissions. These projects must undergo a review process to certify that the emissions reductions are real in that total emissions are below what they would have been otherwise.[1] In addition, a portion of the emissions credits generated by the project would support an adaptation fund for low-income countries especially vulnerable to climate change and for administrative costs of the CDM. Under the Buenos Aires Plan of Action, the rules for the Clean Development Mechanism are scheduled to be developed by the sixth Conference of the Parties.

The Clean Development Mechanism, if effectively implemented, could incorporate a new factor – the economic value of abating greenhouse gas emissions – for project finance consideration by investors. The emissions abatement certified through the CDM would have economic value because developed countries will demand emissions abatement under the Kyoto Protocol. For example, a U.S. firm may evaluate the opportunity to invest in an energy production project such as an advanced technology coal plant in China. In evaluating this project, one of the critical determinants in the decision to invest in the project is the rate of return to the investor. Without the CDM, the investing firm would assess the traditional financial characteristics associated with the project to calculate the rate of return. With the CDM, the investing firm would also account for the economic value associated with the certified emissions reductions that would accrue from the project going forward. Without CDM, the project may not have a sufficient rate of return to justify investment. However, with the CDM, the project may generate enough economic benefits to justify investment. By including the additional stream of economic benefits associated with abating greenhouse gas emissions, the CDM can leverage investment in clean energy and other greenhouse gas abating projects that would not likely happen otherwise.

However, efforts to promote sustainable development through CDM projects probably would result in a likely volume of capital and technology flows much smaller than that expected for a country with an emissions target that is participating actively in international emissions trading. The CDM carries with it several transaction costs, such as project approval and certification, the adaptation charge, and a charge to cover administrative expenses that together reduce the potential cost-effectiveness of this approach relative to a less-burdened emissions trading system. It should also be noted that the rules for CDM and international emissions trading, to be approved by the Conference of the Parties, could

1 The Kyoto Protocol notes that "emission reductions resulting from each project activity shall be certified by operational entities to be designated by the Conference of the Parties" to the Framework Convention on Climate Change (Article 12, Paragraph 5).

allow developing countries that adopt emissions targets to participate as hosts to CDM projects until the beginning of the commitment period, and then to begin participating in international emissions trading.

In addition to firms in developed and developing countries working together to design and implement specific projects, some have suggested that governments could cooperate to design project "fast-track" processes (Chayes 1998). To reduce some of the transaction costs associated with participating in the CDM, two countries could design a fast-track process that makes the project approval process more transparent to the private sector and simplifies the rules for approval. Others have suggested that smaller CDM projects might be bundled, or that a standard for calculating emission reductions might be employed to further reduce transaction costs.

B. International Emissions Trading

Articles 3 and 17 of the Kyoto Protocol allow countries with binding targets to meet their targets by participating in international emissions trading.[2] These binding targets take the form of an "assigned amount" – the number of metric tons of greenhouse gases that may be emitted by sources within the country during the five-year commitment period running from 2008 through 2012. In emissions trading, one country transfers part of its assigned amount to another. This transfer of assigned amount lowers the number of tons of greenhouse gases that the first country may emit between 2008 and 2012, and raises the number of tons that the second country may emit by an equal amount. It is useful to think of each one-ton unit of assigned amount as a tradable allowance for one ton of emissions that may be transferred between countries.

Because the cost of controlling greenhouse gases differs by large amounts from country to country, emissions trading will allow substantial gains from trade in meeting the Kyoto targets. Countries that have relatively inexpensive ways to control greenhouse gases have incentives to reduce emissions by more than their targets require, because they can sell tradable allowances that they will not need. Countries facing the most expensive emissions abatement measures have incentives to buy less costly allowances from others. Since greenhouse gases are global pollutants, the environmental impact of reducing them is the same no matter where the reductions take place. The same overall reduction is achieved, total costs are reduced, and both buyers and sellers gain from the savings allowed by trading. As a result, the international community will be able to afford greater emissions reductions over the longer term while countries selling allowances will receive additional financial in-flows to assist in their economic development.

A country that wants to increase the number of tons of greenhouse gases that it is allowed to emit would seek out other countries that are willing to sell some of their tradable allowances. Buying and selling countries could arrange their transactions directly or use brokers or exchanges. Because of the voluntary nature of trading, a selling country would engage in a trading transaction only if it

2 These countries with binding targets include most OECD countries, several eastern European countries, and some former Soviet Union countries. This set of countries is often referred to as Annex I countries. All other countries in the world are often referred to as Non-Annex I countries in the climate policy context.

makes that country better off.

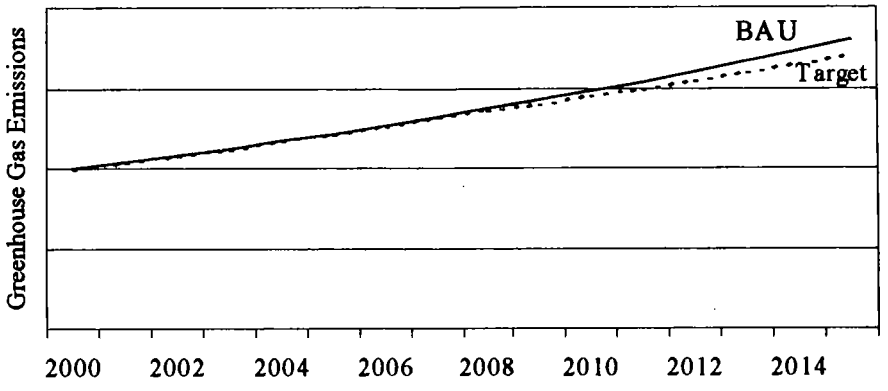
In addition to trading at the governmental level, some countries (including the United States) plan to use both domestic and international emissions trading at the company level as part of their program to meet their Kyoto Protocol commitments. Companies and other legal entities subject to these domestic trading programs (integrated with the international trading system) would have strong incentives to look constantly for innovative ways to abate their greenhouse gas emissions. Those who found inexpensive opportunities to abate their emissions could sell the allowances they do not need to other companies or countries who face higher costs. Further, some companies that have climate-friendly technology may find it cost-effective to transfer this technology to facilities in a low-cost abatement country in return for tradable allowances. Countries selling emissions allowances will, therefore, not only benefit from new financial flows but also from increased technology transfer. These tangible rewards for innovation should provide the incentive for research and development and subsequent technological breakthroughs (Petsonk et al 1998).

As stated above, the Kyoto Protocol stipulates that countries must have an emissions target to engage in international emissions trading. Since the Kyoto Conference, several developing countries have expressed an interest in emissions targets. Consistent with the Framework Convention on Climate Change, targets for developing countries should help promote their sustainable development. To do so, such targets should accommodate emissions growth. Unlike targets currently set in the Kyoto Protocol, which were set below most countries' current emissions levels, such a target for developing countries could be set above current emissions levels. To contribute to the international effort to address climate change risks, such targets must result in real abatement of emissions below levels that would otherwise occur during the commitment period – that is, below the projected business as usual (BAU) emissions level.[3] This kind of target, often referred to as an emissions growth target, could provide for continued economic development but with a lower emissions growth rate.

If developing countries were to agree to binding limits, even if they involved only small cuts below BAU in the first budget period, then such targets, with trading, would imply gains for their economies and gains for the environment. Figure 1 provides an illustration of an emissions growth target. Such a target could be expressed as some percentage of a base year, in a similar fashion to current Kyoto Protocol targets, but perhaps with a different base year and/or a percentage greater than 100% to account for emissions growth.

3 The term "business as usual emissions level" as used in this paper is synonymous with the term "reference emissions level."

Figure 1. Illustration of a Developing Country Growth Target



An emissions target could also take alternative forms. Some have expressed concerns about the uncertainty associated with BAU emissions projections (Baumert et al 1999). A country that takes on a commitment for the 2008-2012 period that is fixed now, faces the risk, for example, that its economy will grow more rapidly than expected, resulting in an inadvertently stringent target. Alternatively, a country's economy could grow less rapidly than expected, resulting in an inadvertently lax target. There are, however, ways of designing targets to reduce uncertainty and mitigate these risks. In particular, targets could be indexed to future values of economic and other, possibly demographic, variables.

A target could, for example, be indexed to a country's economic performance between now and the start of the 2008-2012 commitment period (Frankel 1999). This approach is used in the private sector, where contracts are frequently indexed to various economic variables, as well as in the public sector (e.g., the U.S. government provides cost-of-living adjustments for social security payments). A target could then be specified in a way that depends on the future values of economic variables, such as GDP. For example, Baumert et al (1999) have argued for a carbon-to-GDP intensity measure as an appropriate form of a developing country commitment. Zhang (1999) discussed a greenhouse gas emissions per unit GDP measure as the basis for a voluntary commitment by China around 2020.

Such targets would avoid the risk of inadvertent stringency associated with higher than projected economic growth between now and the beginning of the commitment period in 2008. Developing countries would face only the much smaller risk that emissions would be higher than expected, given the economic conditions realized in 2007. Similarly, such targets would also avoid the risk of inadvertent laxness associated with lower than expected economic growth between now and the start of the commitment period.

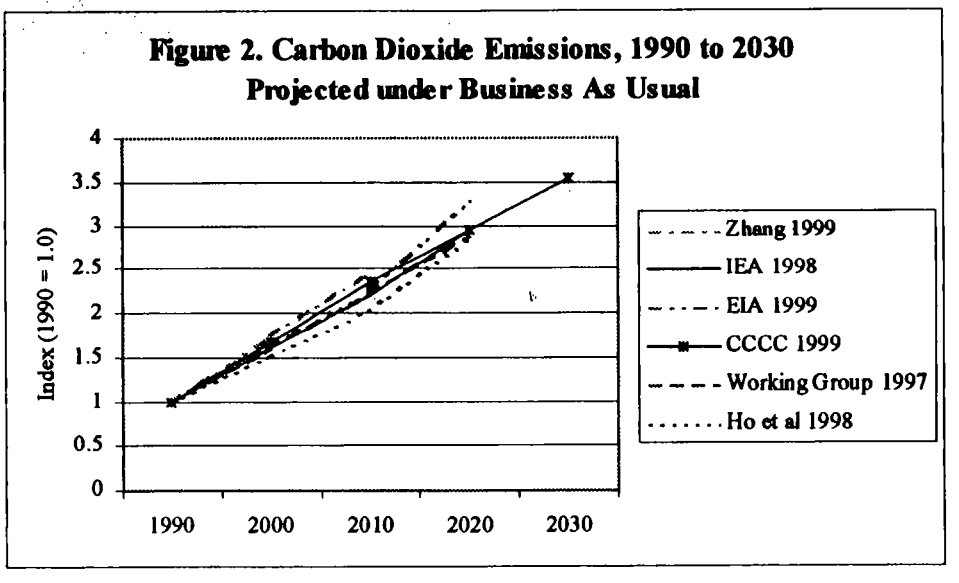
II. Economic Gains from the Clean Development Mechanism and Emissions Trading

A variety of economic models have been developed throughout the world that can evaluate the potential economic gains from trade in emissions allowances. These economic tools effectively model trade in emissions as if they were any other internationally tradable commodity where both production costs and demand vary across countries. However, before reviewing the summary of model results for China, it may be useful to consider some relevant statistics regarding China's projected energy trends. These data will provide some context for the model results presented below.

A. Illustrative Energy and Economic Statistics

China's economy is expected to continue growing at a strong pace. The International Energy Agency (1998) projects China's economy will grow 5.5% for the 1995-2020 period, while IEA projects OECD countries' GDP to grow on average about 2% over this time period. The higher economic growth rate will likely result in a higher emissions growth rate. However, projected emissions in China are estimated to grow at a slower rate than GDP growth, consistent with the declining energy-to-GDP ratio trend of the past twenty years (IEA 1998, CCCC 1999).

Figure 2. Carbon Dioxide Emissions, 1990 to 2030
Projected under Business As Usual



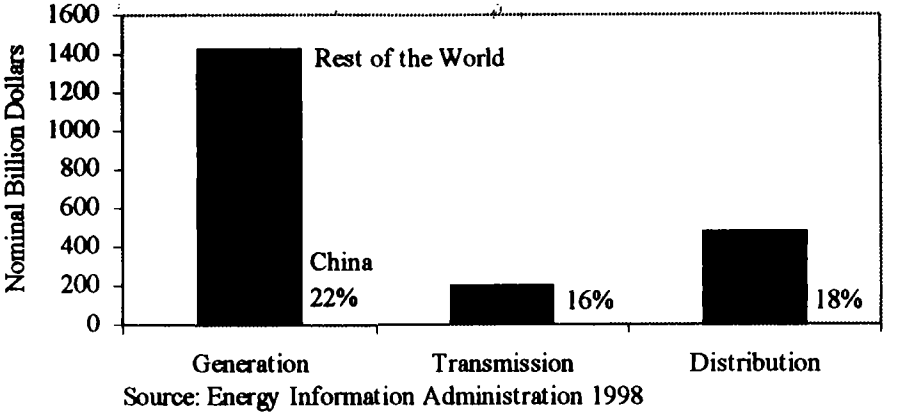
Forecasts of emissions growth through 2010 across six different business as usual projections appear to be fairly similar (figure 2). The small differences in projections appear to be influenced by different economic growth rate assumptions. Indeed, energy-to-GDP projections by many of these analysts follow very similar trends of continued improvement. These forecasts illustrate that the recent decoupling of greenhouse gas emissions and economic growth will likely continue into the future.

Because of its higher growth rate, China has more opportunities than many OECD countries to reduce emissions relative to baseline projections by installing new greenhouse gas-efficient plants and adopting other new technologies. In contrast to retrofitting existing plants, new investment in

greenhouse gas-efficient plants is a less costly approach to abate emissions.

The faster economic growth expected in China also implies a higher rate of investment than most OECD countries. For example, investments in electric power generating capacity in China are projected to comprise nearly ¼ of total world generation investment between 1995 and 2010 (figure 3). Many of these Chinese investment projects are likely to increase total generation, while a larger share of OECD investments will likely replace existing power plants. The current Chinese power system is less efficient than developed countries' systems (Murray and Rogers 1998). Investing in power technologies with comparable efficiencies to developed countries' plants could significantly reduce Chinese emissions per unit of electricity generated. Further, one out of every six dollars expected to be invested in transmission systems around the world will be spent in China through 2010. Improving transmission efficiency in China – where transmission losses are nearly twice those found in developed countries and can range up to 30% (Ni and Sze 1998) – through these investments can further reduce emissions per unit of energy consumed.

Figure 3. Cumulative Projected Worldwide Electric Power Investments by Region, 1995-2010



Source: Energy Information Administration 1998

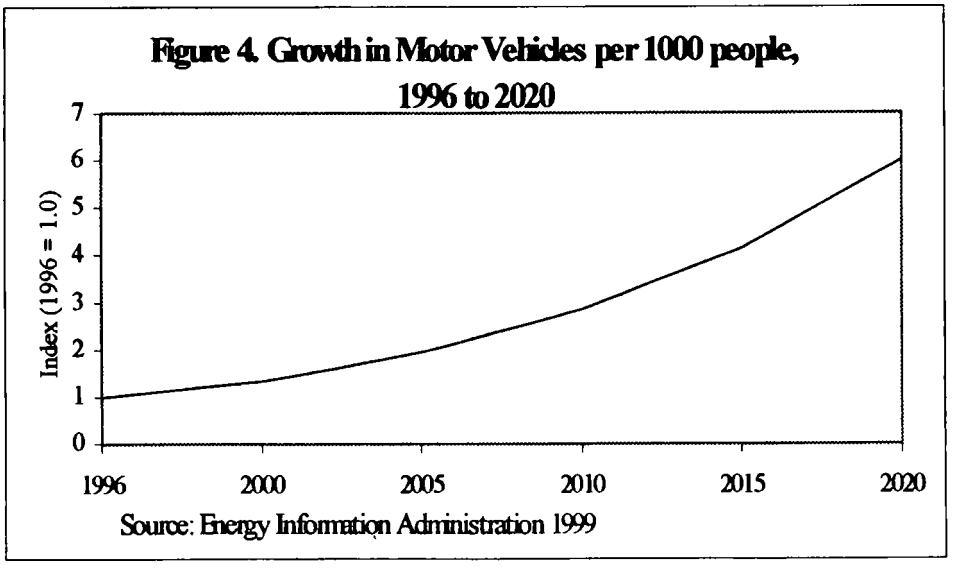
Differences in energy efficiency between China and developed countries also exist in various industrial sectors. Table 1 illustrates some of these differences in industrial production activities. As these industrial sectors in China evolve, new investment could be leveraged by the value derived from generating emissions abatement to install more advanced, more energy-efficient production technologies.

Table 1. Comparison of Physical Energy Efficiency in Industrial Production between China and Western Countries

Production Activity	China	Western Countries
Industrial Boiler	55-60%	75-80%
Industrial Furnaces	20-30%	50-60%
Thermal Electrical Power	25-30%	35-40%
Steel Industry	1.0 tce/ton of output	0.7 tce/ton of output
Synthetic Ammonia	2.1 tce/ton of output	1.15 tce/ton of output
Cement	0.2 tce/ton of output	0.13 tce/ton of output

Note: tce refers to tons of standard coal equivalent.
Source: Fang et al 1998, p. 125.

As per capita incomes continue to rise in China, the number of motor vehicles per capita is projected to increase much faster (figure 4). Between 1996 and 2010, motor vehicles per capita is projected to nearly triple, and then double again by 2020 (EIA 1999). Since Chinese fuel intensity in highway transport is 25% higher than in developed countries, and domestic-made vehicles consume 30-40% more fuel than comparable import vehicles (Lin and Polenske 1998), this growth in vehicle usage could significantly increase emissions. However, this differential in fuel economy also illustrates another potential opportunity to improve energy efficiency as the transportation sector continues to expand, in part by improving the technologies incorporated in vehicles made in China.



B. Clean Development Mechanism

The Clean Development Mechanism can serve as a vehicle for transferring technology from developed countries to developing countries and investment opportunities for clean energy technologies developed within developing countries. CDM projects will attract investment from firms in developed countries if they generate a sufficient economic return, which includes the value of the certified emissions reductions. The technologies to be diffused through the CDM most likely will be focused in the energy sector.

China has many options for improving efficiency in the energy sector with the continued use of coal. For example, Pressurized Fluidized Bed Combustion (PFBC) achieves thermal efficiency rates of about 40% by operating in combined cycle configurations, using both gas and steam engines. If a PFBC plant of 300 MW displaced a low-efficiency 300 MW pulverized coal plant that was part of China's base load, then 0.18 million metric tons of carbon (MMTC)[4] per year could be abated. Further, Integrated Gas Combustion Cycle (IGCC) is the state-of-the-art in electricity generation from coal. IGCC employs coal gasification along with gas turbines to achieve efficiency rates of 38-45% with SO_2 removal technology in place (Fang et al 1998). Desulfurization efficiency can reach levels as high as 99%, and the technology can reduce levels of NO_x formation by 25% to 60% when compared to a traditional pulverized coal plant (Government of China 1996). An IGCC plant displacing the same pulverized coal plant discussed above could abate about 0.2 MMTC annually.[5]

China has extensive potential for the development of wind power especially along the coastline and in the north. Large-scale wind projects could directly replace coal plants and can usually start generating electricity within a year of beginning construction. Two examples highlight the potential for wind power. One effort, begun in the 1980s to subsidize rural electrification in Inner Mongolia, has generated 140,000 small systems, employed 15,000 technicians, and fostered 42 Chinese enterprises engaged in wind power development. Another project imported medium scale turbines to create a wind farm in Dabancheng, Xinjiang. Overall, China has about 30 MW of grid-connected wind power in operation (Fang et al 1998).

In addition to technology investment opportunities in the energy sector, several technologies in industrial sectors could also have potential under the CDM. For example, the direct reduction technique for iron smelting could decrease energy use per unit of output. This process uses gas or liquid fuel and non-coking coal as a reducer to smelt iron. It achieves energy savings of 40-50% over blast furnace methods and can reduce carbon dioxide emissions by 50-60% per ton of steel produced (Government of China 1996).

While the Clean Development Mechanism can serve as an important vehicle for investment and

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4 All data on carbon dioxide emissions are presented in this document in terms of million metric tons of carbon equivalent. One ton of carbon dioxide is equal to 12/44 ton of carbon (this is based on the ratio of the molecular weights of carbon and carbon dioxide). All data on the price of a ton of carbon refer to carbon equivalent.

5 These estimates are for illustrative purposes and require more detailed analysis, especially with respect to factors that influence performance, such as location, operating conditions, etc.

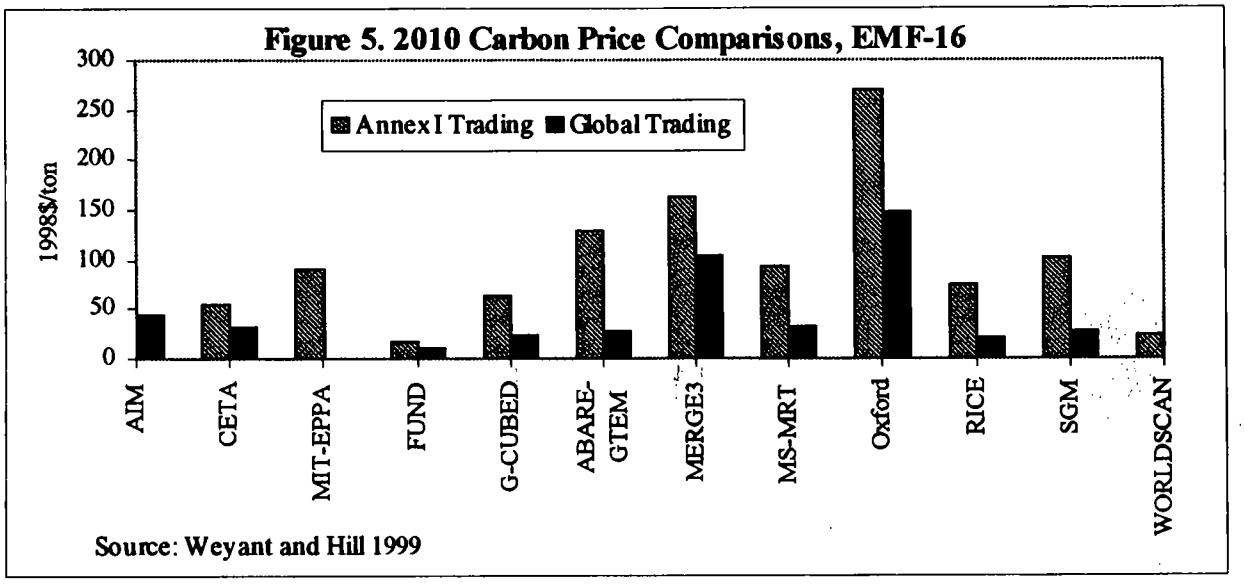
technology transfer, some economists believe that several characteristics of the CDM will cause it to result in fewer economic benefits than a well-functioning international trading system. The process of project certification, the adaptation fund, and accounting for administrative expenses will likely increase the transaction costs with a specific CDM project that would not likely occur in an efficient trading system. Further, the project-oriented approach of the CDM may not deliver least-cost abatement first like a tradable permit or tax system. Because of this, some have argued that the CDM will deliver fewer tons of emissions abatement at a given price of carbon than a trading system (MacCracken et al 1999). Because of CDM's complexity, Manne and Richels (1999) assumed that a developing country would be able to generate emissions abatement through the CDM equal to 15% of what it would abate at the same carbon price in an international emissions trading system.

C. International Emissions Trading

A variety of international energy-economic models have been used to evaluate the potential economic implications of the Kyoto Protocol. For example, the Stanford University Energy Modeling Forum coordinated a modeling comparison exercise involving 13 models developed by teams in Europe, the United States, Asia, and Australia. Further, the Organisation for Economic Cooperation and Development (OECD) hosted a workshop in 1998 where 16 papers with assessments of the Kyoto Protocol were presented.

These models assess the projected marginal cost of abating carbon dioxide across countries and then estimate the extent of buying and selling in an international emissions market until no further economic gains can be achieved through additional trades – i.e., they find the market clearing price for an emissions allowance. For estimating the marginal cost within a country, most of these models evaluate a country's potential emissions abatement by assuming that such abatement occurs at least-cost. In the case of China, these models depict energy technologies – in terms of energy production, carbon emissions, and costs characteristics – across various sectors and they evaluate how firms modify their investment and consumption decisions in these technologies in response to the cost of emitting a ton of carbon. This incentive – pricing carbon emissions – could be provided through a carbon trading system, analogous to the U.S. sulfur dioxide trading system, or through a carbon tax system, analogous to some of China's current pollution discharge fees (Panayotou 1998). Such a policy approach would provide the incentive to attract greenhouse gas-efficient technologies like those discussed in the CDM section above, but at a higher volume than would be expected under the CDM. These models can then provide estimates of marginal cost (e.g., price of one ton of carbon abatement), emissions abatement by country, transfers by country, and measures of total economic costs or benefits.

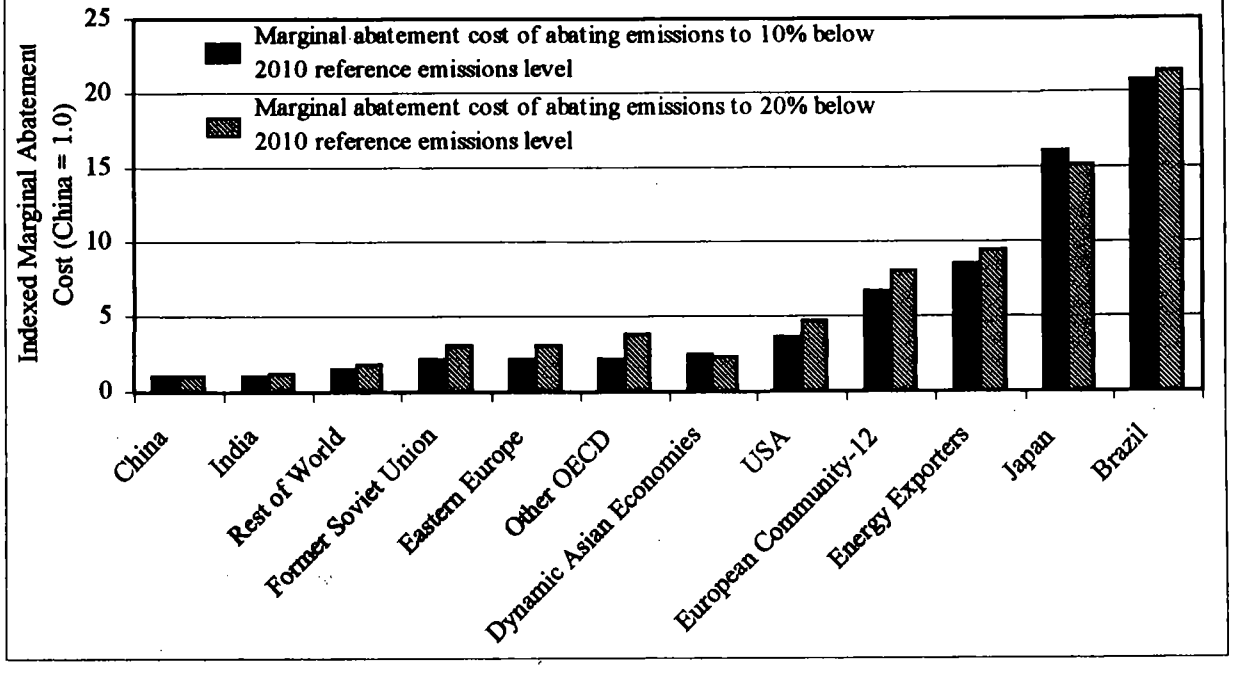
In scenarios involving non-Annex I countries, these models assume that developing countries adopt emissions targets set at estimated 2010 business as usual emissions levels and participate in international trading. Figure 5 presents results from 12 models that participated in the Stanford University Energy Modeling Forum Kyoto Protocol exercise (EMF-16).



While the price of a ton of carbon emissions may vary across models, three key lessons can be drawn from these results. First, projected gains from trade, especially in expanding trading from Annex I countries to all countries, can be substantial. All the models found that marginal and total costs fell substantially going from Annex I to global trading, because developing countries can undertake low-cost emissions abatement and sell their emissions abatement to Annex I countries. Second, higher rates of economic growth in Annex I countries increase demand for emissions allowances, while higher rates of economic growth in developing countries tend to create more opportunities to substitute greenhouse gas-lean technology, and thus increase supply of low-cost emissions abatement. Third, countries with larger coal shares of total energy have more opportunities to abate emissions through energy efficiency and fuel switching than countries with smaller coal shares.

These model results provide illustrations of the possible characteristics of an international emissions market. What kind of role can China play in this emissions market? Analyses based on the MIT-EPPA model developed by researchers at the Massachusetts Institute of Technology indicate that China may have the lowest marginal abatement cost of any country or region in the world (figure 6). To abate emissions to 10% below 2010 projected business as usual levels, Japan realizes marginal costs 16 times greater than China. The European Community would experience marginal costs more than 6 times greater than China, while the United States would witness marginal costs nearly 4 times greater. The relative differences in marginal costs increase for most countries as they move from abatement of 10% below 2010 BAU to 20% below 2010 BAU. Further, in the EPPA model, no developing or transition economy countries or regions have marginal costs lower than China's marginal cost. Thus, in this representation of the international emissions market, China would be the lowest-cost producer of emissions abatement. Tol (1999) also reports that China (as the dominant economy in the Centrally Planned Asia component of his FUND model) has the lowest abatement costs of any region or country in his global model. These results are based on the specific technology configurations in these models, and such technology representations vary across models.

Figure 6. 2010 Marginal Abatement Costs Across Countries in MIT-EPPA Model

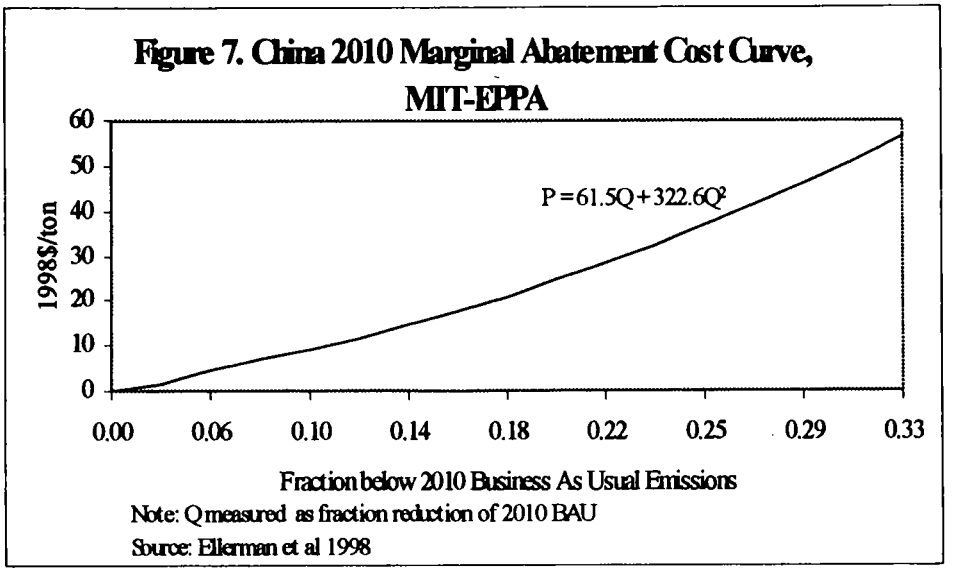


In addition to having the lowest abatement cost, as the largest non-Annex I economy, these modeling results illustrate the potential for China to be the largest producer of emissions abatement. Several of the EMF-16 modeling analyses also confirm the potential for China to produce the largest quantity of emissions abatement.

Ellerman et al (1998) have estimated the marginal abatement cost curve for China with the MIT-EPPA model presented below (figure 7).[6] With this marginal abatement cost curve, or emissions abatement supply curve, one can estimate the number of tons abated in 2010 at a given price of carbon. In their assessment of global trading, they found that the market price would be about $34/ton of carbon.[7] At this price, China would find it economic to abate emissions to nearly 25% below its 2010 business as usual emissions level. If China had a target set at 2010 BAU, Ellerman et al estimate that it could sell more than $14 billion per year in emissions allowances which would generate gains from trade of about $9 billion per year during the first commitment period.

6 The equations in figures 7 and 8 take the form: price of carbon (in 1998 U.S. dollars per metric ton of carbon) is equal to the first coefficient multiplied by the fraction of emissions abated below 2010 BAU (in million metric tons of carbon) as a share of 2010 BAU emissions plus the second coefficient multiplied by the square of the fraction of emissions abated below 2010 BAU (MMTC) as a share of 2010 BAU emissions.

7 All estimates of carbon prices are in 1998 U.S. dollars per ton of carbon equivalent, unless specified otherwise.



MacCracken et al (1999) employed the Second Generation Model (SGM) to evaluate the international emissions market assuming global participation. The SGM includes a China module, developed in coordination with Chinese energy-economic experts. The marginal abatement cost curve for China has then been estimated with SGM model outputs (figure 8). They found that under global participation in the international emissions market, the price for a ton of carbon would be $29/ton, and China would find it profitable to abate about 340 MMTC in 2010. With a target assumed to be set at 2010 business as usual, exporting emissions allowances representing the emissions abatement could generate nearly $10 billion in revenue annually.

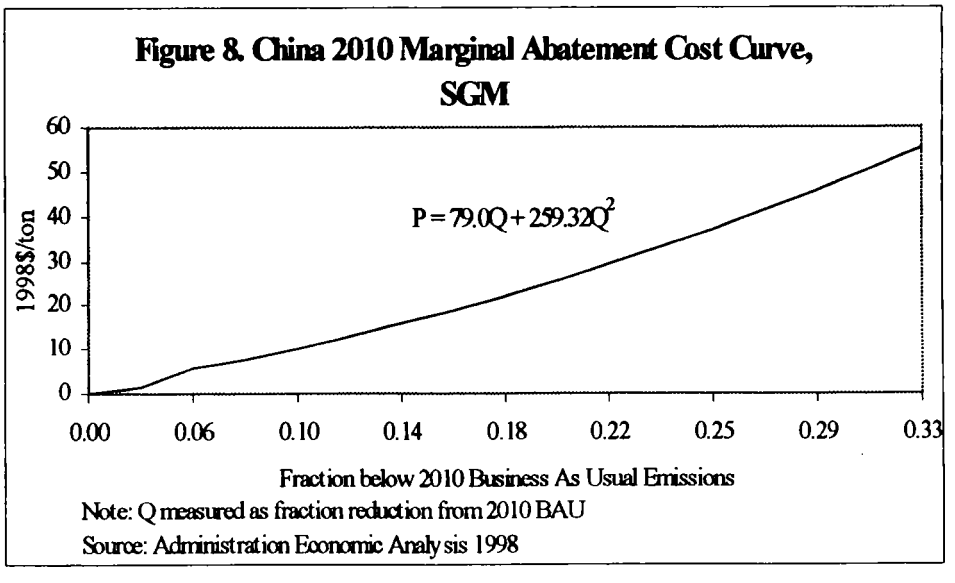


Table 2 summarizes some of the findings in the economic-energy modeling literature on the potential economic gains for China in participating in international emissions trading. These results assume that China has an emissions target for the first commitment period set at projected emissions for 2010 under business as usual. With the relatively significant emissions abatement below business as usual reflected in these modeling results, targets set slightly below business as usual could generate substantial gains from trade. However, more stringent targets would likely reduce these gains, and extremely stringent targets – for example, below 1990 levels for greenhouse gases in China – would likely result in abatement costs well in excess of sales revenues. Of course, these gains from trade are sensitive to both the international market price for a ton of carbon as well as the abatement opportunities within China. These scenarios assume that all developing countries adopt emissions targets. Since some of these countries also have low abatement costs relative to developed countries, this assumption implies that China would have competition in "producing" emissions abatement. To the extent that other relatively large, low-cost developing countries do not adopt emissions targets, the supply of emissions abatement would be less than estimated in these global trading scenarios, and China would witness a higher market price for abating carbon and additional economic incentive to abate more emissions. This would increase both the volume of emissions abatement sold to other countries and the economic value of these sales.

Table 2. Potential Economic Effects of Chinese Participation in International Emissions Trading

Model	**2010 Price of Carbon (1998$)**	**Emissions Abatement (% below 2010 BAU)**	**Annual Revenues from Sales of Emissions Allowances, 2008-2012**
MIT-EPPA (Ellerman et al 1998)	$34/ton	24%	$14 billion/year
SGM (MacCracken et al 1999)	$29/ton	24%	$10 billion/year
GREEN (van der Mensbrugghe 1998)	$27/ton	15%	$6 billion/year
RICE (Nordhaus and Boyer 1999)	$22/ton	14%	$4 billion/year
G-Cubed (McKibbin et al 1999)	$24/ton	19%	$7 billion/year
ABARE-GTEM (Tulpule et al 1999)	$28/ton	19%	$10 billion/year

In these scenarios, every ton of abatement undertaken by China under a 2010 BAU target would allow it to sell a one-ton emissions allowance to other countries with emissions targets. Because these models assume that emissions abatement occurs at least-cost, every ton abated costs less than the 2010 price of carbon – the price China would receive for selling emissions allowances internationally – except for the last ton abated. In addition to the revenues associated with the sale of emissions allowances, the abatement of emissions could have several other economic effects on China. This opportunity to act as one of the largest suppliers of emissions allowances in the

international emissions market could serve to attract more FDI and advanced technology to the energy and industrial sectors that emit the majority of greenhouse gases.

In addition to the international economic models used in the EMF-16 exercise, some China-specific assessments of abatement potential have been conducted. While these studies cannot explicitly illustrate the potential role of China in an international emissions market, they have the benefit of evaluating the Chinese economy, and its abatement potential, in greater detail.

For example, Garbaccio et al (1999) recently completed an evaluation of a carbon tax on the Chinese economy. Such a tax could mirror other emissions and pollutant charges in China. Garbaccio et al designed a 29-sector computable general equilibrium model based on China's 1992 input-output (I-O) tables. They estimated levels of carbon taxes necessary to abate emissions 5%, 10%, and 15% below business as usual over a 40-year period. Revenues from the carbon tax were recycled through proportional reductions in labor and capital taxes. Because rates of taxation on capital in China are significantly higher than rates on labor, this revenue recycling results in increased investment. While GDP falls below projected business as usual in the first year of these three simulations, the investment induced by revenue recycling results in GDP growth above BAU after the first year in all scenarios. In this model, China's emissions could be abated by 15% below business as usual at a cost of less than $10 per ton of carbon equivalent (approximately 30 yuan, in 1992 yuan), which is well below the estimated Annex I trading carbon prices in the EMF-16 model results. This analysis indicates that China can substantially reduce its greenhouse gas emissions while maintaining or even increasing its economic growth rate. Selling emissions allowances through international trading would provide similar economic benefits and bring in more capital that could also contribute to economic growth.

This analysis by Garbaccio et al illustrates the two countervailing effects a carbon tax scheme can have on the economy. First, a carbon tax could provide revenues to the government and afford it the opportunity to reduce taxes on labor and investment.[8] As reflected in Garbaccio et al research, such a policy could result in lower carbon dioxide emissions while stimulating investment and increasing GDP in the long run. However, some researchers have found that carbon taxes can exacerbate pre-existing tax distortions in markets (Bovenberg and Goulder 1996). Which effect is dominant depends on an economy's tax structure and the nature of the recycling. It should also be noted that carbon taxes can partially correct pre-existing subsidy distortions in energy markets, which would reduce abatement costs.

Finally, abating carbon dioxide emissions often results in the abatement of local air pollutants, such as sulfur dioxide, particulate matter, and nitrogen oxides that cause significant costs in terms of public health effects as well as agriculture and forestry damage. The next section reviews the benefits in improving local air quality that accompanies carbon dioxide abatement.

8 Also note that by adopting an emissions target and abating greenhouse gas emissions below this target, the Chinese Government could acquire significant revenues from selling emissions allowances to other countries.

III. Local Air Quality Benefits from Abating Greenhouse Gas Emissions

The same combustion processes that emit carbon dioxide and other greenhouse gases also generate numerous local air pollutants such as sulfur dioxide and particulate matter. In its Report on the State of the Environment in China, the State Environmental Protection Administration noted that "atmospheric pollution results mainly from coal-burning" (SEPA 1998, p. 8). This is true for both global and local pollutants. By reducing carbon dioxide emissions through the use of coal substitutes and the adoption of more efficient coal combustion methods, China can simultaneously abate greenhouse gases and improve local air quality.

A. Local Air Quality

Local air quality is the most immediate environmental threat facing China. As figures 9 and 10 show, a number of China's cities regularly encounter more than 2 times the World Health Organization's recommendations for levels of sulfur dioxide (SO_2) and nitrogen dioxide (NO_2).

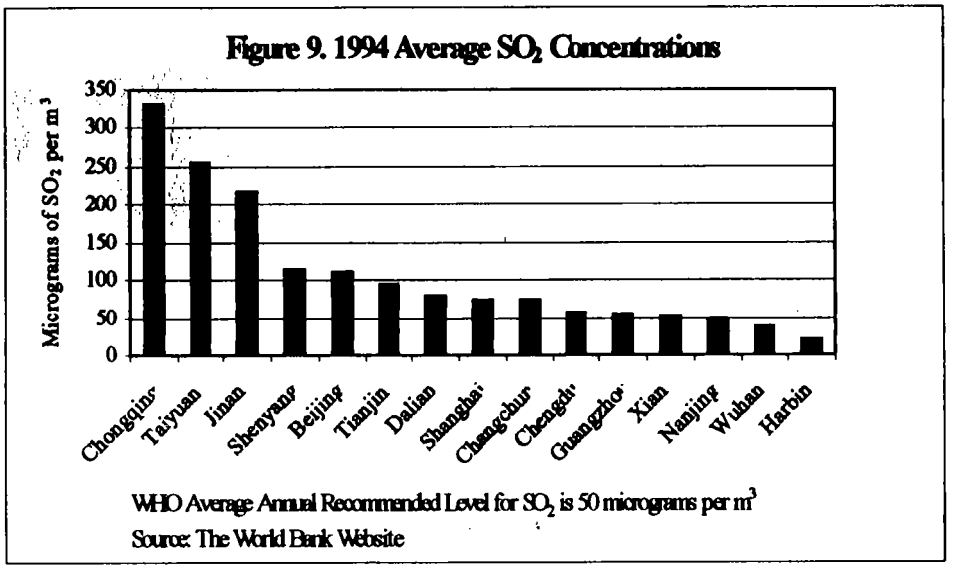


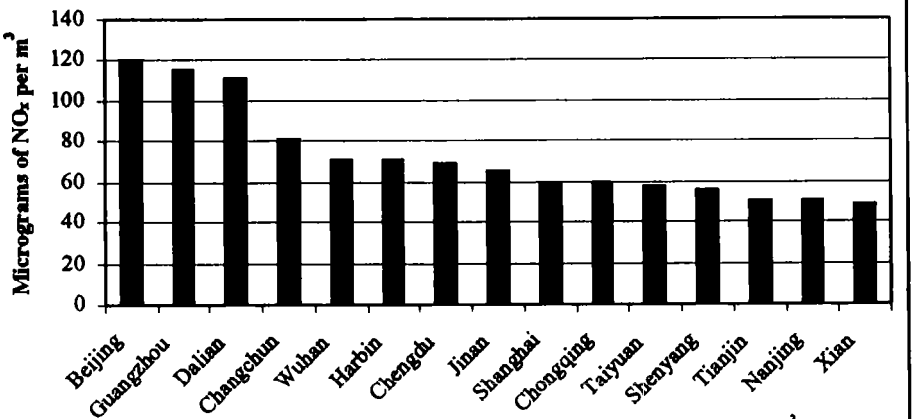
Figure 9. 1994 Average SO_2 Concentrations

WHO Average Annual Recommended Level for SO_2 is 50 micrograms per m^3

Source: The World Bank Website

In recent years, the level of pollutants has stabilized due primarily to two countervailing effects (Florig 1997). First, more efficient power generation technology, the use of pollution control, and changes in the distribution of output have reduced emissions from industrial sites. Second, China's overall industrial production has increased substantially, leaving the total pollution levels constant. Estimates from the World Bank (1997), however, show sulfur dioxide emissions increasing 150% and household smoke increasing 90% between 1995 and 2020.

Figure 10. 1994 NO_x Concentrations



WHO Average Annual Recommended Level for NO_2 is 40 micrograms per m^3

Source: The World Bank Website

B. Costs of Local Air Pollution

A number of studies have analyzed the relationship between current high levels of local air pollutants and health problems. Xu Zhaoyi and associates at the Liaoning Public Health and Anti-Epidemic Station estimated that indoor and outdoor pollution cause 60% of urban chronic obstructive pulmonary disease cases (Florig 1997). Research by Xu Xiping at the Harvard School of Public Health and his colleagues found that a one-percent increase in SO_2 and total suspended particulates (TSP) levels increased the number of non-surgical visits by 20% and 17%, respectively (Xu et al 1995a; Xu et al 1995b). Xu Zhaoyi and Xu Xiping have also estimated the effects of pollution on mortality rates in Shenyang and Beijing respectively (Xu 1998). In Beijing, a doubling of SO_2 levels increased the mortality rate by 11% while in Shenyang, mortality increased by 2% for each 100 $\mu g/m^3$ of SO_2 and by 1% for each 100 $\mu g/m^3$ for TSP. The World Bank (1997) estimates that the economic costs from lost work hours, hospital and emergency room visits, and chronic bronchitis at more than $20 billion per year in China.

Researchers have also documented the effects of pollution on children. Liu Yulin of the Institute of Pediatrics in Beijing found that children's chances of contracting pneumonia doubled if they lived in a home with coal stoves or adults who smoked. He Qingci of the Wuhan Environmental Protection Institute showed that children from Wuhan's urban areas had lung capacities 5% smaller than children from the suburbs where outdoor TSP levels are 50% lower (110 $\mu g/m^3$ vs. 251 $\mu g/m^3$). Finally, Xu Zhaoyi found "up to four times more rhinitis, pharyngitis, and tonsillitis [inflammation of the nasal mucous membrane, pharynx, and tonsils, respectively] among children living in areas of heavier outdoor pollution" (Florig 1997).

While these estimates demand consideration, they should be used with caution. This area of epidemiology has a relatively short history compared with other disciplines. As a result, many of the studies ignore the effects of pollution levels over time and may not adequately control for the

presence of covariates that could magnify or diminish the estimated effects of pollution levels on public health. This criticism not withstanding, the Working Group on Public Health and Fossil-Fuel Combustion (1997) estimates the number of potential lives that could be saved from particulate matter (PM) alone through a 10% reduction from business as usual over the 2000 to 2020 period. The authors project that 1.5 million premature deaths could be avoided in Centrally Planned Asia.[9] Since the study assumes an immediate reduction in the mortality rate after a reduction in PM concentrations, the actual number of premature deaths avoided may extend beyond 2020. Additionally, the study does not account for other causes of death, which brings into question the actual number of life-years these statistical lives represent. By assuming PM distributions similar to the United States, however, the authors underestimate the number of deaths because of China's higher use of coal and residential reliance on coal and biomass stoves.

In addition to public health effects, local air pollution adversely impacts agricultural and forestry production activities. The World Bank (1997) estimates that the share of farming and forestry output damaged by sulfur deposition is more than 5% of total economic output in these industries in several provinces. This damage affects commodities representing a value of perhaps more than $4 billion annually in the Chinese economy.

C. Options for Carbon Dioxide Abatement and Local Air Quality Improvement

The future increases in pollution levels reflect the growth of numerous pollution sources, including new power plants, household heating sources, and automobiles. Electricity generating capacity has increased by nearly 200% between 1980 and 1994. Because Chinese power generators tend to be small, to run for long life spans, and to have low efficiency levels, significant potential exists both to improve ambient air quality and to generate credits for carbon abatement under an emissions target. Even relatively simple policies such as washing and screening coal could both improve air quality and generate more efficient power, reducing levels of carbon dioxide emissions (Murray and Rogers 1998).

To reduce crowding on public transportation and to improve commercial service, China has begun encouraging the use of automobiles. Between 1983 and 1990, the number of civilian motor vehicles increased from 1.8 million to 8.2 million and road transportation volume increased at an average annual rate of 13.5% for both passengers and freight while rail volume only increased 7.7% and 5.6% for passengers and freight, respectively (Lin and Polenske 1998). China's emissions standards and automotive technology are similar to those of the west in the 1970's; compared to foreign vehicles, Chinese vehicles emit "2.5 to 7.5 times more hydrocarbons, 2 to 7 time more nitrous oxides, and 6 to 12 times more carbon monoxide" (World Resources Institute 1998). These trends are challenging in themselves, but also offer substantial opportunities for simultaneous reductions in local air pollutants and carbon dioxide emissions through improved highway infrastructure and the use of more recent automotive technology.

Finally, most Chinese residents rely on coal and biomass stoves for cooking and heating. These also

9 Centrally Planned Asia includes China, Laos, North Korea, and Vietnam.

constitute significant sources of indoor air pollution. If other energy options develop such as natural gas or electricity, then the adoption of gas furnaces or electric appliances would provide an obvious route to reducing pollution levels, perhaps by substantial amounts. Such steps would tend to reduce greenhouse gas emissions, as well. Absent these developments, however, options still exist. China's cities, for example, are very dense. This may allow a more centralized control of pollution emissions through large scale heating systems that service multiple housing units (Fang et al 1998).

IV. Summary

The Kyoto Protocol has the potential to create the incentives necessary for a global greenhouse gas emissions market to evolve. This market would serve as a critical vehicle for countries and private firms to participate in the transfer of capital and technology to the countries where emissions can be abated at least cost. A review of the existing economic literature illustrates that China has significant potential to abate greenhouse gas emissions at low cost, thereby providing an opportunity for it to act as a major supplier of emissions abatement in this global market. While the Clean Development Mechanism can attract some investment in climate-friendly technologies, most economists believe that more substantial economic gains can accrue from an appropriately designed emissions growth target and active participation through international emissions trading. The global emissions market would provide the incentive to China to abate emissions of greenhouse gases, providing the opportunity to sell emissions allowances potentially valued in the billions of dollars annually. In addition, the abatement of carbon dioxide would deliver the substantial benefit of reducing emissions of local air pollutants and improving air quality in many urban areas in China.

V. References

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APRIL XX, 2000

DRAFT

HIS EXCELLENCY
ZHU RONGJI
PREMIER
PEOPLE'S REPUBLIC OF CHINA
BEIJING

DEAR MR. PREMIER:

I HAVE BEEN BRIEFED ON THE RESULTS OF THE THIRD SESSION OF OUR JOINT FORUM ON ENVIRONMENT AND DEVELOPMENT. UNDER THE LEADERSHIP OF THE MODERATORS, THIS SESSION ACHIEVED CONCRETE RESULTS, ESPECIALLY IN THE AREAS OF CLEAN ENERGY AND SCIENTIFIC COOPERATION. I BELIEVE WE SHOULD CONTINUE TO PRESS FORWARD, ADVANCING COOPERATION BILATERALLY AND GLOBALLY WHEREVER IT CAN LEAD TO SUSTAINABLE ECONOMIC DEVELOPMENT. THIS IS PARTICULARLY IMPORTANT AS CHINA MOVES CLOSER TO JOINING THE WORLD TRADE ORGANIZATION, A BOLD STEP THAT WILL PRESENT CHINA WITH NEW OPPORTUNITIES AND NEW RESPONSIBILITIES.

IN THE AREA OF CLEAN ENERGY, I UNDERSTAND CHINA IDENTIFIED WHAT COULD BE THE FIRST PROJECT TO UTILIZE THE $100 MILLION CLEAN ENERGY PROGRAM OF THE U.S. EXPORT-IMPORT BANK, CHINA DEVELOPMENT BANK, DEPARTMENT OF ENERGY AND STATE DEVELOPMENT PLANNING COMMISSION. I HOPE THIS IS THE FIRST OF MANY SUCH COLLABORATIVE PROJECTS EMPHASIZING THE IMPORTANCE OF CLEAN SOURCES OF ENERGY, SUCH AS NATURAL GAS, RENEWABLES, CLEAN FOSSIL FUELS AND NUCLEAR ENERGY.

I WAS PLEASED TO LEARN THAT OUR SCIENTISTS WILL UNDERTAKE A JOINT STUDY OF CLIMATE SCIENCE AND OCEAN OBSERVATIONS. WHILE DIFFERENCES REMAIN, BOTH SIDES RECOGNIZED THE UTILITY OF A JOINT ASSESSMENT OF THE ECONOMIC POTENTIAL FOR CHINA IN ABATING GREENHOUSE GAS EMISSIONS. AMERICAN SCIENTISTS AND OFFICIALS ARE WORKING SIDE-BY-SIDE WITH CHINESE SCIENTISTS AND OFFICIALS IN MANY AREAS: AGRICULTURE, COASTAL ZONE AND WATER RESOURCE MANAGEMENT, NATURAL AND TECHNOLOGICAL DISASTER MITIGATION, AIR QUALITY MONITORING, CLEANER PRODUCTION, LAND AND FOREST MANAGEMENT, AND ON THE LINK BETWEEN HEALTH AND THE ENVIRONMENT. WHILE THIS LIST IS IMPRESSIVE, THE POSSIBILITIES FOR FURTHER COOPERATION ARE EVEN MORE SO.

IN HONOLULU, CHINESE REPRESENTATIVES EXPRESSED INTEREST IN U.S. EXPERIENCE WITH ENVIRONMENTAL LAW AND REGULATIONS. WE HAVE FOUND THAT WELL-DRAFTED AND EFFECTIVELY-ENFORCED ENVIRONMENTAL

LAWS AND REGULATIONS CREATE PREDICTABILITY AND FAIRNESS THAT BENEFIT THE ECONOMY. IN U.S. SOCIETY, THE INVOLVEMENT OF NON-GOVERNMENT ORGANIZATIONS IN BUILDING PUBLIC AWARENESS AND UNDERSTANDING OF ENVIRONMENTAL LAWS HAS BEEN CRITICAL. WE HAVE WORKED CLOSELY WITH OTHER COUNTRIES TO CURB ENVIRONMENTAL CRIMES WITH AN INTERNATIONAL COMPONENT, AND WOULD BE INTERESTED IN EXPANDING OUR COLLABORATION WITH CHINA IN THIS AREA.

THE FORUM ALSO HIGHLIGHTED OUR GROWING COMMERCIAL COOPERATION IN ENERGY AND THE ENVIRONMENT. CHINA'S ACCESSION TO THE WORLD TRADE ORGANIZATION WILL PROVIDE ADDITIONAL OPPORTUNITIES FOR ENVIRONMENTAL PROTECTION AND CLEANER ECONOMIC DEVELOPMENT. LIBERALIZATION OF CHINA'S ENERGY SECTOR, IN PARTICULAR, WILL REDUCE TRADE BARRIERS TO A WIDE VARIETY OF MORE EFFICIENT AND CLEAN ENERGY GENERATION AND TRANSMISSION TECHNOLOGIES. WE WILL, OF COURSE, WELCOME NEWS OF FURTHER SALES OF AMERICAN ENERGY- AND ENVIRONMENT RELATED-SERVICES, AS WELL AS MANUFACTURED AND AGRICULTURAL GOODS, TO THE CHINESE MARKET.

FORUM PARTICIPANTS TOLD ME OF YOUR GOVERNMENT'S DEEP INTEREST IN DEVELOPING CHINA'S WESTERN PROVINCES. I BELIEVE COOPERATION WITH THE U.S. PRIVATE SECTOR – ESPECIALLY IN RESOURCE AND ENVIRONMENTAL – WOULD BE BENEFICIAL. U.S. FIRMS MAY BE INTERESTED IN YOUR INVESTMENTS IN WATER, ENERGY, ENVIRONMENTAL AND TRANSPORTATION INFRASTRUCTURE. OUR EXPERTS WOULD BE INTERESTED IN ENGAGING ON APPROPRIATE REGULATORY FRAMEWORKS, CITY AND LAND USE PLANNING, AND CLEAN ENERGY DEVELOPMENT.

IN THIS REGARD, I BELIEVE WE SHOULD EXPLORE INCREASED COOPERATION BETWEEN A NUMBER OF CHINESE PROVINCES AND U.S. STATES. OUR WEST COAST STATES HAVE EXTENSIVE COMMERCIAL INVOLVEMENT WITH REGIONS OF THE RUSSIAN FAR EAST; INDEED, ONE OF THEIR PROPOSED FUTURE INITIATIVES IS FOR A NEW TRANSPORT CORRIDOR EXTENDING FROM OUR WEST COAST ACROSS THE RUSSIAN FAR EAST TO CHINA'S NORTHEAST PROVINCES. IF YOU AGREE, I SUGGEST THAT OUR TWO SIDES DEVELOP A SIMILAR INTER-REGIONAL WORKING GROUP UNDER THE AUSPICES OF THE FORUM ON ENVIRONMENT AND DEVELOPMENT.

FEW CHALLENGES IN THE 21ST CENTURY LOOM LARGER THAN ENSURING CLEAN ECONOMIC GROWTH. WE NEED STEADFAST COMMITMENT, STRONG LEADERSHIP, AND ACTIVE COOPERATION BETWEEN GOVERNMENTS, ACADEMICS, BUSINESS PEOPLE, AND CONCERNED CITIZENS IN PURSUIT OF THIS GOAL. I AM CONFIDENT THAT WE CAN MEET THIS CRITICAL CHALLENGE.

SINCERELY,
AL GORE