

# As Cities in the US and Europe Explore Electrification, China Is Taking the Lead

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In 2017, the Chinese city of Shenzhen became the first in the world to run a fully electric transport system. The transformation took less than a decade, and is the first of 13 pilot cities that the central government has selected for demonstration and promotion of new energy vehicles. Shenzhen, a city of 12 million which links Hong Kong to mainland China, replaced their entire diesel fleet with 16,359 electric buses, and the results have already been impressive.

Much has been made of China's increasing contribution to global CO<sup>2</sup> emissions, and for good reason. The 2018 Annual Report of China's Motor Vehicle Environmental Management, published by the Ministry of Ecology and Environment, shows China as the world's largest motor vehicle market, in both production and sales, for nine consecutive years. There has been comparatively little attention paid to the major steps that the government is taking to mediate it, which is what they are attempting to do with the increasing development and use of "new energy" vehicles. This refers to plug-in electric, battery electric, plug-in hybrids, and fuel cell vehicles.

Shenzhen's e-buses, as well as the overall switch to new energy vehicles, have already reduced dependence on fossil fuels and lessened environmental pollution in the city. In Shenzhen, gas consumption in public transport has been reduced by 95%. Compared to the operating mileage in Shenzhen in 2016, electric buses are consuming 72.9% less energy, with a daily average operating mileage of 174.4 km, and energy consumption of 106.3 kWh/100 km. According to the Shenzhen Municipal Transportation Commission, the resulting energy savings amount to 366,000 tons of coal saved annually, substituted by 345,000 tons of alternative fuel.

There are also major reductions in CO<sup>2</sup> emissions. On average per year, electric buses emit 67 kg of CO<sup>2</sup> per 100 km, compared to diesel vehicles which emit 130 kg, a reduction of 48%. 2017 data show a total reduction of CO<sup>2</sup> emissions of 1.353 million tons. Annual emissions of pollutants such as nitrogen oxides, non-methane hydrocarbons and particulate matter was reduced by 432 tons.



Some of the new electric bus fleet of 16,359 in Shenzhen.  
Photo: Wikimedia common.



An aerial view of Shenzhen, a city of 12 million connecting Hong Kong with mainland China. Photo: Wikimedia common



The driving cockpit of a new electric bus in Shenzhen. Photo: ITDP China

It's clear that China sees new energy vehicles as a way to continue its pace of rapid development while reducing emissions. However, like all big changes, it has its critics. Some have been using terms such as “zero emissions” to describe new energy vehicles, which is not entirely accurate. Many have pointed out that new energy vehicles simply transfer pollution from roads to power plants. The central government has been increasing its uses of renewable energy, but there has not been comparable progress in decarbonizing the grid. In 2016, coal-generated power still accounted for 72% of all power sources in China.

For electrification to have any real effect on global emissions, governments must focus more on long-term de-carbonization of the grid. Despite its rapid pace of development, China is still mainly based on coal-generated electricity. How much electrification still matters in spite of that is a complex question, and the answer is changing as electrification technology improves, and the sources of energy move away from oil and coal. Still, based on the average standard and composition of the Chinese power grid, electrification alone has decreased CO<sup>2</sup> emissions 15-20% compared to diesel vehicles<sup>1</sup>.

Few governments have the resources, or the will, to replace their entire transit fleets and add the infrastructure necessary to go fully electric on this scale. Yet, China's progress in this area shows the advantages that big, sweeping investments in technology can have on transport emissions. Shenzhen has the potential to serve as a model for rapidly growing megacities finding themselves overwhelmed by transport emissions as their cities grow.

<sup>1</sup> Study on Demonstration Promotion and Business Model of New Energy Buses, China Electric Vehicle 100 People's Congress