Connections
Transport & ICT

How China's Transport Sector Can Contribute to Carbon Reduction

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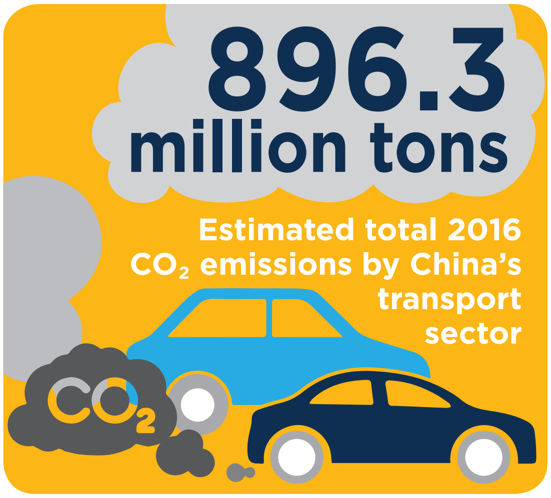
The Chinese government, based on its commitment to carbon reduction in the Paris Climate Agreement, laid out its intention to achieve peak CO_2 emissions by 2030, and to make its best effort to peak as early as possible. It committed to lowering CO_2 emissions per unit of GDP by 60–65 percent of their 2005 levels, and to increasing the share of non-fossil fuels in primary energy consumption to about 20 percent. Although these targets were set up for the country as a whole, it is essential for decision makers and practitioners to understand the contribution the transport sector can make if its development path is aimed at sustainability.



Refine China's Emissions Estimates

The 'top-down' approach, which calculates emissions based on the consumption of various types of fuels, is commonly used to estimate transport's national-level carbon emissions. Energy consumption by the transport sector, in the widely used International Energy Agency (IEA) definition, includes "all transport activity in mobile engines, regardless of the economic sector to which it is contributing." The estimates can then be benchmarked among different countries and regions. Using this definition, in 2015 the total GHG emissions of the U.S. transportation sector were about 2,015 million tons CO2-equivalent,[1] while the GHG emissions in EU-28 were about 1,048 million tons.[2]

In China's current statistics on national energy consumption, the transport category includes all consumption by transport activities in business operations, including urban public transport, railway, coach, and freight services on roads, airways, and waterways. But it also includes consumption by support facilities such as terminal buildings, offices for operations, etc. The energy consumption of private vehicles, construction vehicles, company vehicles, etc. is not included in the transport category, but is reflected in the energy statistics of other categories, such as citizens' businesses, private buildings, etc.

To focus on the transport activities of mobile engines, and to be consistent with international standards for benchmarking, the following two adjust-

1 Source: United States Environmental Protection Agency. https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P100S7NK.pdf.
2 Source: European Environment Agency. https://www.eea.europa.eu/data-and-maps/indicators/transport-emissions-of-greenhouse-gases/transport-emissions-of-greenhouse-gases-10.

ments need to be made to the results from China's statistical system:

1. The energy consumption of private vehicles and other vehicles, now accounted for in other sectors, should be included in the transport sector data.
2. The energy consumption of transport-related buildings and facilities should be excluded from the transport sector data.

Look at Transport's Share of China's Energy Consumption

There have been several papers and studies setting out methodologies for benchmarking the energy consumption and carbon emissions of the transport sector.[3 4 5] Most of them adopted the 'fuel separation' method, identifying the amounts of gasoline and diesel consumption in other sectors, and then including them in the transport sector. This method is based on the common observation that most of the gasoline consumed in other sectors belongs to transport, and about 35 percent of the diesel consumption in other sectors should be counted as part of the transport sector.

Over the past 17 years, total energy consumption by the transport sector has tripled, from 135 million-tons of coal equivalent (TCE) in 2000 to 443 million TCE in 2016. However, the proportion of transport's energy consumption to China's total energy consumption remained relatively stable, averaging between 9 and 10 percent.[6] During the past decade there was substantial growth in overall energy consumption nationwide. The growing demand for travel, coupled with structural reforms toward energy-saving and environmentally friendly industries, was reflected in transport's relative share of the total, which rose from 9.75 percent in 2014 to 10.5 percent in 2016.

Transport's share of consumption in China's energy sector is still quite low compared with other developed countries. In 2014, both in the EU 28 and the United states, the average proportion of total energy consumption by the transport sector was about 33 percent. This implies that China's energy consumption in the transport sector has room to grow; and with further industrial restructuring, its share will be much higher in the future.

In 2016, diesel and gasoline—at 82 percent—represented the majority of fuels consumed by transport in China. Also, the total carbon emissions in the transport sector reached about 900 million tons. For benchmarking purposes, the transport sector CO_2 emissions alone in U.S. in 2015 were about 1,953 million tons,[7] about twice the level of transport emissions in China.

The Way Forward

China is still on the fast track of economic development. With rapid urbanization and motorization, travel demands will continue to grow substantially in the future. This implies that energy consumption and GHG emissions will continue to grow.

After understanding the structure of energy consumption and GHG emissions in the transport sector, and benchmarking the emissions with other counties, it is clear that curbing GHG emissions from the transport sector will become more and more important in the control of total emissions. Improving transport efficiency, shifting road transport to cleaner transport modes such as waterways and railways, and upgrading the energy of road transport to cleaner modes are the three main paths to reducing the carbon emissions of the transport sector.

New technologies play a key role in all paths. Big data and internet-based technologies allow the easy sharing and analysis of information, which substantially improve the efficiency of transport. High-speed rail and connected inland waterway channels provide competitive alternatives to road transport for both passengers and freight. And clean energy technology represents the possibility of zero-emission transport in the future

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3 Jia Shunping, Mao Baohua, Liu Shuang, Sun Qipeng; The Transportation Energy Consumption Level Evaluation and Analysis; Journal of Transportation Systems Engineering and Information Technology. Feb 2010.

4 Han Wenke, Kang Yanbing, Liu Qiang; China's 2020 Low Carbon Target: Approaches and Measures; China Development Press. Oct 2012.

5 Dai Yande, Zhu Yuezhong; Thirteen's Five Year Plan and Transport 2030 Energy Saving Target Study; Energy Foundation and Energy Research Institute (NDRC). Mar 2017.

6 EPA. Inventory of U.S. Greenhouse Gas Emissions and Sinks. 1990–2016.

7 Source: United States Environmental Protection Agency. https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P100S7NK.pdf

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