Climate Action in the United States and China

中国与美国在气候变化领域的行动

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Advanced International Studies Unit

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Summary

The United States and China together produce almost 40 percent of the greenhouse gas emissions that now threaten to alter the global climate. Any successful global effort to reduce greenhouse gas emissions will therefore require the direct support and participation of both countries.

The United States and China are beginning to acknowledge their roles in shaping a response to the problem of greenhouse gas emissions and, intentionally or not, each country has taken steps to slow the growth rate of emissions. For example, both China and the United States have limited growth in greenhouse gas emissions through energy efficiency and energy conservation programs. If Chinese energy intensity had remained constant at the 1977 level, China would be emitting more than twice the greenhouse gas emissions that it currently does. Using the same measures and timeframe, the United States has limited growth in greenhouse gas emissions by approximately 25 percent. The United States is also leading the effort to better understand the science of climate change and the specific policy options available domestically and internationally.

However, emissions in both countries continue to grow and new efforts are needed. The December 1997 Kyoto Protocol is a possible starting point to achieve reductions in global greenhouse gas emissions. While both the United States and China have signed the Protocol, neither has ratified it yet.

Negotiations between the two countries on whether and how to implement the Kyoto Protocol continue. One barrier is a lack of recognition by each country about the accomplishments of the other. A better understanding of each country's activities¾and each country's negotiating stance¾could perhaps represent a first step toward negotiating mutually acceptable climate change protection policies.

Both countries will need to take further actions to reduce emissions and to hold atmospheric concentrations of greenhouse gases at levels that do not endanger future generations. Acknowledging the accomplishments that both countries have already achieved will help move international discussions to a higher level.

Overview

This pamphlet sets the context and summarizes the actions taken by the United States and China to address the threat of global climate change. The purpose is not to judge the actions of one country against the other but to help each country understand the existing activities and accomplishments of the other as a foundation for dialogue. It does not attempt to provide a comprehensive source of information about activities in each country but instead highlights activities that have resulted in concrete achievements. The report is divided into two sections: the first describes the context of climate change action in China and the United States; the second offers a side-by-side analysis of the actions and accomplishments in both countries.

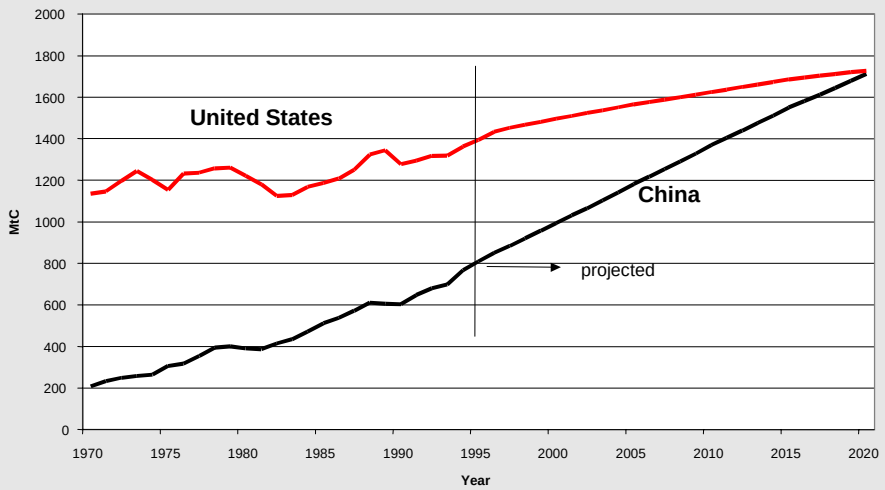
The Context for Action

The People's Republic of China and the United States are both parties to the United Nations Framework Convention on Climate Change (UNFCCC) and signatories to the Kyoto Protocol, but they have significantly different obligations under these commitments. As an Annex I party (developed country) to the UNFCCC, the United States voluntarily agreed in 1992 to aim to hold greenhouse gas (GHG) emissions at 1990 levels by the year 2000. If ratified, the Kyoto Protocol (completed in December 1997) would require the United States to reduce GHG emissions 7 percent below 1990 levels in the 2008-2012 timeframe.

China, as a non-Annex I party (developing country), has "common but differentiated" responsibilities as outlined in Article 4 (a-j) of the UNFCCC. These commitments require China to survey sources and sinks of greenhouse gases, account for changes in sources and sinks in economic planning, and take steps to reduce the likelihood of climate change. Unlike Annex I countries, China is not obligated to reduce GHG emissions, nor will it be required to do so even if the Kyoto Protocol is enacted. The Protocol, however, encourages non-Annex I countries such as China to take voluntary action to limit their emissions as quickly as possible. Two non-Annex I countries, Argentina and Kazakhstan, have currently volunteered to adopt targeted emissions reductions.

China's greenhouse gas emissions¾the most important of which is carbon dioxide (CO_2)¾are increasing rapidly. These emissions will likely surpass those of the United States within 25 years (see Figure 1). Much of this growth can be attributed to China's massive population—

Figure 1 - Energy-related carbon dioxide emissions from the U.S. and China, 1970-2020



Source: Marland, G., T.A. Boden, R. J. Andres, A. L. Brenkert, and C. Johnston. 1998. Global, Regional, and National CO2 Emissions. In *Trends: A Compendium of Data on Global Change.* Carbon Dioxide Information Analysis Center, Oak Ridge National Laboratory. "Business as usual" estimates for 1996 and beyond provided by Battelle Memorial Institute.

four times that of the United States—and the fact that China has quadrupled personal income levels over the past twenty years. It is important to keep in mind that China is still a developing country. China's gross domestic product (GDP) per capita in purchasing power parity is, optimistically, only one-eighth that in the United States, and many rural Chinese citizens still live in abject

poverty. Table 1 provides indicators showing relative standards of living in China and the United States.

Table 1 - Basic indicators for China and the United States

	China	USA
Population (millions), 1998	1,243	270
Population Growth Rate (%), 1997	1.1	0.9
GDP Per Capita in Purchasing Power Parity ($), 1997	2,970[1]	26,980
Economic Growth Rate (%), 1998	7.8	3.9
Commercial Energy Use per Capita (tons of standard coal), 1998	1.2	11.4
Electricity Use per Capita (kilowatts per hour), 1998	930	11,800
Carbon Emissions (million metric tons), 1997	885	1,480
Carbon Emissions per Capita (kg), 1997	705	5,303
Carbon Emissions (billion metric tons), 1900-1997	16.4	75.5
People per Registered Car, 1998	104	2

Sources: World Bank, Battelle Memorial Institute, U.S. Department of Energy, Oak Ridge National Laboratory

Although its carbon dioxide emissions will most likely continue to increase, China deserves recognition for an energy conservation program that has already reduced carbon emissions by hundreds of millions of tons each year when measured against a baseline scenario. Over the past two decades, China has held growth in energy consumption at half the level of economic growth, unlike other developing countries such as India, South Korea, and Brazil, in which growth in energy consumption has exceeded economic growth. China has managed to uncouple energy growth from economic growth more effectively than even most developed countries.

The United States should also be recognized for its greenhouse gas emission reduction efforts. Over the past two decades, the United States has carried out a variety of energy-efficiency efforts that have resulted in hundreds of millions of tons of reduced carbon emissions each year when measured against a baseline scenario. Additionally, the United States is spending billions of dollars at home and abroad to research essential questions regarding climate change.

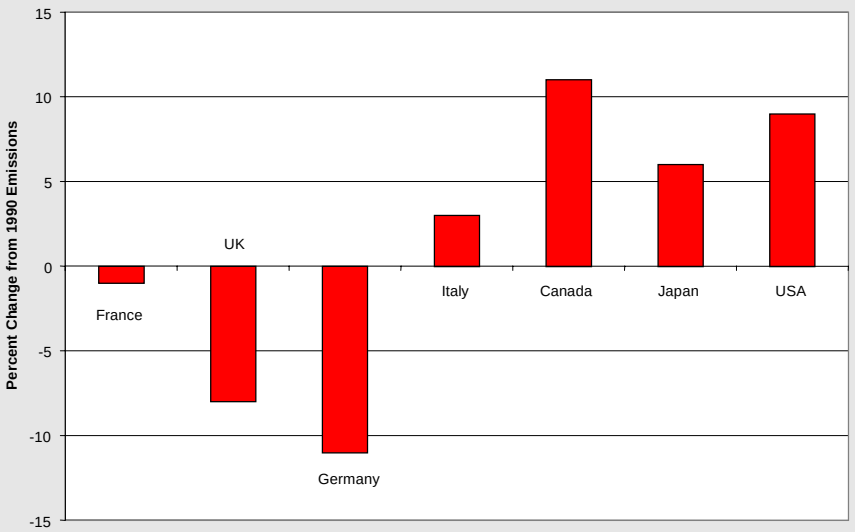
Some Annex I countries criticize China, as an influential member of the developing country community, for not playing a more constructive role in international climate change negotiations. These countries argue that global efforts to reduce GHG emissions will be meaningless unless both developed and developing countries take joint action. This belief is based on three concerns. First, emissions from developing countries are growing rapidly and will eventually offset any mitigation efforts from Annex I nations, resulting in little net change in atmospheric concentrations. Second, Annex I nations could lose competitive advantage to non-Annex I countries if they incur the added costs of emission mitigation unilaterally. Finally, energy-intensive industries in Annex I countries could simply transfer production to non-Annex I countries if unilateral reductions are required.

Non-Annex I nations, however, claim that industrialized countries have created most of

the global climate change problem and therefore have the historical responsibility, and resources, to act first. Data in Table 1 show that the United States is responsible for almost five times the amount of carbon emissions as China over the course of the twentieth century. Other stakeholders in the negotiations have also criticized the United States for pushing the trade of permits for "hot air" emissions.[2] These critics claim that the United States would buy these emission permits as a substitute for reducing emissions domestically. While carbon trading is an economically efficient tool for reducing greenhouse gas emissions, trading hot air would not benefit the global climate in the short term.

Other participants, both Annex I and non-Annex I, note that the United States is failing to meet even the voluntary target agreed upon in 1992 of holding emissions in the year 2000 to their 1990 level (Figure 2). Most of these participants, including China, believe that the United States should first demonstrate its concern about global climate change by lowering emissions domestically before it can expect developing countries to accept targeted emission reductions.

Figure 2 - Greenhouse gas emissions of selected Annex I countries in 1996 relative to 1990 baseline*

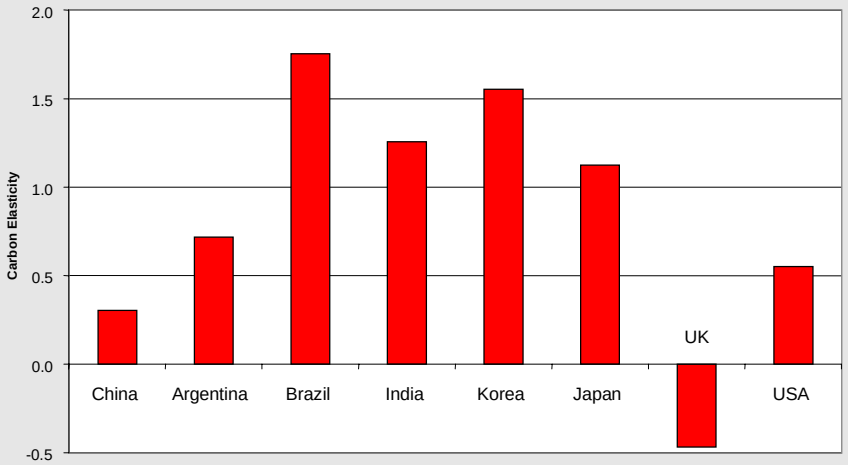


Source: U.S. Energy Information Administration.

*** The United Kingdom has reduced emissions primarily through fuel substitution from coal to natural gas, while Germany has done so primarily as a result of reunification.**

Finally, it is instructive to examine the nature of carbon emissions across countries relative to economic growth. Carbon elasticity measures the percentage change in carbon emissions per unit change in economic activity. Figure 3 demonstrates that while China's carbon emissions have grown about one-third as quickly as its economy this decade, developing countries typically have ratios greater than 1. In the United States, carbon emissions have grown slightly more than half as quickly as the economy.

Figure 3 - Carbon elasticity of major greenhouse gas producers, 1990-97[3]



Source: BP Statistical Review of World Energy 1998; Energy Information Agency; Battelle Memorial.

Actions and Accomplishments

This section presents a side-by-side display of climate change actions and accomplishments in China and the United States. Information is provided under two headings: treaty activities and domestic activities. These headings do not always allow for precise classification. We focus on concrete achievements that have already *occurred; future plans are not discussed to maintain an objective, rather than speculative, approach. Finally, it is not possible to record every activity in each country due to space limitations. For more details, see the references at the end of this document.*

Treaty Activities

China

- Ratified the United Nations Framework Convention on Climate Change in 1992.
- Signed, but has yet to ratify, the Kyoto Protocol in May 1998.

Bilateral Technical Assistance

The Framework Convention on Climate Change and the Kyoto Protocol have created two mechanisms to assist non-Annex I countries in reducing greenhouse gas emissions: activities implemented jointly (AIJ) and the clean development mechanism (CDM). China has explored both mechanisms and has cooperated bilaterally on the following projects:

- Started AIJ project with Japan on coke-gas utilization to reduce methane-rich greenhouse gas emissions and offset coal use. Negotiating projects with other countries.
- Initiated studies on the CDM as a method of technology transfer. The CDM was created to assist non-Annex I parties in achieving sustainable development while helping developed countries meet their targeted reductions.
- Prepared the *China Country Study* with sponsorship from the U.S. Country Studies Program.

Participation with Multilateral Organizations

China has worked with multilateral organizations to study climate change and help develop a coordinated national climate change action plan.

- Collaborated on climate change policy studies and published the following reports:
  - *China: Issues and Options in Greenhouse Gas Emission Control*, conducted with the World Bank and the Global Environment Facility (1994).
  - *National Response Strategy for Global Climate Change: People's Republic of China*, conducted with the Asian Development Bank (1994).
  - *Asian Least-Cost Greenhouse Gas Abatement Strategy: China*, conducted with the Asian Development Bank (forthcoming in 1999).
- Established the China Commission for the Global Climate Observing System and participating in Global Climate Observing System activities.

Treaty Activities

United States

- Ratified the United Nations Framework Convention on Climate Change in 1992, the first industrialized country to do so.
- Signed, but has yet to ratify, the Kyoto Protocol in November 1998.

Bilateral Technical Assistance

The United States has assisted developing countries in understanding the science of climate change and in taking actions to address the impacts of climate change. The following are examples of two such activities:

- Contributes technical assistance worth hundreds of millions of dollars to developing countries through the U.S. Agency for International Development (USAID), U.S. Department of Energy (DOE), and U.S. Environmental Protection Agency (EPA). USAID has made mitigation of climate change one of two global environmental priorities and works with over ten leading greenhouse gas producing countries on these issues.[4]
- Provides financial and technical assistance to 56 developing and transition countries, including China ($40 million to all countries since 1993), through the U.S. Country Studies Program, a cooperative effort overseen by the U.S. Department of State, DOE, USAID, and EPA. The Program assists countries in conducting inventories of their greenhouse gas emissions, assessing their vulnerability to climate change, and in evaluating strategies for mitigating emissions.

Participation with Multilateral Organizations

In the field of climate science and analysis, the United States has been an important member of multilateral organizations.

- Plays a leading role in funding the UNFCCC, the Global Environment Facility (GEF), the United Nations, five multilateral development banks, and the International Energy Agency. The United States has contributed several hundred million dollars to the GEF alone.

Nongovernmental/Private Efforts

The United States government has worked with the private sector and the nongovernmental community to promote greenhouse gas reduction measures, as illustrated by the following activities:

- Promotes energy efficiency and renewable energy globally through dozens of for-profit and non-profit private organizations, often working in conjunction with local nongovernmental organizations (NGOs) and governments.
- Transfers technology to developing countries through private sector and NGO involvement.
- Promotes cooperation through the U.S. Initiative on Joint Implementation pilot program by encouraging private sector investment in projects aimed at reducing or sequestering greenhouse gases in developing countries. Over two dozen projects are underway.

Domestic Activities

China

China's domestic greenhouse gas activities, like those in most nations, have focused on "no-regrets" strategies in energy efficiency and conservation, clean energy supply, and reforestation. In addition to mitigating greenhouse gas emissions, these efforts cut energy costs and reduce local pollution. Intentional or not, China's greatest accomplishment in addressing climate change has been the success of energy conservation and energy-efficiency programs first established almost two decades ago. These efforts continue to play an important role in the country's energy policy.[5] We outline these successes after highlighting three domestic actions directly related to climate change:

- Established the National Climate Change Coordinating Group in 1990 to study policy issues and interagency coordination
- Created China's Agenda 21, a strategy to put China on a sustainable development path in the 21st century. This strategy has not yet been widely utilized or implemented in China's economic planning process
- Expanded the role for environmental NGOs to promote education and demonstrate energy saving technologies.

China's energy conservation efforts began in the early 1980s, mainly to address energy shortages throughout the country. Many of these initiatives are still in place today, although some, as will be explained later, have been expanded to rely on newly formed market forces. Energy saving efforts include:

- Establishing minimum efficiency standards for industrial processes
- Reducing subsidies for coal and oil to encourage conservation[6]
- Enforcing energy quotas, which lead to improved resource allocation
- Subsidizing loans and tax breaks to upgrade equipment
- Creating public education programs
- Building a network of provincial and municipal energy conservation organizations
- Passing a new energy efficiency law that entered into effect in 1998.

Had its energy intensity remained constant at 1977 levels, China would now be consuming more than twice as much energy¾and emitting twice as much carbon into the atmosphere¾than it currently does (see Figure 4).

The red region of the graph shows energy (mostly coal) that would have been used if energy intensity had remained frozen at the 1977 level. Energy intensity, which measures how much energy is needed to drive economic growth, declined by an average 4.2 percent each year between 1977 and 1997.[7]

China has also begun to shift its energy conservation drive to match the country's transformation from a centrally planned to a socialist market economy. With partial assistance from the GEF, World Bank, and UNDP, the Chinese government is carrying out the following

(continued p.10)

Domestic Activities

United States

The centerpiece of U.S. domestic action to mitigate greenhouse gas emissions is the Climate Change Action Plan, published in 1993. The Plan established over fifty voluntary programs designed both to develop the economy and meet U.S. commitments to the UNFCCC. Most of these projects aim to improve energy efficiency and expand the use of clean energy through market transformation activities. The initial target of reducing emissions by over 100 million tons of carbon per year by 2000 is estimated to be about 60-70 percent realized to date. While it would not be possible to list all of the programs involved in this undertaking, some of the projects under the Plan, and related efforts, are included in Table 2 below.[8]

Even before establishing the Climate Change Action Plan, the United States was reducing growth in greenhouse gas emissions through energy conservation and energy efficiency programs. These efforts to save energy started after the first oil embargo in 1973. Efforts intensified in the late 1970s when the second oil shock hit.

In the transport sector, corporate average fuel efficiency (CAFE) standards for new cars doubled fuel efficiency from 14 miles per gallon to 27 miles per gallon between 1975 and 1985, saving billions of dollars in oil costs and cutting carbon emissions by tens of millions of tons each year. Average fuel economy for new vehicle fleets has not improved since, while sales of petrol-intensive sport utility vehicles surpassed automobile sales for the first time in 1998.

Rapid development of technologies in the petroleum refinery, steel production, and gas turbine sectors over the past two decades have similarly cut carbon emissions in U.S. industries.

Table 2 - Example programs included in the U.S. Climate Change Action Plan

Buildings	Energy Star: labeling of energy-efficient products to raise consumer awareness	Green Lights: upgrading commercial lighting to higher energy-efficiency standards	Energy-Efficient Standards for Equipment and Appliances: raises efficiency levels for building equipment	Performance Contracting in Federal Buildings: creates market incentives for financing of efficiency-upgrades
Industry	Climate Wise: improvements for energy efficiency and pollution prevention in over 400 companies	Waste Wise: reduction in commercial waste and increase in materials recycled	Motor Challenge: increase energy efficiency of electric motor systems	Voluntary Aluminum Industrial Partnership: reduction of perfluorocarbon emissions and increase in primary production efficiency
Energy Supply	Climate Challenge: reduction or prevention of GHG emissions in utility sector	Natural Gas Star: reduction of methane emissions by natural gas producers and distributors	Coalbed Methane: reduction of methane emissions by capturing coal mine gases that escape to the atmosphere	Renewable Energy Commercialization: accelerates development of renewable energy by sharing risk
Transportation	Transportation Efficiency Strategy: promotes state efforts to minimize transportation waste	Fuel Economy Labels for Tires: informs consumers about performance of energy saving tires	Clean Cities: promotes alternative fuel vehicle use in urban areas	Partnership for a New Generation of Vehicles: develops more fuel-efficient vehicles

The complement to Figure 4 for U.S. energy consumption and intensity indicates an average decrease in energy intensity of 1.5 percent between 1977 and 1997 (Figure 5).[10] If U.S. energy intensity had remained constant at the 1977 level, energy consumption would be over 4.5 billion metric tons of coal equivalent instead of the current level of almost 3.4 billion tons. Carbon dioxide emissions would have also increased by over one-third.

(continued p.11)

energy efficiency projects to tap the power of an emerging private sector:

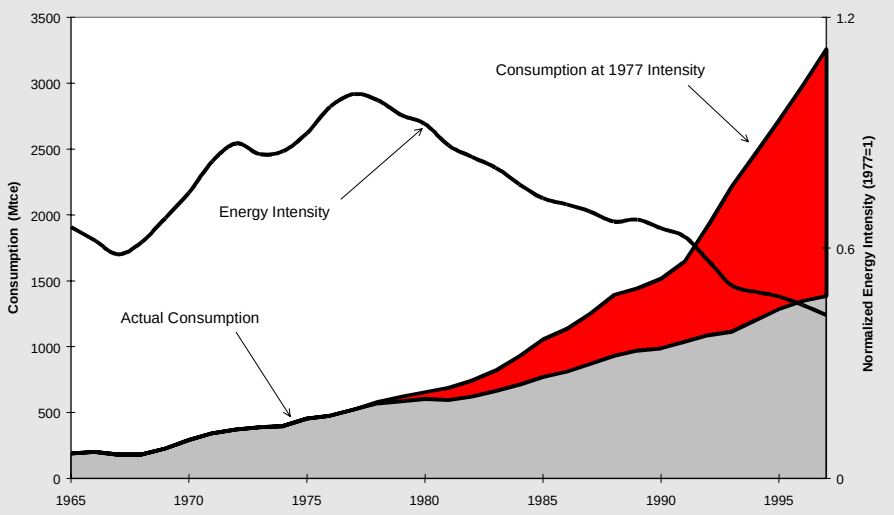
- Energy Efficient chlorofluorocarbon (CFC)-Free Refrigerator Production ($41m)
- Efficient Industrial Boiler Production ($101m)
- Energy Conservation in Township and Village Enterprises ($9m)
- Energy Conservation through Private Energy Management Companies ($202m)
- China Green Lights Program ($65m)

Research & Development

China has worked to expand domestic climate research, and has:

- Established the Chinese National Committee for the International Geosphere-Biosphere Program and the Chinese National Climate Committee to work with the International Geosphere-Biosphere Program and the World Climate Research Program, respectively.
- Participated actively in the Human Dimensions of Global Environmental Change Programme.

Figure 4 - Chinese energy consumption and energy intensity, 1965-1997[9]



Average annual energy intensity decline since 1977: 4.2 percent

Source: Lawrence Berkeley National Laboratory and Battelle Memorial Institute.

Research & Development

The United States has placed an emphasis on new technologies and research to help reduce greenhouse gas emissions. The following are examples of these efforts:

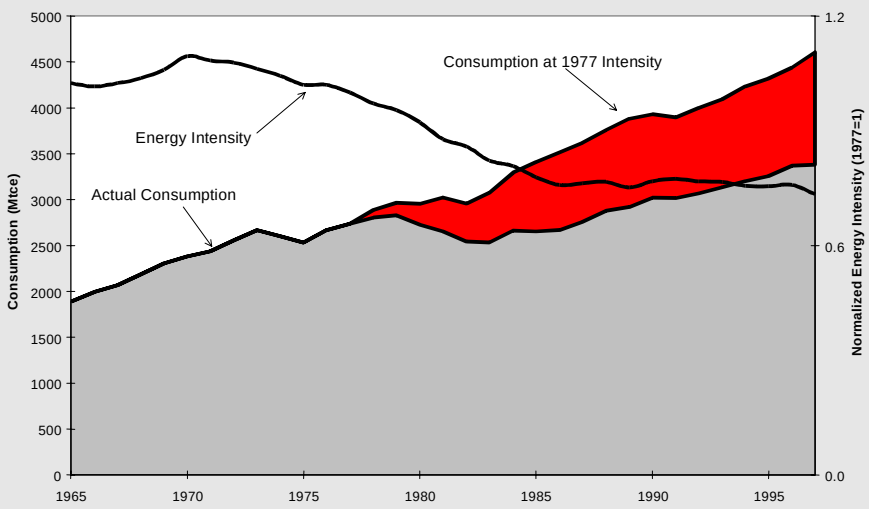
- Created a five-year, $6.3 billion initiative in 1998 combining research and development with selective tax cuts to create a bigger market for climate-friendly products. Approximately $1 billion was funded during 1999 and more is targeted for spending in 2000.
- Invests over $1.8 billion annually in the U.S. Global Change Research Program that provides the national and international communities with scientific research on climate change, and with information and innovative solutions for achieving emissions reductions.

State and Local Efforts

Some states and municipalities have enacted their own energy efficiency programs that supplement federal activities.[11] Examples include:

- Creating tax credits for purchasing efficient equipment
- Assisting homeowners to insulate and weatherize their residences
- Planning climate-friendly urban transportation development
- Partnering with electric power utilities to lower demand
- Developing local government networks to share information and success stories.

Figure 5 – U.S. energy consumption and energy intensity, 1965-1997



Average annual energy intensity decline since 1977 = 1.5 percent

Source: Battelle Memorial Institute.

Clean Energy Supply

China

Coal, which causes heavy local pollution and produces almost twice as much carbon dioxide per unit of usable energy as natural gas, accounts for three-quarters of China's energy supply. China is struggling to accelerate the development of cleaner fuels such as natural gas and coalbed methane, yet coal will continue to play a major role in the near future because it often has the cheapest up-front costs. China is currently:

- Developing natural gas and coalbed methane infrastructure to offset coal consumption
- Boosting combined heat and power installations, which now account for over 10 percent of installed electrical generation capacity
- Adding approximately 3,000 megawatt (MW) of hydropower plants annually, although some, like the massive Three Gorges project, are controversial
- Attempting to increase nuclear power capacity despite high costs and financing problems
- Developing renewable energy sources such as wind power and photovoltaics in off-grid regions and where they are competitive with other options. Installed wind capacity is now 240 MW, and units under construction will double this value by 2000.

Partial assistance from the World Bank, GEF, and UNDP is helping China carry out the following clean energy projects:

- Natural Gas Transmission and Distribution Line Rehabilitation ($123m)
- Methane Recovery and Utilization ($20m)
- Commercialization of Renewable Energy ($28m)
- Renewable Energy Development ($408m).

Forestry Issues

China

While the effectiveness of its reforestation efforts has been questioned, China is taking dramatic steps to increase its forest coverage and to protect forested areas in some regions of the country, as is evidenced by the following:

- Over 10 billion trees were planted in China during the 1980s and forest coverage increased to almost 14 percent of landmass by 1997.
- Powerful floods during the summer of 1998 have led to new land protection policies in some regions of China and contributed to the banning of logging activities by state owned enterprises in especially sensitive regions of China.

Forests and Climate Change

The role of forests in global climate change is still relatively uncertain. However, it is clear that trees uptake carbon dioxide while growing, thereby reducing the concentration of greenhouse gases in the atmosphere. Reforestation and forest conservation efforts in both the United States and China could consequently play a significant role in determining the concentration of atmospheric greenhouse gases and in calculating each country's overall emissions reductions.

Clean Energy Supply

United States

Coal consumption in the United States is now limited almost exclusively to power generation and coking operations. Natural gas consumption and hydroelectric output in the power sector is increasing while nuclear output is stable or declining slowly. Hydropower currently generates approximately 10% of the nation's electricity. The United States has:

- Restructured the natural gas sector beginning in the early 1980s, resulting in expanded gas supplies and lower costs
- Installed wind energy capacity amounting to over 1,650 MW in 1997 with assistance from federal subsidies
- Tripled coalbed methane production since 1990 (30 billion cubic meters a year in 1997), avoiding the release of this potent greenhouse gas into the atmosphere
- Spent millions of dollars researching photovoltaic, biomass, and other forms of renewable energy
- Provided tax credits for efficient vehicles
- Converted tens of thousands of vehicles to operate on natural gas and other alternative fuels
- Demonstrated that environmental goals can be met cost-effectively with market incentives. For example, the Clean Air Act has reduced sulfur dioxide emissions with tradable permits at one-tenth the estimated cost of non-market mechanism reductions.

Forestry Issues

United States

Over the past century, the United States has acted to protect its forested areas and manage forests open to commercial logging. Although these efforts have sometimes been unsuccessful, U.S. forests cover approximately 30 percent of the country's land area and are a significant sink for greenhouse gas:

- Forest growth has outpaced consumption for several decades; the ratio of growth to harvest is 1.37.
- Forestland has increased since the 1960s, from 251 million hectares to 298 million hectares in 1992.

Conclusions

Both China and the United States have reduced greenhouse gas emissions from expected levels through energy efficiency and energy conservation programs. The United States has led the effort to better understand the science of climate change and the specific policy options available domestically and internationally. The United States has also invested significant effort and resources to assist developing countries to begin meeting the challenges of global climate change. China has instituted a successful energy conservation program over the last two decades, helping it uncouple energy growth from economic growth. This program has cut China's emissions in half relative to the path a typical developing country would have followed.

One barrier to increased cooperation during negotiations is a lack of recognition by each country of the accomplishments of the other. A greater understanding of each country's activities—and each country's negotiating stance—could perhaps provide a joint step forward on negotiating mutually acceptable climate change actions.

Both countries will need to do more to reduce emissions to hold atmospheric concentrations of greenhouse gas at a level that is not dangerous for future generations. Acknowledging the accomplishments that both countries have already achieved can help move international discussions to a higher level.

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[1] Per capita GDP estimates for China based on purchasing power parity ($2,970) probably overestimate the standard of living as much as the exchange rate value ($680) underestimates it.

[2] "Hot air" refers to emissions from transition economies such as Russia and Ukraine, whose economies have collapsed since 1990, resulting in excess emission capacity that may not be generated until far into the future.

[3] Carbon elasticity is calculated by dividing the percentage change in carbon emissions by the percentage change in economic growth over two time periods.

[4] USAID does not provide assistance to China in accordance with section 116 of the Foreign Assistance Act.

[5] Lawrence Berkeley National Laboratory has published extensively on China's energy conservation efforts (http://eetd.lbl.gov/EA/partnership/China/index.html).

[6] Subsidies for coal declined from 37 to 20 percent between 1984 and 1995, and for petroleum from 55 percent in 1990 to essentially zero in 1998 (Walter Reid and Jose Goldemberg, "Are Developing Countries Already Doing as Much as Industrialized Countries to Slow Climate Change?" World Resources Institute, Washington, DC, 1997).

[7] Consumption is measured in million tons of coal equivalent (Mtce). Energy intensity is measured in Mtce divided by national income in constant 1996 Yuan.

[8] For further details, please see http://www.state.gov/www/global/oes/97climate_report/.

[9] Much controversy exists over China's achievement in lowering energy intensity. Because intensity measures energy use per unit of GDP, how GDP is measured in the Chinese national accounts affects the estimate. Some observers claim that China understates GDP and overstates growth, leading to larger declines in intensity. A recent study by the OECD, however, showed that China had indeed lowered its intensity of energy use in relation to output over the course of its sustained fast expansion. See Mehmet Ogutcu (1999), *Linking China to the World Energy System: China's Global Search for Energy Security*, International Energy Agency (in press).

[10] Energy intensity is measured in million tons of coal equivalent (Mtce) divided by gross domestic product in constant 1992 dollars.

[11] More information on state and local efforts can be found on the U.S. EPA web site (http://134.67.55.16:7777/dc/ghg.nsf).

For more information on climate change activities in the two countries, see these Internet references:

Bilateral and Multilateral References

Framework Convention on Climate Change and Kyoto Protocol
http://www.unfccc.de

Working Group on Environment in U.S.-China Relations (Woodrow Wilson Center)
http://ecsp.si.edu/china.htm

Global Environment Facility
http://www.gefweb.com

Carbon Dioxide Information Analysis Center (Oak Ridge National Laboratory)
http://cdiac.esd.ornl.gov/home.html

References on U.S. Activities

U.S. Global Change Research Program
http://www.usgcrp.gov/

U.S. Environmental Protection Agency Site on Global Warming
http://www.epa.gov/globalwarming/

U.S. Climate Action Report (State Department)
http://www.state.gov/www/global/oes/97climate_report/

References on Chinese Activities

Case studies of Chinese climate change mitigation
http://www.pnl.gov/China/pubs.htm

The Professional Association for China's Environment (PACE)
http://www.chinaenvironment.net/

The Beijing Energy Efficiency Center
http://www.gcinfo.com/becon

Chinese scientific perspectives on climate change
http://www.usembassy-china.gov/english/sandt/index.html

China Energy, Environment and Sustainable Development (UNDP)
http://www.edu.cn/undp/shd/sustain.htm

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