

SECTION 2: CHINA'S ENVIRONMENTAL SITUATION

“The Commission shall investigate and report on—

“ENERGY—The effect of the large and growing economy of the People’s Republic of China on world energy supplies and the role the United States can play (including joint research and development efforts and technological assistance), in influencing the energy policy of the People’s Republic of China.”

The Environmental Effects of China’s Energy Consumption on China and the United States

Burning carbon fuels to produce energy yields byproducts that pollute the atmosphere and also have the potential to affect water supplies. While this process certainly is not unique to China, the patterns of China’s energy consumption, and the ways in which the government has viewed and addressed environmental consequences of that consumption, have produced and are continuing to produce severe immediate and long-term environmental consequences that have large economic and social costs.

The primary contributor to energy-related pollution is coal burning for electricity generation. Coal-fired plants emit carbon dioxide, sulfur dioxide, nitrous oxide, mercury, and black carbon dust. It is estimated that China’s coal consumption is responsible for 25 percent of global mercury and 12 percent of global carbon dioxide emissions.¹⁰⁵ China’s State Environmental Protection Administration (SEPA) has estimated that China’s sulfur dioxide emissions—the main component of acid rain—have increased 30 percent since 2000.¹⁰⁶ U.S. Environmental Protection Agency (EPA) Assistant Administrator for International Affairs Judith Ayres noted in her testimony to the Commission that the average concentration of fine-particle pollution in Beijing is seven times higher than the air quality standards set by the U.S. EPA.¹⁰⁷

Coal produces more carbon dioxide per unit of energy than any other fossil fuel. Although the Chinese government has not released official statistics on carbon dioxide or mercury emissions since 2001, Assistant Secretary of Energy for Policy and International Affairs Karen Harbert testified that China will overtake the United States as the world’s largest emitter of carbon dioxide before 2010.¹⁰⁸ Other estimates are that China will reach that point much sooner, and by some calculations it already has done so. A Netherlands-based environmental research group reported in June 2007 that “China overtook the U.S. in emissions of [carbon di-

oxide] by about 7.5 percent in 2006.”¹⁰⁹ Although China disputed this report, there is a broad consensus in the global scientific community that China either already is, or soon will become, the world’s largest emitter of greenhouse gases. By 2030 China is projected to account for 26 percent of the world’s carbon dioxide emissions and 48 percent of all coal-related emissions.¹¹⁰

China’s air pollution includes pollution generated by transportation vehicles and indoor air pollution. Due to the dramatic rise in the number of vehicles in use in China (described in Chapter 3, Section 1), byproducts of fuel combustion by transportation vehicles are contributing significantly to urban air pollution.¹¹¹ Nitrogen oxide from motor vehicles generates ozone.¹¹² Although trucks and cars are the most prolific vehicle pollution sources, rail transport and shipping also contribute to urban air pollution. During a Commission delegation’s trip to China and Hong Kong in April 2007, environmentalists with whom the delegation met in Hong Kong noted the impact of shipping-related pollution on Hong Kong’s local air quality. Because ships are unable to link to shoreline power there, they burn fuel continuously while docked, producing emissions that are concentrated at ground level. The U.S. EPA has identified this as a problem in the United States and is working with the shipping industry to reduce port pollution.¹¹³

Indoor air pollution caused by burning solid fuels—such as coal briquettes and biomass—for household heating and cooking contributes to nearly 400,000 deaths in China annually, according to the World Health Organization.¹¹⁴ The World Health Organization’s report *Indoor Air Pollution: National Burden of Disease Estimates* states, “Exposure to indoor air pollution from solid fuels has been linked to many diseases, including acute and chronic respiratory diseases, tuberculosis, asthma, cardiovascular disease, and perinatal health outcomes.”¹¹⁵ It reported that 80 percent of the population in China uses solid fuels,¹¹⁶ indicating that a high percentage of the population is exposed to these risks. The full effects of this pollution are not yet understood because environmental data within China are meager and often exist only as aggregate data across many jurisdictions.¹¹⁷

The effects of the pollution China generates by no means are limited to China, although China suffers most from them. As one example, high levels of mercury traced to emissions in China threaten watersheds and wildlife in Oregon.¹¹⁸ Assistant Administrator Ayres noted in her testimony that the ability of aerosols—airborne microscopic particles—to travel great distances is well documented. The difficulty typically is to trace a pollutant to its source. However, Dr. Jane Long, Associate Director of the Energy and Environmental Directorate at Lawrence Livermore National Laboratory, testified that the Laboratory has conducted a study tracing the path of aerosols from China, which it recently submitted for publication. This study concludes that 40 percent of the aerosols in the Sierra Nevada Mountains of California are attributable to China.¹¹⁹ While this study did not chemically match the aerosols it studied to aerosols produced in China, a mechanical analysis of airstream data was conducted by the researchers, leading to their conclusions about the geographical sources of the aerosols they identified.¹²⁰

The situation with aerosol pollution traveling to the United States from China is not an isolated case. Additional studies reported in U.S. media confirm that satellites have observed dust, soot, ozone, and nitrous oxide as they are blown across the Pacific at high altitudes. Dr. Dan Jaffe, from the University of Washington-Bothell, is involved with these studies. In a media interview he stated, "By looking at the ratios of different pollutants, particularly carbon monoxide and mercury, we can actually say the ratio of these pollutants we are seeing . . . matches the ratio of pollutants coming right out of China."¹²¹

The Chinese government has enacted laws and regulations placing caps on sulfur emissions and requiring coal-fired power plants to reduce pollution, but only a small fraction of the plants subject to those laws and regulations have installed flue gas desulfurization (FGD) technology to capture sulfur dioxide from emissions.¹²² Dr. Mun S. Ho, Visiting Scholar at Resources for the Future, testified, "These systems use about two percent of the electricity generated, i.e. the gross revenues of the utility [are] reduced by about two percent as a result of this rule."¹²³ In his opinion, this cost creates a strong incentive for businesses to cheat on environmental pollution controls.

Regrettably, China's weak environmental regulatory and enforcement system does very little to prevent or effectively penalize those who ignore or skirt the laws and regulations. Indeed, the primary obstacle to improving emissions control in China is not a lack of access to effective technologies and equipment; instead, it is the inability or unwillingness of the central government to monitor, appropriately incentivize, and compel environmental compliance at the local level.

Dr. Jennifer Turner, China Environment Forum Coordinator and Senior Project Associate at the Woodrow Wilson International Center for Scholars, testified about the ominous implications: "The expansion of China's power plants alone could nullify the cuts required under the Kyoto Protocol from industrialized countries."¹²⁴ Within the United States, there is concern that China's transboundary air pollution may more than offset the progress that California, Washington, and Oregon are making toward pollution reduction targets set by the Clean Air Act.¹²⁵

According to Dr. Ng Chonam, a professor at Hong Kong University who focuses on environmental impact assessments and with whom Commissioners met in Hong Kong in May, China's unimpeded energy consumption, especially by its industries, results not only in air pollution but also in water shortages and water pollution.

Water pollution caused by the byproducts of fuel combustion is not the only threat to China's water quality. Dumping of the toxic wastes from manufacturing and agricultural operations; disposal of untreated or inadequately treated sewage; return to rivers of wastewater resulting from washing coal and other mining operations; and runoff of agricultural chemicals and animal waste also have resulted in distressing water pollution. Increasingly, water conditions in many of China's lakes and rivers threaten human health or are truly deadly. Surface water pollution often does not confine itself to the surface. Polluted water frequently finds its way

into underground aquifers. Polluted groundwater, which often is used as a source of well water by individuals or even entire communities, can be just as harmful to human and other life as polluted surface water; and once polluted, aquifers are far more challenging and expensive targets for pollution mitigation efforts than surface water.

Water shortages brought about by the inefficient use and overconsumption of water resources often result in salinization of freshwater resources. When the water in freshwater rivers is so depleted by overuse that river flows into the ocean cease or are substantially curtailed, a seawater surge is often the result, resulting in saline pollution of surrounding riverbanks and other ecological harm.

Pollution from Coal Mining

Air pollution is not the only environmental consequence of China's dependence on coal as a primary fuel source. Coal mining produces air, land, and water pollution. The country has approximately 30,000 coal mines, and the cumulative effect of China's mining practices has devastating environmental consequences. These consequences include methane emissions, toxic wastewater, dangerously polluted wasteland inhospitable to human and animal habitation, and land collapse.¹²⁶ Methane is a greenhouse gas that is 23 times more effective in trapping heat in the atmosphere than carbon dioxide,¹²⁷ and China is the largest emitter of coal mine methane in the world.¹²⁸ Coal mining pollutes surface and groundwater when wastewater is discharged from mines without any treatment. This polluted water can affect agricultural production as well as public health.¹²⁹ Additional health effects from coal mine pollution include lung disease, hearing loss, neuromuscular disorders, and rheumatism among mine workers.¹³⁰ In 2002, 70,000 Chinese miners suffered from black lung disease, and over 2,000 died from the disease.¹³¹

Dr. Jennifer Turner illustrated the effects of coal mine pollution on a local population in her testimony to the Commission:

Linfen—a major coal mining city in Shanxi Province—has been dubbed the most polluted city in the world by the World Bank. The coal industry has greatly boosted the city's economic development; however, it has led to the dramatic deterioration of the environment and a rise in major health problems. Crops are covered in [gray] dust and considered toxic, and the coal pollution dust is so great cars must use headlights during the day. City residents suffer from respiratory illnesses from the severe pollution generated by dozens of coal mines surrounding the city.¹³²

The Economic and Social Impacts of China's Environmental Degradation

China is finding that environmental degradation has costs—both economic and social. According to Assistant Administrator Ayres, “It has become abundantly clear to the Chinese that a poor environment is affecting their economy and that the damage they have done and the degradation that they now must suffer and attempt to remediate is having economic consequences.”¹³³ Last year, the Chinese government officially estimated the cost of environmental damage as three percent of gross domestic product (GDP).¹³⁴ However, Ms. Ayres testified that China's State Environmental Protection Administration, in contrast, estimates that environmental degradation costs China eight to 13 percent of GDP annually. She noted that air pollution alone costs two to four percent of GDP.¹³⁵ In 2007 the PRC National Bureau of Statistics declined to release information about the cost of pollution relative to GDP, noting that “the study has prove[n] to be too sensitive to continue, and it has been suspended.”¹³⁶

Pollution due to China's energy consumption not only has a macroeconomic impact, but also affects the basic productivity of China's cities and provinces. Black carbon soot blocks sunlight and is estimated to be lowering crop yields by 30 percent for grain crops in China.¹³⁷ The Worldwatch Institute estimates that acid rain and smog produced from coal burning cost China \$13 billion per year in damages to crops, forests, and human health.¹³⁸ The World Health Organization found that over half the damage caused by acid rain in China occurs in three provinces: Guangdong, Zhejiang, and Jiangsu. Almost half the acid rain damage *to crops* in China occurs in Hebei, Hunan, and Shandong provinces.¹³⁹

Air pollution also affects China's investment climate. International investors such as Merrill Lynch have called air pollution produced in Guangdong province a risk to Hong Kong's competitiveness because it reduces Hong Kong's appeal as an investment location and commercial hub.¹⁴⁰ China has 16 of the 20 most polluted cities in the world, according to the World Health Organization, and the population in those cities faces increased health risks due to elevated levels of sulfur dioxide and nitrogen oxide.¹⁴¹ International investors are reluctant to risk the health of their employees or damage to their investments by locating in highly polluted areas.

Air pollution has been linked to premature mortality and chronic respiratory problems.¹⁴² Dr. Ho testified that, based on his studies of the economic costs of air pollution, he conservatively estimates that 94,000 Chinese die prematurely every year due to severe air pollution. Other estimates indicate that air pollution contributes to 400,000 premature deaths per year.¹⁴³ Further, 1.4 million cases of chronic bronchitis and 1.3 billion lost work days are associated with air pollution.¹⁴⁴ Both air and water pollution have been linked to increased rates of cancer in both rural and urban areas,¹⁴⁵ which results in increased morbidity, losses in labor productivity, and strain on the health care system. In her statement to the Commission, Dr. Elizabeth Economy of the Council on Foreign Relations noted that the impact on public health from coal-based pollu-

tion alone is projected to cost China \$39 billion in 2020.¹⁴⁶ These troubling public health status and health care cost trends are not expected to improve in the future.

Along these lines, the Chinese government's recent decision to refuse to release two reports quantifying the impact of air pollution on public health and the cost of China's pollution to its gross domestic product (GDP) is not a fortuitous indicator.¹⁴⁷ Without public information detailing and quantifying the costs of pollution to China and the Chinese people, it will be more difficult for the government to take the steps necessary to reduce pollution, establish monitoring baselines, and motivate the public to participate in energy conservation and environmental awareness efforts.

The cumulative effects of pollution could have political ramifications for Beijing. The growing middle class in China is increasingly aware of and attentive to quality-of-life issues, including the environment in which they live.¹⁴⁸

Protests in Xiamen in June against the construction of a chemical plant were reported in the press as the "nation's largest middle-class rally in years."¹⁴⁹ Xiamen residents organized two days of demonstrations through the use of instant text messages on cell phones despite the efforts of Public Security Bureau technicians to block these transmissions.¹⁵⁰ Police arrested and denied bail to at least four residents who attended the protests.¹⁵¹ Days following the Xiamen demonstrations, Beijing residents protested against the construction of a waste incinerator in northwest Beijing.¹⁵² In both these cases, residents protested the lack of public information about the environmental risks that these projects posed to the local population, and forced officials to reconsider and delay the projects, demonstrating the potential for public involvement in matters with environmental impacts.¹⁵³

In July 2007 Zhou Shenxian, the leading minister of the State Environmental Protection Administration, publicly blamed the increasing instability across the country—reflected in riots, protests, and petitions—on the public's anger toward the country's polluted environment.¹⁵⁴ He chided local officials for not standing up to environmental polluters whom he labeled as the cause for a rising number of "mass incidents."¹⁵⁵ These incidents demonstrate the potential for Chinese citizens to become involved on a local level in environmental monitoring and enforcement. But it is not yet certain whether the Chinese government is willing to accept this participation on a large scale, and will provide the policy tools by which members of the public can channel their participation in ways the government will accept, but that also yield positive changes. Without comprehensively addressing energy-related environmental pollution, the government is likely to face increased protest and challenges to the political system, especially directed toward local officials who protect industrial polluters.

Conclusions

- China's national leaders recognize that a failure to enforce environmental controls on pollution has significant economic and social costs. However, the government has not yet taken steps to ascribe value to environmental compliance that equals or exceeds

the value placed on economic growth. Continued lax enforcement may have consequences for the sustainability of China's economic growth.

- If China's underlying environmental problems are not addressed effectively, this could become another source of unrest that could challenge the Chinese Communist Party's control of the country.
- China soon will overtake the United States as the largest emitter of greenhouse gases in the world, if it has not already done so. China currently is the largest national source of coal mine methane and is poised to become the largest national source of carbon dioxide. Global climate change initiatives will not work without China's participation.
- The effects of China's energy-related pollution are far-reaching, extending to the United States and beyond. China lacks adequate data and public information to assess accurately changes in its energy consumption and resulting environmental consequences, especially at the provincial and local levels. Greater availability and transparency of data can improve the central government's ability to make and implement sound energy policy, and assist the United States in understanding more clearly the mutual energy and environmental challenges facing both countries. Additionally, more accurate data can facilitate deployment of green energy technology, much of which is developed in the United States.