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A Different Way to Look at Carbon Emissions in China

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A more nuanced way of looking at China's carbon emissions may be key to finding a way to curb them in the future, post-doctoral research fellow Zhu Liu said in Monday's Energy Policy Seminar.

It is well known that China's carbon emissions are large and on an upward trajectory, Dr. Liu said. A common approach to analyzing emissions is found in the "IPAT" equation, which analyzes CO₂ emissions as the combined effect of three factors: population, improvements in wealth, and available technology. Viewed in this framework, China's carbon emission reduction options seem limited. China's population growth is already small, and the option of reducing GDP growth is not appealing in a country in which many still live in poverty.

The only remaining category in this analysis is technology, and it is on this—using technology to decrease the energy intensity of production—that China has focused, moving to increase the energy efficiency of certain key sectors (coal-fired power generation and iron, steel, and cement production) by replacing small, inefficient plants with larger new plants. The results, assuming this project is fully carried out, are approximately 3000 Mt of CO₂ reductions, an amount, Liu pointed out, that dwarfs the 80 million tons of CO₂ reductions achieved by developed countries under the Kyoto Protocol between 1990 and 2008.

However, Dr. Liu noted, there are significant limitations to this approach—in particular, once the plant replacements are done, they are done, leaving China still a long way from the levels of emissions reductions called for by climate models.

So is the only choice for China either exceeding target carbon emission levels or cutting the growth of GDP? Dr. Liu suggested that a more fine-grained analysis might reveal other options. Specifically, Liu suggested a "footprint" perspective on carbon emissions—rather than a simple focus on where carbon emissions are produced (often in rural, relatively impoverished areas of China) Liu analyzed where the products and services associated with such emissions are consumed.

Dr. Liu highlighted a few insights that emerged from this analysis:

- Although many carbon emissions come from relatively poor areas in China, footprint analysis reveals that wealthy cities, such as Beijing and Shanghai, have a much larger carbon footprint than the relatively poor rural areas where much of the carbon is emitted in the course of manufacturing products for urban consumption.
- 20-25% of China's carbon emissions are tied to international exports.
- The construction sector is responsible for the lion's share of China's carbon footprint. Within this category, metal smelting and pressing is responsible for the plurality of emissions. This is of particular importance because of the role the construction sector plays as an engine of China's economic growth.

Using this kind of fine-grained analysis, Liu suggested, it may be possible for China to find a way to move towards, not an overall reduction of consumption, but more green consumption patterns as a means of curbing future carbon emissions.

Dr. Liu is a Giorgio Ruffolo Post-doctoral Research Fellow in the Sustainability Science Program and the Energy Technology Innovation Policy research group. The Energy Policy Seminar Series is jointly sponsored by the Energy



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