



## Trade Imbalance Shifts U.S. Carbon Emissions to China, Boosts Global Total

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BOULDER—The growth of Chinese imports in the U.S. economy boosted the total emissions of carbon dioxide (a primary greenhouse gas) from the two countries by over 700 million metric tons between 1997 and 2003, according to a study published online in the journal *Energy Policy*. The analysis, prepared by two scientists at the National Center for Atmospheric Research, suggests that American emissions of carbon dioxide in 2003 would have been 6% higher if the United States had manufactured the products that it imported from China. Meanwhile, China's 2003 emissions would have been 14% lower had it not produced goods for the United States.

"These results show the importance of world trade in accounting for the emissions that drive climate change," says Shui Bin, an environmental policy analyst who authored the *Energy Policy* paper with geochemist Robert Harriss. Their research was supported by the National Science Foundation, NCAR's primary sponsor.

The world's two biggest emitters of greenhouse gases are the United States (about 25% of the global total) and China (about 15%). The Shui and Harriss study implies that the United States is indirectly responsible for even more carbon dioxide than widely perceived.

Because Chinese manufacturing relies heavily on coal and less-efficient technologies, it produces more greenhouse-gas emissions on average than the United States for a given product. Emissions in 2002 and 2003 rose at 8-9% a year in China and about 1% a year in the United States. If all of the U.S. imports from China had been produced domestically, then U.S. greenhouse emissions would have risen at 1.5% to 2% per year.

Altogether, the U.S.-China trade imbalance boosted the two nations' combined greenhouse-gas output from 1997 to 2003 by an estimated 720 million metric tons. That represents more than 1% of the two nations' total emissions of carbon dioxide in 1997–2003. The global total for the same period is close to 165 billion metric tons.

China and the United States are not parties to the Kyoto Protocol and are not bound by the protocol's limits on carbon dioxide. Shui and Harris believe that future global agreements should consider aspects of international trade. "For any trade issue, we should look at its multiple dimensions," Shui says.

According to Shui, efforts to address the emissions imbalance could also help better understand the U.S. trade deficit, which is expected to top \$650 billion in 2005.

"The export of U.S. technologies and expertise related to clean production and energy efficiency to China would help equalize U.S.-China trade and at the same time mitigate global emissions of carbon dioxide," says Shui.

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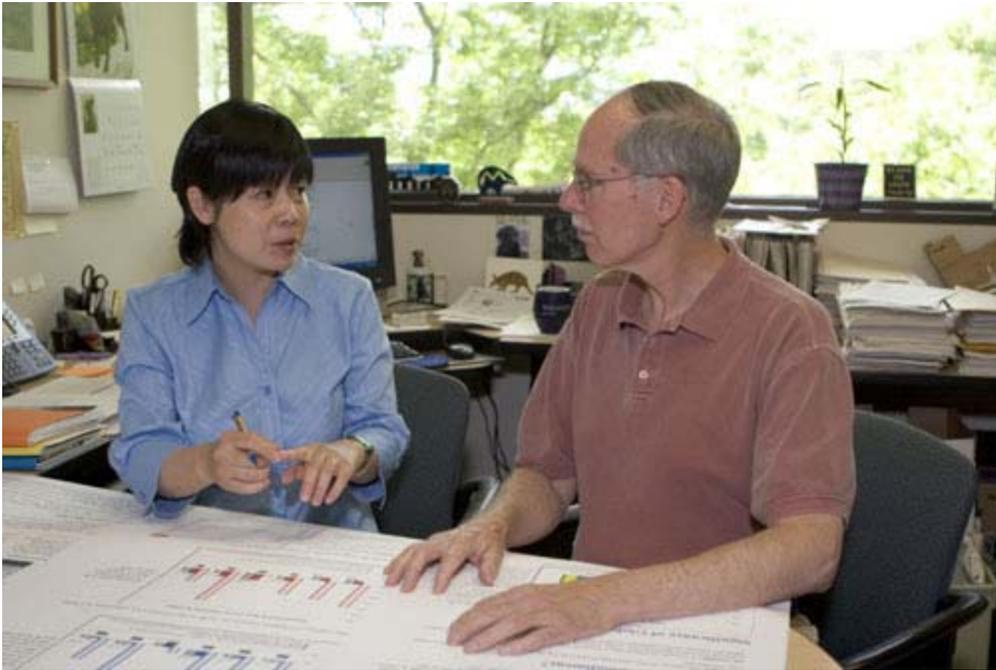
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To carry out their analysis, Shui and Harriss used trade data from the U.S. Census Bureau and estimates of the fuel mix used in U.S. and Chinese manufacturing. They also used a software tool developed at Carnegie Mellon University to estimate the total amount of carbon dioxide emissions that arise from making a particular product.

Shui Bin (left) and Bob Harriss, of NCAR's Institute for the Study of Society and Environment, collaborated on a study of U.S.-China trade and the carbon dioxide emissions that result. (Photo by Carlye Calvin.)

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