

China and Global Warming

By Dadi Zhou and William Chandler

China ratified the United Nations Framework Convention on Climate Change (UNFCCC) in June 1992, one of the first 10 nations to do so. China's decision to participate stemmed from the recognition that rapid economic development was creating serious global as well as local environmental problems. In 1994, the Chinese government published *Agenda 21*, providing a framework for fostering sustainable development and responding to climate change and a specific list of needed technical measures. Because the nation places priority on solving local, severe problems of environment and poverty, it has deferred explicit action on climate change. But to a degree that some observers may find surprising, China has implemented policies for economic development and environmental protection that match well the objectives of the Framework Convention on Climate Change. Those policies, first articulated in *Agenda 21*, include energy conservation, clean energy technology and reforestation.

ENERGY AND CLIMATE IN CONTEXT

China ranks second in the world in emissions of carbon dioxide, a greenhouse gas produced in the combustion of fossil fuels. Chinese leaders view this fact in the context of China's large population, which is four times that of the United States, which ranks first in greenhouse gas emissions. China remains a developing nation in which GDP per capita is only one-twentieth the U.S. level. Chinese energy use, which is directly related to greenhouse gas emissions, amounts to only one-tenth the U.S. level, though rapid economic growth means that energy demand continues to grow rapidly. In many rural areas, Chinese still lack access to commercial energy supplies—the oil, gas and electricity that many people take for granted—and instead use firewood and crop waste for cooking and heating. Satisfying what many people would call basic human needs will continue to drive energy demand growth in China for many years to come.

Industry currently consumes about two-thirds of all energy used in China, but this ratio is rapidly changing. As the country develops and narrows the income gap with the richer countries, more energy will be used in buildings and for transportation. Two-thirds of China's energy is now supplied by coal, which releases sulfur and particulates, causing severe air pollution problems such as acid rain and smog. Coal also produces more carbon dioxide per unit of energy than oil or gas.

Chinese leaders plan for China to reach the economic development level of today's middle-income countries by the middle of the century. But they also expect Chinese to use much less energy per capita than do citizens of rich countries today.

ENERGY SAVINGS

China has achieved unprecedented success in saving energy. In most developing countries, energy use grows faster than the economy. But in China over the past two decades, energy demand has grown only half to two-thirds as fast as the economy. This reduction in "energy intensity," the amount of energy used per unit of economic output, is the result of intentional government policies and stemmed from the need to use scarce resources efficiently as well as to reduce energy-related pollution.

Since the early 1980s, China has had a policy of "giving equal priority to energy exploitation and energy conservation," emphasizing the efficiency of energy utilization. The early emphasis was in the industrial sector, where most energy is used. For example, the coal required to make a ton of steel has been cut by one-third since 1980. Over the same period, the energy needed to make a ton of cement was reduced by 17 percent. The coal needed to make a kilowatt-hour of electricity was diminished by 8 percent.

These results stemmed from conscious policy choices, including efforts to reform and restructure the economy, rationalize energy prices and allocate capital investment to energy savings measures. Over the past 16 years, di-

rect investment in energy conservation has exceeded \$8 billion, with more than half that total coming from enterprises. Those efforts, plus recent acceleration of economic restructuring, helped China actually *reduce* carbon dioxide emissions by more than 10 percent over the last 5 years.

CLEANER FUEL

China has emphasized clean utilization of fossil energy in its sustainable energy development strategy. In 1994, the State Council established a lead group for developing and deploying clean coal technologies. The goal is to improve coal utilization efficiency, reduce environmental pollution and promote economic development. Another major component of China's sustainable development strategy is to decrease the share of energy supplied by coal. The Chinese government has, through a series of market reforms as well as direct investment, accelerated exploration and development of natural gas and other clean energy sources.

Renewable energy has grown as a viable energy option. For example, the number of solar water heaters has increased twentyfold since 1985 to more than 5 million square meters collector area added per year. Wind power capacity has grown from virtually nothing in 1985 to more than 390 MW today. Installed small hydropower capacity increased over the same period by 10,000 MW.

Because two-thirds of China's population lives in the countryside, the government devotes considerable attention to rural energy projects, including small hydropower, firewood and biogas. The number of households using efficient woodstoves has increased by 177 million since 1980, saving the yearly equivalent of about 20 million tons of coal.

REFORESTATION

Forests in China provide a renewable energy source and remove carbon dioxide from the air as a natural result of plant respiration. The Chinese government has paid considerable attention to forestry development, sponsoring or organizing the planting of more than 25 billion trees. Afforestation efforts have included shelter-forest projects in the basins of the Yellow, Zhujiang, Huaihe, Taihu and Liaohe rivers. Forestry efforts have also included the "Three-north," coastal, and Taihang

Mountain greening projects. New techniques have been introduced locally, including forestation by air and forest conservation practices promoted by national forestry centers. In recent years, some 5 million hectares of forests have been added annually, increasing the total forest cover in China to over 34 million hectares.

THE FUTURE

Sustainable development remains a long-term objective of the Chinese government. Progress in reducing local air pollution is literally visible in many areas. But, according to the World Bank, environmental pollution still costs China 8 percent of its annual economic output. As the country develops—becomes richer—more effort for environmental protection can be expected. The government hopes that modern, renewable energy and advanced, clean energy technologies will facilitate this effort, and that market mechanisms and incentives will lead their introduction.

Chinese leaders have collaborated with Americans for over a decade on China's energy and environmental problems, including establishment of the Beijing Energy Efficiency Center (BECon) with support from the American and Chinese governments and the World Wide Fund for Nature. Ongoing Sino-U.S. collaboration on energy efficiency helps to catalyze additional measures to improve energy efficiency, reduce pollution and boost trade in modern technology.

Supporting and shaping energy-sector reform accelerates financial performance and helps retain incentives for energy technology innovation. Barriers to continued progress in energy efficiency include lack of credit, collateral or funds to prepare business plans. International institutions can mobilize private and public sector experts to provide technical and policy advice, particularly for price reform and imposition of "hard budget constraints." One high priority for cooperation is promotion of low-carbon natural gas use through removal of obstacles to foreign participation in the gas sector and the development of a much-needed legal framework for building and regulating natural gas supply pipelines and distribution systems.

China continues to work to slow the growth of emissions of greenhouse gases by emphasizing policies such as energy efficiency and clean energy alternatives. These support not only China's economic and local environmental protection goals, but will also help make easier the global task of mitigating greenhouse warming.

The international community can contribute to these efforts through trade, capacity building for economic reform and environmental management, and joint research and development on energy technologies. Cooperation of this type has contributed to China's success in energy efficiency and renewable energy development, but is far too limited in comparison to the task ahead. ❄️

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