

ChinaFAQs

The Network for Climate and Energy Information



Fast Track to Curbing Emissions?

Is China on a fast track to curbing greenhouse gas emissions? The nation's massive investment in high-speed rail, although controversial, could bring gains in energy efficiency that will reduce emissions, concludes a recent analysis.*

"A high-speed train uses three-quarters the energy of a car and half that of a plane" to carry a passenger one kilometer, Will Freeman of GaveKal Dragonomics, a Beijing-based research firm, notes in *The Big Engine That Can: China's High Speed Rail Project*. And as China builds out a planned 10,000-mile (16,000-kilometer) high-speed rail network by 2020, travelers could forgo congested airports and freeways for a fast ride on the rails. "There is good reason to believe that China's relatively long-distance high-speed lines will have a net energy efficiency benefit," Freeman concludes.

BACKGROUND

China's high-speed push is, in part, a response to the nation's chronically jammed rail lines. Trains in China carry one-quarter of the world's combined rail freight and passenger traffic, but the nation has just 6% of the world's track. As a result, Freeman notes that China's intensity of rail use is double that of India's, triple that found in the United States, and a dozen times higher than in the European Union.

To help clear the tracks, in the 1990s China's Ministry of Railways began a number of "speed up" campaigns to increase average speeds on China's major passenger and freight lines. Then, in 2003, China's State Council approved a mid- to long-range plan to add more than 21,000 miles (34,000 km) of track by 2020, with nearly half committed to high-speed passenger trains that travel at speeds of up to 217 miles per hour. The new network will connect most major cities in China's densely-populated east and center, and a number of western cities, including Kunming, Chongqing, Chengdu and Xi'an. About 2,500 miles (4,000 km), or one-quarter, of the network is already built.

Some critics have argued that spending on the new lines, which could ultimately top \$300 billion, should go to other kinds of projects. Others predict that ticket prices, which can be \$70 for a second-class fare, are too expensive and likely to be out of reach for most Chinese consumers. But Freeman says travelers have flocked to the first lines, in part because ticket prices are competitive with air travel, and the train is often more convenient. If that trend holds, it could help curb emissions, he notes, since high-speed trains produce about 70% lower carbon dioxide emissions than planes per passenger kilometer.

Key Points

- China is investing heavily in building 10,000 miles of high-speed passenger rail over the next decade that will carry trains traveling at up to 217 miles per hour.
- The system, which will connect most of China's major cities, could produce significant gains in energy efficiency if travelers shift to the new trains from aircraft and autos.
- High-speed rail could also help unclog China's rail freight lines, leading to more energy-efficient cargo transport, according to a recent analysis.

If the new trains primarily attract riders currently using traditional trains, however, the gains could be less, since faster trains use more energy than the slower models. “The net economy-wide benefit,” he writes, will depend “on whether passengers switch to high-speed rail from planes or cars, or simply switch from conventional to high-speed rail.”

The new trains could also bring indirect efficiency gains, he adds. Taking some passenger trains off crowded freight lines could improve cargo flows, prompting shippers to move their loads from trucks to trains. “On the freight side... there is a high likelihood of energy efficiency gains,” Freeman concludes. “Freight trains use 77% less energy and produce 91% fewer carbon dioxide emissions than trucks” in moving a ton of freight one kilometer, he notes.

The economic impact of the new system is harder to predict, but the long-run benefits of the multi-billion dollar investment “will almost certainly outweigh that debt,” Freeman predicts. Among those hard-to-measure benefits, he notes, are things like more livable, less-polluted cities, and more efficient, time-saving business practices. Overall,

however, he concludes that “China appears in a good position to take full advantage of a high-speed transport network that connects almost every major city in the country.”

Energy efficiency and carbon intensity in passenger transport		
	Energy use	CO2 emissions
Airplane	67	170
Automobile	42	100
Train (high-speed)	32	30
Train (conventional)	20	20
Bus	16	40

Energy use: watt-hours or ml per passenger-km
 CO2 emissions: g / passenger-km
 Source: World Bank

* Will Freeman, “The big engine that can: China’s high-speed rail project,” *Gavekal Dragonomics China Insight Note*, May 24, 2010, <http://gavekal.com/index.cfm>.

This fact sheet is a product of ChinaFAQs, a joint project of the World Resources Institute and experts from leading American universities, think tanks and government laboratories. Find out more about the ChinaFAQs Project at: <http://www.ChinaFAQs.org/>.

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