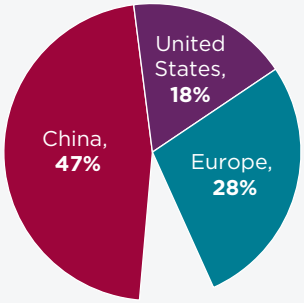
FACT SHEET GLOBAL

FEBRUARY 2021

RACE TO ELECTRIFY LIGHT-DUTY VEHICLES IN CHINA, THE UNITED STATES, AND EUROPE: A COMPARISON OF KEY EV MARKET DEVELOPMENT INDICATORS

A look at the progress of global transport electrification shows that China, the United States, and Europe hold a combined share of over 90% of cumulative passenger electric vehicle (EV) sales. They are undoubtedly the world's three giants and, unsurprisingly, markets in these three regions are often compared. We recently analyzed them quantitatively in terms of their national domestic market, export market, and city-level markets for light-duty vehicles, and also examined their charging infrastructure, battery production, EV technology, and battery technology.

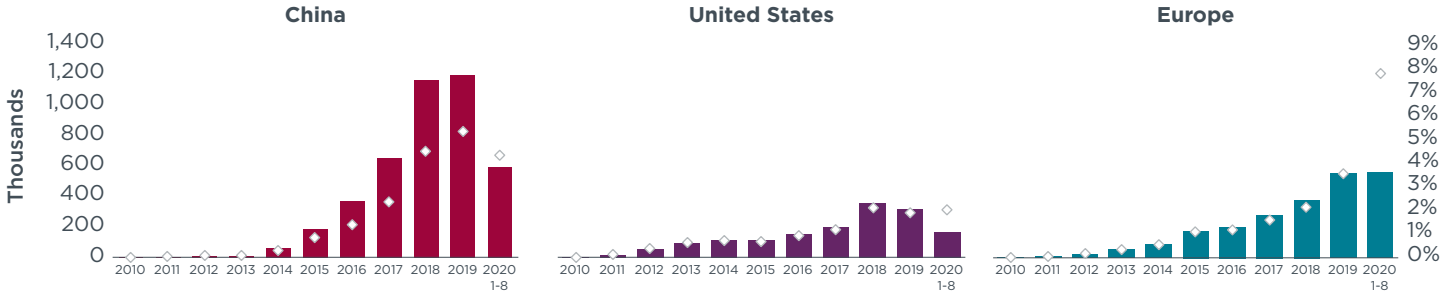


Cumulative passenger EV sales shares in the global market. *Note:* Based on EV-volumes (2020)

MARKET TRENDS

DOMESTIC MARKET

The electric passenger vehicle markets in China, the United States, and Europe have distinct trends. Over the past decade, China has the fastest growth rate and leads in terms of market penetration rate. China is also home to the world's largest stock of electric vehicles, with 4.3 million cumulative electric passenger vehicle sales by August 2020, accounting for 47% of the global total.[1] In contrast, the U.S. market is the slowest growing of the three, with the lowest cumulative sales total and relatively low market penetration. Europe is in the middle in terms of passenger EV stock, market penetration, and industry growth speed. Nonetheless, it is worth noting that in the first eight months of 2020, passenger EV sales in Europe increased significantly and market penetration soared to around 8%.



Annual passenger EV sales (bar and left axis) and annual passenger EV sales share of passenger vehicle market (dot and right axis). *Note:* Based on EV-volumes (2020)

1 EV-volumes.com. (2020). Global electric car database. http://www.ev-volumes.com/datacenter/

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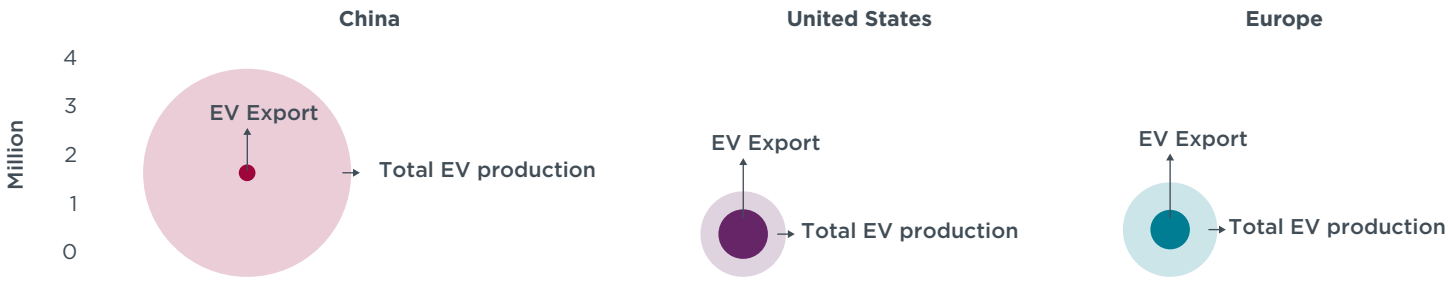
EXPORT MARKET

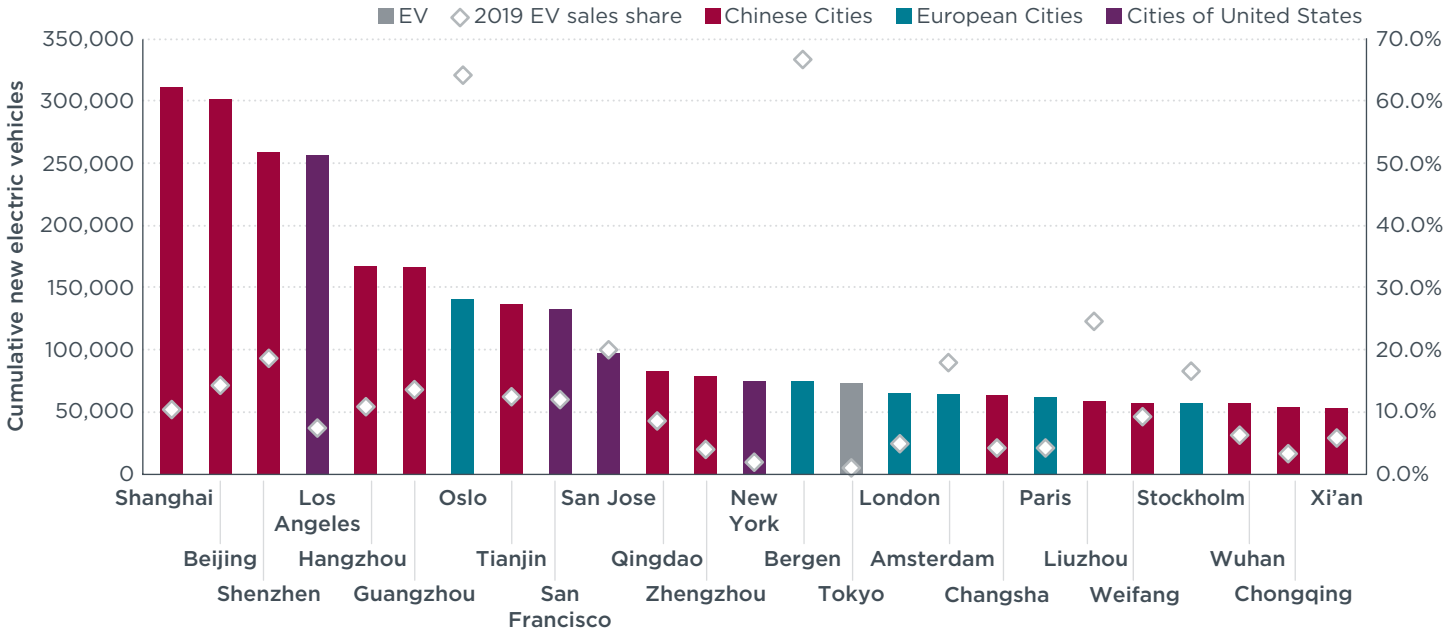
Among the three regions, China is relatively self-sufficient in EV production, and its export ratio is much lower than those of the United States and Europe. Between 2010 and 2019, China exported about 25,000 light-duty electric vehicles, less than 1% of its production. The United States, on the other hand, is the largest exporter by volume and percentage, with more than half a million exports, or about 35% of its total light-duty EV production. During this period, Europe's export rate was between those of China and the United States, at approximately 17%, corresponding to 277,000 EVs exported.



Cumulative light-duty EV exports 2010–2019 (inner circle) and cumulative light-duty EV production 2010–2019 (outer circle). *Note:* Based on EV-volumes (2020)

LOCAL MARKET

At the city level, markets in China and the United States are the most active in EV sales. By the end of 2019, 14 of the 25 cities in the world with the most cumulative sales of electric passenger vehicles were in China, six were in the United States, and only four were in Europe. But the market share of new passenger vehicle sales in 2019 in these cities varied. Of the 13 major cities with a market share of more than 10%, seven were in China, four in Europe, and only one was in the United States. Notably, the Norwegian cities of Bergen and Oslo ranked first and second globally with 67% and 64% passenger EV sales share, respectively, and they were followed by the Chinese city of Liuzhou with 24%.

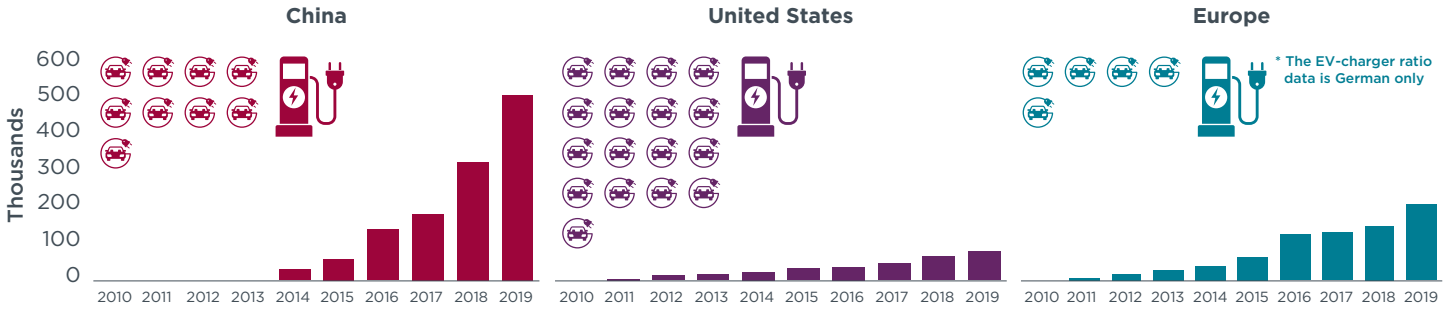


Cumulative electric passenger vehicle sales 2010–2019 and the 2019 EV share of new passenger vehicles in the 25 cities with the most cumulative plug-in electric passenger vehicles[2]

2 Dale Hall, Sandra Wappelhorst, Peter Mock, and Nic Lutsey, *European electric vehicle factbook 2019/2020*, (ICCT: Washington, D.C., 2020), https://theicct.org/publications/european-electric-vehicle-factbook-20192020

CHARGING INFRASTRUCTURE

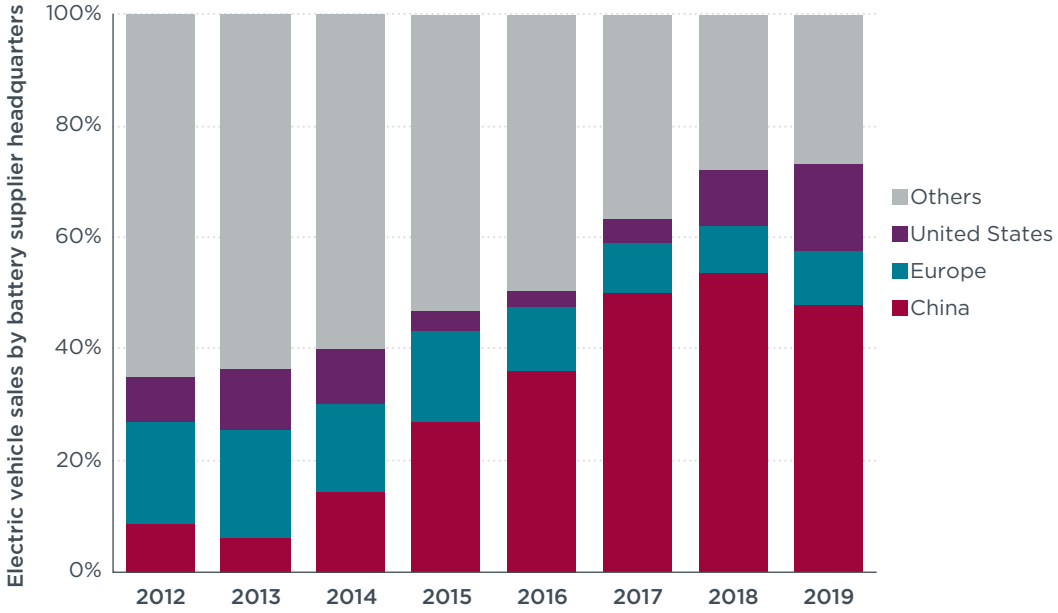
The quantity of public chargers is growing the fastest in China, followed by Europe and then the United States. China has the largest network of public chargers with more than 500,000 chargers by 2019 and accounts for more than 50% of the global total. That is, the number of chargers in China exceeds the number in the United States and Europe combined. However, a large number of chargers does not mean an ideal vehicle-to-charger ratio. While China's passenger electric vehicle-to-public charger ratio (8.5 to 1) is lower than that of the United States (17 to 1), some European countries have even lower EV to public charger ratios (e.g., France: 7 to 1; Germany: 5-1; and the Netherlands: 4-1).



Number of public chargers and vehicle-to-public-charger ratio in 2018[3]

BATTERY PRODUCTION

China gradually became the biggest battery producer globally, while the United States' battery production share fluctuated and Europe's share decreased. Based on the vehicle battery supplier's headquarters' location, the share of light-duty EVs fitted with Chinese-made batteries has grown from less than 10% in 2012 to about 50% in 2019. On the other hand, batteries produced from the other two markets currently account for a relatively small share of global sales.



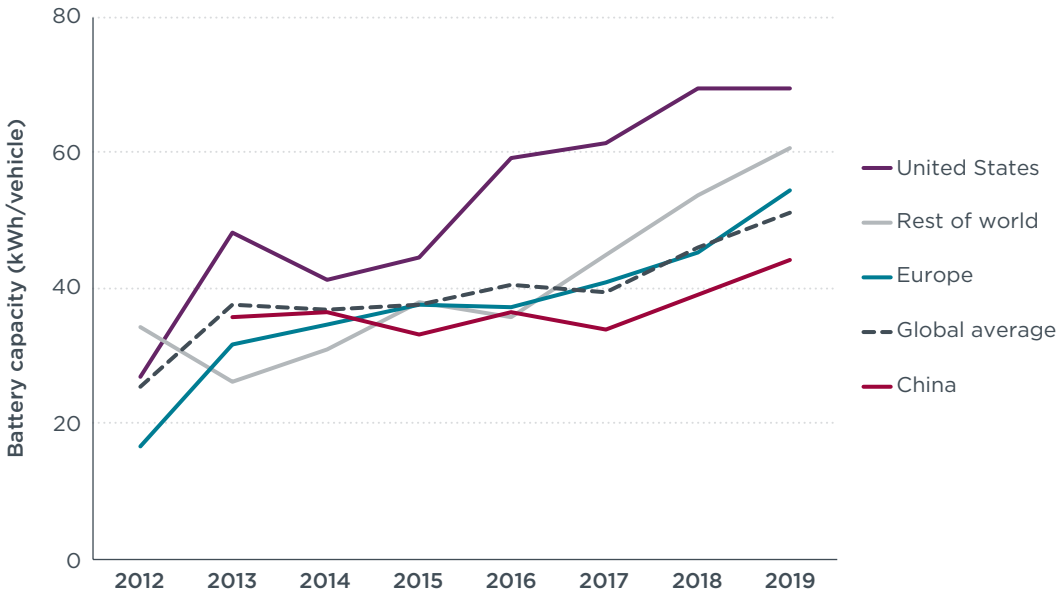
Light-duty electric vehicle sales by battery supplier headquarters[4]

3 Dall Hall, Nic Lutsey, *Charging infrastructure in cities: Metrics for evaluating future needs*, (ICCT: Washington, D.C., 2020), https://theicct.org/publications/EV_charging_metrics_aug2020

4 Pete Slowik, Nic Lutsey N., Chih-Wei Hsu, *How technology, recycling, and policy can mitigate supply risks to long-term transition to zero-emission vehicles*, (ICCT: Washington, D.C., 2020), https://theicct.org/publications/mitigating-zev-supply-risks-dec2020

ELECTRIC VEHICLE TECHNOLOGY

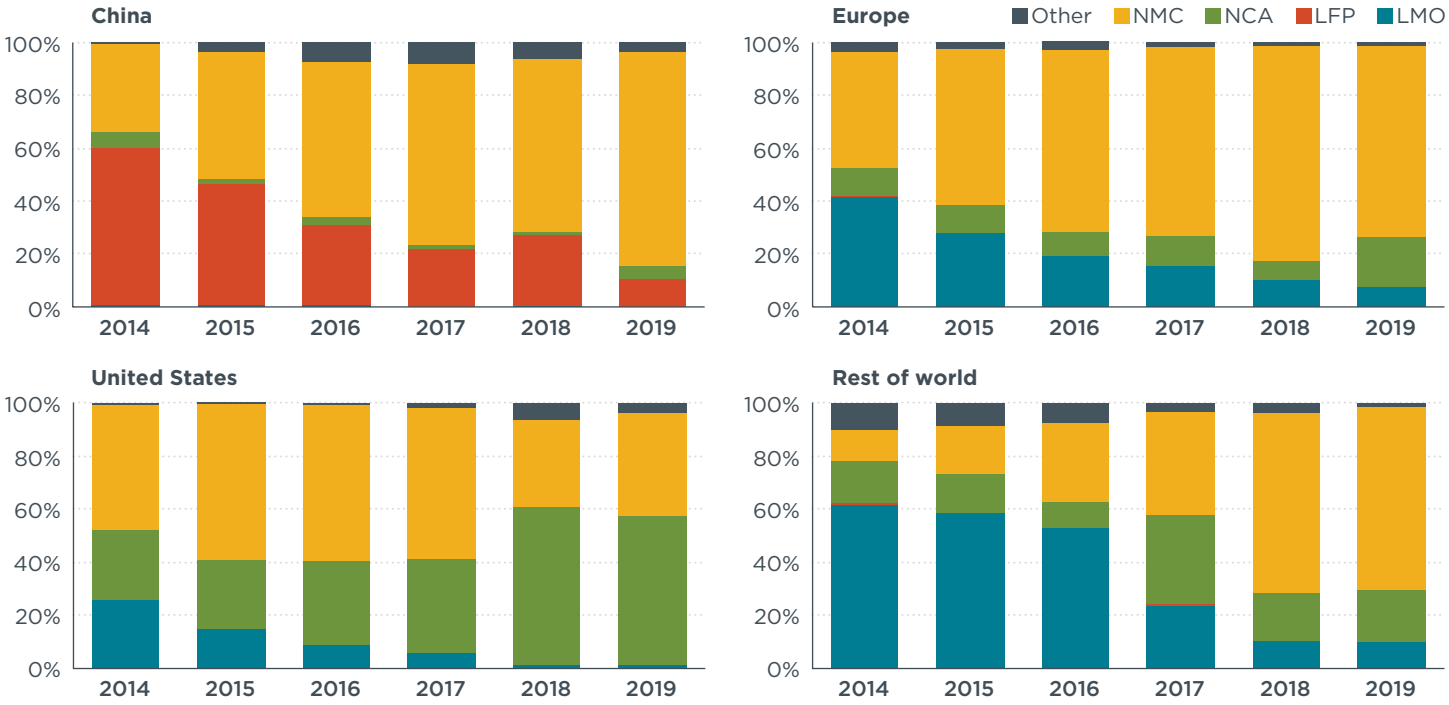
While the average battery capacity for pure electric vehicles in China has increased significantly, the overall improvement pace is still slower than in the United States and Europe. Although China's battery capacity for pure electric vehicles has increased from 35 kilowatt hours (kWh) per vehicle in 2013 to 44 kWh/vehicle in 2019, it is still below the level in the U.S. and European markets, and also remains below the global average. The United States' average capacity has grown from 27 kWh/vehicle in 2012 to 69 kWh/vehicle in 2019, and it has been leading the world. In recent years, battery capacity in the European market has also improved significantly, but it has fluctuated around the global average.



Battery capacity for light-duty battery electric vehicles, 2012–2019. *Note:* Based on EV-volumes (2020).

BATTERY TECHNOLOGY

China is rapidly transitioning from lithium-iron-phosphate (LFP) batteries to high-energy-density lithium nickel manganese cobalt oxide (NMC) batteries, but in the United States and Europe, NMC and lithium nickel cobalt aluminum oxide (NCA) batteries are gradually becoming the mainstream. Although lithium manganese oxide (LMO) batteries used to be the dominant product in the world (except in China), battery technology has gradually moved to NMC and NCA batteries. With improvements in battery technology and consumers' demand for longer range and greater power, cobalt and nickel-rich batteries are being widely used to meet higher battery performance expectations. LFP batteries once dominated China's EV battery sector due to a higher acceptance of short-range EVs than in other countries. This is possibly due to shorter range needs for urban mobility and a shortage of nickel and cobalt.



Share of new light-duty electric vehicle sales by battery chemistry. *Note:* Based on EV-volumes (2020).

PUBLICATION DETAILS

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Download: https://theicct.org/publications/china-green-future-ev-jan2021

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