

A CHINA ENVIRONMENTAL HEALTH PROJECT FACT SHEET

'Transboundary Air Pollution—Will China Choke On Its Success?

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It is difficult to understate the influence of China's atmospheric pollution on the Asia Pacific region and beyond. Prevailing winds carry pollutants such as ozone, fine particulate matter, and mercury from continent to continent, and in this case, from Asia to North America. Although statistics on China's dismal air quality are dated, anecdotal, or limited in scope (e.g., China has not publicly disclosed CO₂ or mercury emissions data since 2001), when examined as a whole, overall air pollution trends indicate a growing economic and health threat both within and outside China. Although the regional impact of China's air pollution has encouraged some cooperation, new data on the economic, environmental, and human health implications of China's pollution on Northeast Asia and the western seaboard of the United States and Canada call for more serious efforts by global stakeholders to engage China on these issues.

Coal, Cars, and Desertification

The majority of China's domestic and transboundary air pollution originates from the country's heavy dependence on coal, which makes up about 70 percent of its energy mix. Despite efforts to diversify energy sources, China will remain dependent upon coal for the foreseeable future. This dependence—along with the low quality of the coal, the lack of widespread coal washing infrastructure and scrubbers at industrial facilities and power plants, and plans for building nearly 100 new coal-fired power stations each year until 2012—translate into increasing health and environmental problems for the East Asia/Pacific region and beyond. China is second only to the United States in energy consumption and greenhouse gas (GHG) emissions, and is expected to surpass the United States in GHG emissions by 2009. The expansion of China's power plants alone could nullify the cuts required under the Kyoto Protocol from industrialized countries.

Beyond coal, in urban centers where the majority of the wealth and record breaking GDP rates are generated, car emissions have replaced coal as the major source of air pollution. Currently, sixteen of the world's twenty most polluted cities are in China and auto emissions will worsen urban air quality in China. Although current data show that China only has 22 cars per 1,000 people as opposed to 764 per 1,000 in the United States—China is well on its way to becoming the dominant market for automobiles. As vehicles become more affordable, due especially to WTO tariff reductions, the number of automobiles in China is

expected to rise from the current 24 million to 100 million by 2020. There is already a car culture developing, similar to that witnessed in the United States during the 1940s, with car driving clubs as a prime example. Policies for cleaner cars have been made, but face many obstacles (See CEF meeting summaries from 2 October 2006 and 30 November 2006 for more details). Box 1 provides more examples of the economic and health costs of China's growing air pollution.

Box 1. Negative Economic and Human Health Trends from China's Air Pollution

- The average decrease in China's crop yield attributable to the combined effects of acid rain from SO₂ emissions and black carbon soot was 4.3 percent in the mid-1990s.
- Climate experts link greenhouse gas emissions and deforestation to the rising incidences of natural disasters witnessed between January and September of 2006, which forced the evacuation and relocation of 13.2 million people and killed more than 2,300, causing direct economic losses of \$24 billion.
- According to recent estimates by Qin Dahe, director of the China Meteorological Administration, air pollution is driving some extreme weather events, which hamper China's economic growth by between 3 to 6 percent of GDP, or \$70-130 billion, annually.
- Coal burning in China emits 25 percent of global mercury and 12 percent of global CO₂.
- A 2006 SEPA survey found that 41 percent of fish species in water bodies in eastern Jiangsu Province, where there is a high concentration of manufacturers, contained various heavy metals transmitted through polluted air fall-out.
- SEPA estimates that nearly 200 cities in China fall short of the WHO standards for airborne particulates.

Sources: Lü, Totten, & Chou (2006); Zhu (2006); Buckley (2006); UNDP/World Bank-ESMAP (2003); Guttikunda, Johnson, Liu, & Shah (2004).

Exacerbating the coal and car emission pollutants are large plumes of dust the size of small countries blowing eastward from the encroaching deserts of Mongolia and Western China. Desertification in China is advancing at an annual rate of 1,300 square miles, destroying farmlands and driving more rural migrants into cities. The expanding deserts are increasing the severity of the spring sandstorms—100 are expected between 2000 and 2009, a significant increase over the 23 in the previous decade. Regionally, sulfur dioxide (SO₂) and mercury emissions from coal burning are some of the main pollutants spreading from China. Acid rain resulting from coal and fossil fuel combustion has been damaging nearly one-third of China's limited cropland. The Korean Peninsula and Japan have felt the brunt of China's "export" through acid rain, mercury, and other airborne contaminants as Siberian winds and dust storms flush out China's pollution every spring, severely damaging forests and watersheds.

More recently, studies have examined the problems associated with black carbon (BC) soot in China. BC—the active ingredient in haze produced by burning crop residues, household

coal stoves, and vehicles—is potentially the second most potent global warming gas after CO₂. China is the largest BC emitting country in the world, responsible for 17 percent of these emissions. The BC particles are less than one micron in diameter and cause hundreds of thousands of premature deaths from respiratory illnesses each year in China. Moreover, BC blocks sunlight and may be lowering crop yields for both wheat and rice in China by 30 percent. Regionally, scientists consider China's BC emissions as responsible for some of the warming and destabilizing weather throughout the Pacific Rim.

The Health Effect

According to a recent World Bank report, some 300,000 to 400,000 people die in China every year due to respiratory illnesses triggered by air pollution. Globally, scientific research is illuminating the clear linkages between not only air pollution and respiratory complications, but also to heart disease. For example, a study in *Heart*, the journal of the British Cardiac Society, found a corollary relationship between increases in particulate air pollution and deaths from heart diseases. A study funded in part by the U.S. Environmental Protection Agency (due out February 2007) in *The New England Journal of Medicine* features one of the largest studies ever conducted on the linkages between heart diseases, stroke, and air pollution. This particular study, which focused on women, found air quality to be a strong predictor of heart and stroke risks. However, experts claim that although it is indisputable that fine particle air pollutants pose a risk to health, the reasons are not quite as clear. Researchers state they are still investigating whether it is the chemical composition, size, or ability to transport other pollutants deep into the lungs that is responsible for the effect. These particles often measure less than one-tenth of a micron, in essence being small enough to pass through the walls of a human lung, into the body's red blood cells. In one study in the *Journal of Toxicology and Environmental Health*, researchers found that in the developing nations of Asia two-thirds of their health problems are due to urban air pollution. The growing level of mercury in the air and water in China also raises major health concerns. Mercury accumulates in living tissue, such as fish grown in China's numerous aquaculture pools. When this fish is eaten it can cause birth defects, child development problems, and potentially cancer.

The Disappearing GDP Effect

In 2006, China's environmental watchdog echoed the 1997 World Bank's *Clear Air Blue Water* report that domestic health problems and economic losses stemming from pollution cost China nearly 8 percent of the GDP—statistically eating up almost all of the country's economic growth. The Chinese government's *Green National Accounting Study Report* claims that pollution in general is cutting into 3.1 percent of GDP—although other economists place the number as high as 10 percent.

In China an estimated 19 percent of the agricultural land in seven southern provinces (Jiangsu, Zhejiang, Anhui, Fujian, Hunan, Hubei, and Jiangxi) has been damaged by SO₂ and acid rain. Additionally, China's dirty production is also very detrimental to Hong Kong's economy. A group of nine public health researchers, economists, and environmental scientists released a report in June 2006 estimating that air pollution—much of it blowing from the north—could cost Hong Kong as much as HK\$21 billion a year.

Investors also are coming to view this pollution a concern. Independently, both the chairman of the Hong Kong Stock Exchange and Merrill Lynch issued media-grabbing

statements that the worsening air quality in southern China is a threat to Hong Kong's economic competitiveness. The problems lie directly upwind in the Pearl River Delta, where one-third of China's exports are produced, as well as 80 percent of Hong Kong's air pollution. As the number of days with reduced visibility has tripled in the past three years, a recent survey discovered that 40 percent of businesses were finding it harder to recruit overseas nationals to Hong Kong and southern China due to this factor. In response, Merrill Lynch's Asia Pacific division recently suggested that investors should sell properties in Hong Kong and invest in Singapore instead. Additionally, Merrill Lynch criticized the Hong Kong government's lack of willpower to deal with the pollution problems, especially as most feel that waiting for Beijing to enact tougher laws and enforcement will be a long wait indeed.

China's Invisible Export

The byproducts of China's development are now being felt as far as the east coast of the United States. Besides the aforementioned statistics on China's contribution to global warming and regional mercury fallout—research by the UN now indicates that some 53 percent of the world's natural and human caused mercury emissions come from Asia, while Africa is a distant second with only 18 percent. The most commonly cited numbers attribute between 25 and 40 percent of global mercury emissions (from coal burning) to China. Within China's borders, air pollution from coal, cars, and dust storms is responsible for between 300,000 and 400,000 premature deaths and 75 million asthma attacks annually. Additionally, China's cement kilns, which account for around 40 percent of global cement production, are a major source of dioxin and furan—pollutants that can be transported airborne across long distances.

High levels of mercury deposition in the United States from China and India had been detected on both coasts of the United States. Research conducted in Oregon has shown that one-fifth of the mercury entering the Willamette River in Oregon comes from abroad, mostly from China. Mercury is especially suited for long distance travel because at the smokestack in China it is in elemental form and insoluble. However, by the time it reaches the U.S. west coast, it has transformed into a reactive gaseous material that dissolves in Oregon's wet climate—falling onto the Willamette River's watershed and slowly building up toxic levels of mercury in the local wildlife.

Mercury is just one transboundary pollutant that U.S. scientists are tracking. Bruce Hope, a senior environmental toxicologist at the Oregon Department of Environmental Quality, estimates that global sources contribute 18 percent—more than four times the local share—to Oregon's air pollution. Increasingly, the ozone on the west coast will be determined by China. In California, for example, some researchers believe at least one-third of California's fine particulate pollution—known as aerosol—originates from Asia. These pollutants could potentially nullify California's progress on meeting stricter Clean Air Act requirements. In May 2006, University of California-Davis researchers claimed that almost all the particulate matter over Lake Tahoe was from China. The great irony is that these pollutants are mainly due to the burgeoning demand of U.S. and EU consumers for cheap Chinese goods—which is driving the Chinese economic development. Some estimates cite that 7 percent of China's CO₂ emissions are due to production of U.S. imports.

Cooperative Collaboration

The Chinese government has welcomed considerable international assistance to help the

country address its severe air pollution problems that are tied to coal mining, cars, and desertification. The international community—in the form of multilateral organizations, bilateral aid, and nongovernmental organizations—has been very active in addressing a broad range of air pollution issues through energy efficiency, demand-side management, clean coal, and renewable energy projects. Many of these projects have been driven by international concern regarding China's growing GHG emissions, but nearly all of them focus on local benefits of controlling such emissions.

While U.S. NGOs are particularly active in energy and air pollution collaboration in China, the U.S. government could have more sustained projects in these areas. The growing regional impacts of China's air pollution and related energy hunger should be viewed as incentives for the Bush administration and Congress to pursue active environmental collaboration with China—before China's energy hunger and pollution—which is in large part due to U.S. and EU consumerism—are used as political tools to vilify China. There is a definite need to develop a coherent approach to energy and environmental relations with China. As the April 2000 spy-plane incident and recent satellite shoot-down illustrated, there remains considerable mistrust between the United States and China—cooperation on energy and environmental issues could help build up needed trust between the two countries.

The Chinese government has shown initiative through recent enactments of stricter air pollution control laws and major new incentives and investments into renewable energy, however, the need for the conveyance of a clear and cohesive strategy, along with coordination and organization throughout all the ministries and environmental protection bureaus is necessary for China to begin to balance the benefits of economic growth against the negative costs of air pollution to public health.

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