



MSCI Thematic Insight

Subject Area: **China Tech**

The Third Energy Revolution and China's Electric Vehicle Industry



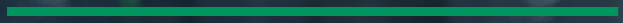
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Contents



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Overview: China's new energy revolution

Each energy “revolution” has contributed to an industrial revolution and helped transform the international economic landscape. In the first energy revolution, the power unit was the steam engine, the energy source was coal, the transportation mode was the train, and Britain surpassed the Netherlands in economic power. In the second energy revolution, the power unit was the internal combustion engine, the energy sources were oil and natural gas, the energy carriers were gasoline and diesel, the transportation mode was the automobile and the United States surpassed Britain.

In the third energy revolution, the power unit is the battery, the energy source is transitioning from fossil fuel-based energy to renewables, the energy carriers are electricity and hydrogen, the transportation mode is the “new energy automobile” and China is the country showing the greatest growth momentum.

China's electric vehicles (EV) sales have increased 36-fold from sales volume of 190,000 in 2015 to about 6.9 million in 2022; while the penetration rate has increased from 0.09% in 2005 to 25.6% in 2022.¹ This growth was both a response to the relative lack of domestic fossil fuels production in China as well as the Chinese government's supportive policies and subsidization programs.

1. Demands of energy giving birth to China's diversification of energy consumption

China is not an energy rich country: it is currently a net importer of oil and gas². To support the country's sustainable economic development, China has sought energy alternatives to diversify its energy consumption structure.

Currently China is the world's second largest oil consumer nation after the United States, but as of 2018, China's proven oil reserves accounted for only 1.5% of the world's total proven reserves.³

While China's crude oil production has remained relatively stable, consumption has continued to rise. According to the National Bureau of Statistics, China's crude oil production has been around 200 million tons since 2015.⁴ In contrast, China's crude oil consumption has been on the rise, rising from 543 million tons in 2015 to 736 million tons in 2020. China's crude oil imports grew from 336 million tons in 2015 to 542 million tons in 2020, with an external dependence of over 70%.⁵

The Chinese government sees the development of “new energy” vehicles as a way to transform fossil-fuel energy consumption into electricity consumption and hence ease the national energy import dependence.

2. China's “double carbon” goal

The climate emergency is one of the greatest challenges facing the world. On September 22, 2020, China formally proposed at the 75th session of the United Nations General Assembly the goals of achieving “carbon peaking” by 2030 and carbon neutrality by 2060.⁶ Carbon peaking is a Chinese government commitment to halt the growth of domestic carbon dioxide emissions by 2030, and start to reduce them thereafter. Carbon neutrality considers the total greenhouse gas emissions generated directly or indirectly by enterprises, groups or individuals until 2060, and that via afforestation, carbon capture, energy saving and emission reduction China will achieve “zero” net carbon dioxide emissions.

3. New energy cars as a path to sustainable carbon reduction

Since China's automobile emissions account for a large share of carbon emissions and are mainly concentrated in the fuel cycle, the development and adoption of new energy vehicles is an important element of the “double carbon” policy goal.

Based on the research by China Automotive Technology Research Center in 2021, automobiles account for over 80% of the emissions of China's transportation sector, which itself is responsible for 7.5% of China's total carbon emissions.⁷ Moreover, Fuel combustion from conventional fuel-fired vehicles is the main factor contributing to high carbon emissions in the use phase of vehicles. In 2020, China's automobile product emissions were about 720 million tons, accounting for about 90% of the total carbon emissions of automobiles according to “China Automotive Low Carbon Action Plan Research Report (2021)” released by China Automotive Technology Research Center.⁸

The development of new energy vehicles is naturally aligned with the consistent reduction of carbon emissions in the fuel and production cycles, thus supporting carbon neutrality in the industry value chain. Of course, continued progress is reliant on the clean energy credentials of the upstream power grid. In 2021, China's national wind power and photovoltaic power generation accounted for 11% of total electricity consumption.⁹ According to the National Energy Administration, this proportion will rise to about 16.5% by 2025.¹⁰ Alongside this trend, production technology innovation, increased use of recycled materials, greater use of power cells and hydrogen fuel cells will be required so that the entire vehicle and battery production and utilization value chain continues to reduce emissions intensity.

It is worth noting that pure electric vehicles do not mean zero CO₂ emissions, but only largely reduced emissions from the burning of oil in the fuel cycle. The current fuel cycle carbon emissions of electric vehicles still account for 50%, which mainly comes from the production process of power cells. With the further development of power cell production technology, the carbon emission share of fuel production cycle is expected to be reduced to 10%.



1 Sales Penetration Rate is defined as a percentage of new car sales. EV includes hybrid vehicles in this context.

2 The National Bureau of Statistics (NBS) of the People's Republic of China

3 The National Bureau of Statistics (NBS) of the People's Republic of China

4 www.stats.gov.cn/english/

5 The National Bureau of Statistics (NBS) of the People's Republic of China

6 <http://cpc.people.com.cn/n1/2020/0923/c64094-31871241.html>

7 China Automotive Technology and research Center Co. LTD

8 China Automotive Technology and research Center Co. LTD

9 China Automotive Technology and research Center Co. LTD

10 http://www.nea.gov.cn/2021-06/11/c_1310001958.htm

China's High Growth of Electric Vehicle Industry

1. Increasing new energy vehicle sales and increasing penetration

According to the data released by the China Association of Automobile Manufacturers,¹¹ new energy vehicles sales in 2022 reached 6.87M (see Figure 1), a market penetration rate of 25.6% (see Figure 2) of total national new vehicle sales in 2022, sharply up from 1.3% in 2020.

Figure 1&2:
Production and sales of new energy vehicles in China, and penetration, 2014-2022

Source: China Association of Automobile Manufacturers

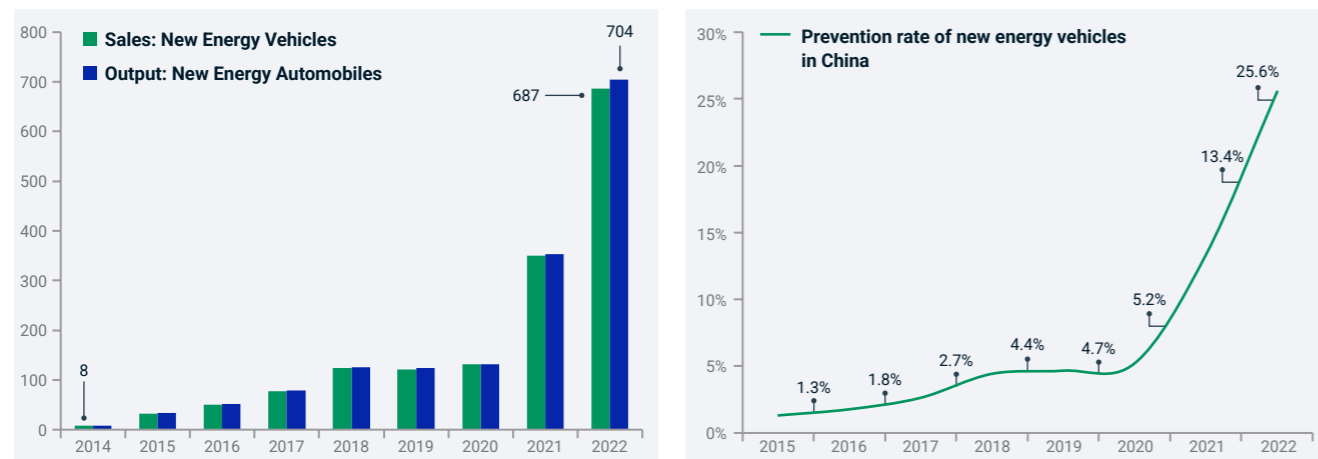
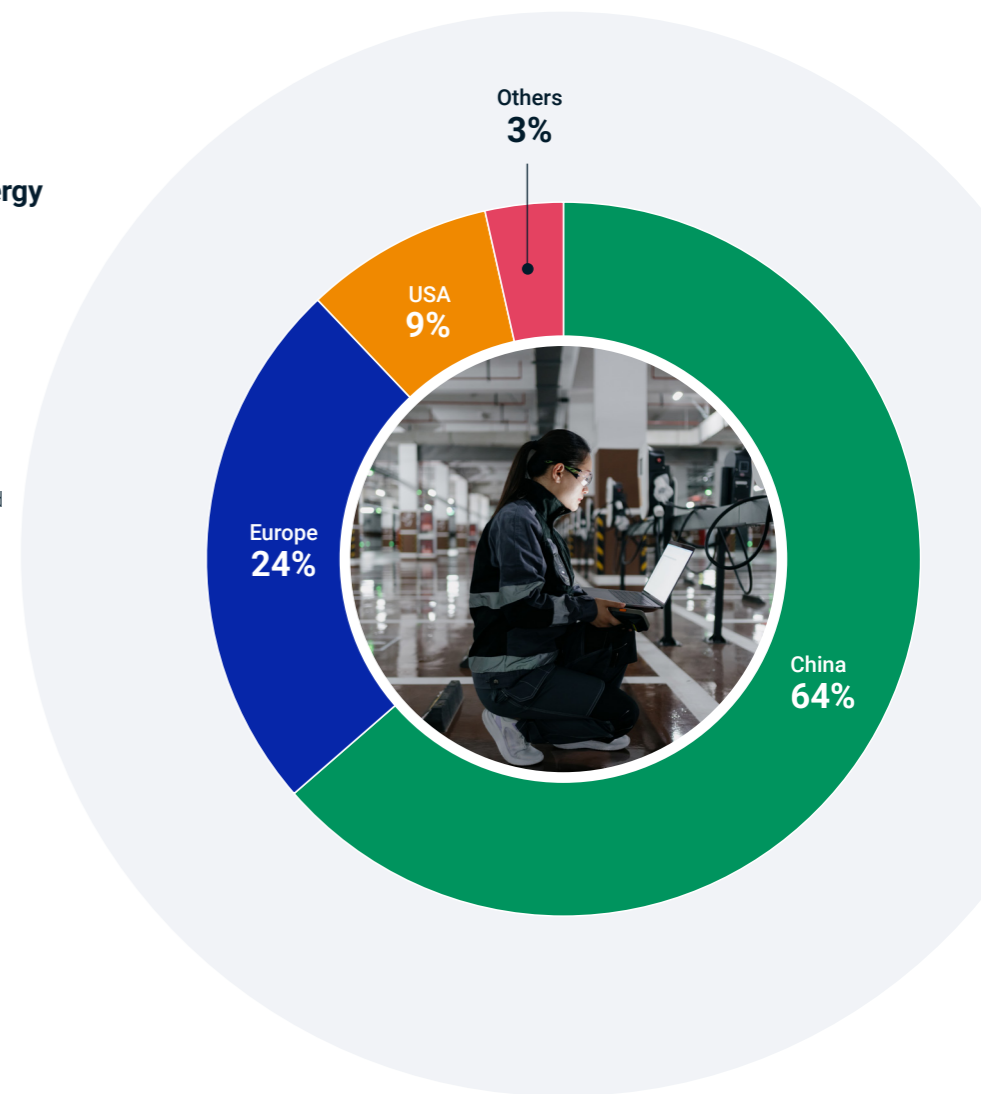


Figure 3:
Global market share of new energy vehicles in 2022

Source: EVTank¹²

In 2022, China's new energy vehicle sales account for 64% of global new energy vehicle sales up from 40.70% in 2020 (see Figure 3). Private purchases of new energy vehicles began to appear in China in 2014. The country entered a high growth year for the new energy vehicle industry in 2015, and China also became the world's largest new energy vehicle market in that year, and 2022 was the eighth successive year as the world's largest new energy vehicle market.

Based on Chinese government's goals and the auto consumption trends, China Association of Automobile Manufacturers projected that China's new energy vehicle sales is likely to grow another six to eight times by 2035.



¹¹ <http://www.caam.org.cn/tjsj>

¹² https://www.sohu.com/a/631212810_121155505?scm=1102_xchannel:325:100002.0.6.0&spm=smc_channel_248.block3_308_NDdFbm_1_fd.1.1682703092638EMR2EMd_324

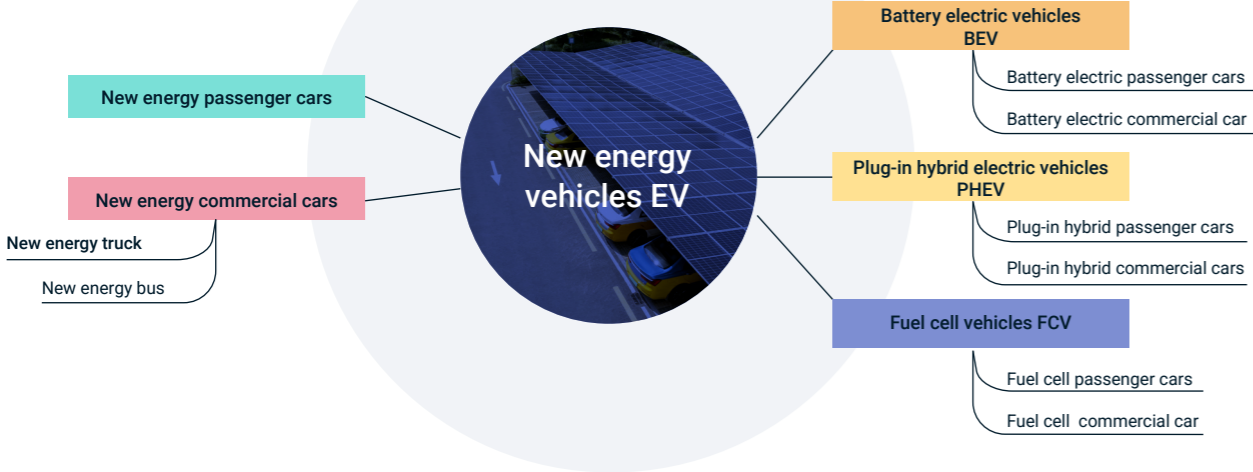
2. China's electric vehicle industry classification

According to the Ministry of Industry and Information Technology's "New Energy Vehicle Production Enterprises and Product Access Management rules"¹³, issued in 2017, new energy vehicles are vehicles with new technologies and new structures, using unconventional vehicle fuels as power sources, and integrating advanced technologies in power control and drive of vehicles.

According to Foresight Industry Research¹⁴, new energy vehicles can be first divided into pure electric vehicles, plug-in hybrid vehicles and fuel cell vehicles; and pure electric vehicles may be further divided into pure electric passenger cars and pure electric commercial vehicles while plug-in hybrid vehicles can be further divided into plug-in hybrid passenger cars and plug-in hybrid commercial vehicles. Fuel cell vehicles split into fuel cell buses and fuel cell trucks. Alternatively, the vehicles can be classified by use: new energy passenger cars, new energy buses and new energy trucks (see Figure 4).

**Figure 4:
 Electric Vehicle Classification**

Source: Foresight Industry Research Institute¹⁵

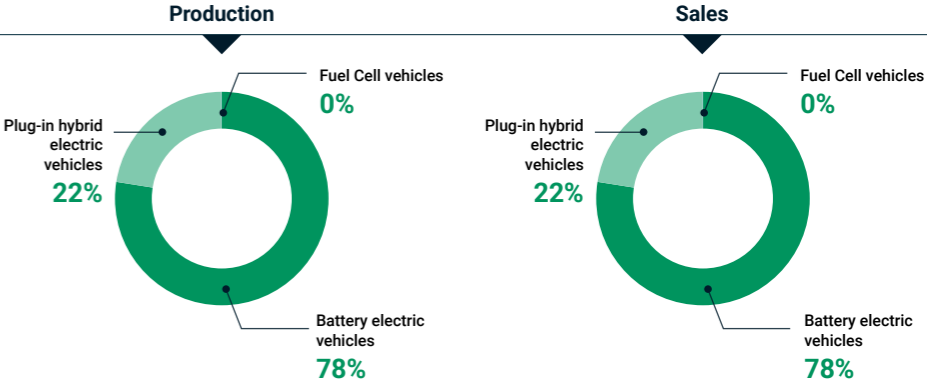


3. Pure electric and passenger cars lead China's new energy vehicle production and sales

Pure electric vehicles are both the most produced and sold category of new energy vehicles in China today. About 78% of China's total new energy vehicle production and sales in 2022 were pure electric vehicles (see Figure 5).¹⁶ Equally, passenger cars are the most produced and sold type of new energy vehicles, accounting for about 95% of the national production and sales in 2022 (see Figure 6).

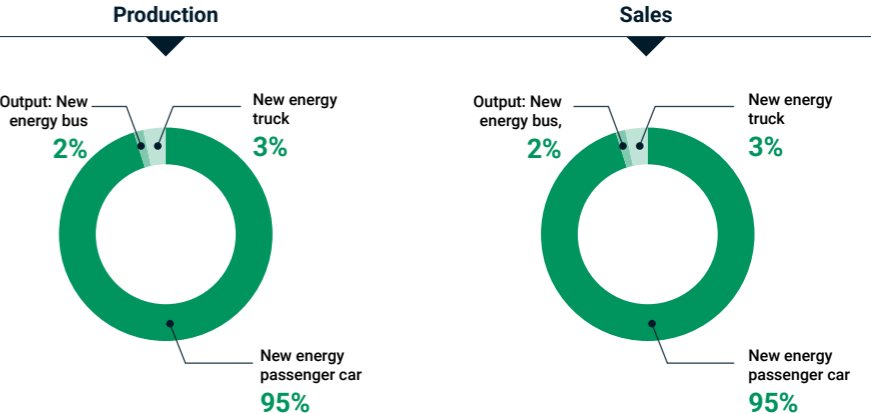
**Figure 5:
 Composition of new energy vehicles in China by power system in 2022**

Source: China Association of Automobile Manufacturers



**Figure 6:
 Composition of new energy vehicle sales and production in China by use in 2022**

Source: China Association of Automobile Manufacturers



13 http://www.gov.cn/gongbao/content/2017/content_5216432.htm
 14 <https://bg.qianzhan.com/>
 15 <https://bg.qianzhan.com/>
 16 <http://www.caam.org.cn/tjsj>

China's Electric Vehicle Industry outlook

1. China's new energy vehicle industry strongly supported by the 14th Five-Year Plan

China's 14th Five-Year Plan indicates a clear focus on new energy vehicles and other strategic emerging industries, alongside "future industry" incubation and acceleration plans in hydrogen energy and related industries. In November 2020, the General Office of the State Council issued the "New Energy Vehicle Industry Development Plan (2021-2035)"¹⁷, which specifies the future goals for new energy vehicles.¹⁸ It proposes, for example, that by 2025 the average electricity consumption of new pure electric passenger cars reduce to 12.0 kWh/100 km (see Figure 7) while by 2035, pure electric vehicles should be the majority of new vehicles sold and all public sector vehicles

Figure 7:
Chinese government's 2020 new energy vehicle development plan

Source: Foresight Industry Research Institute

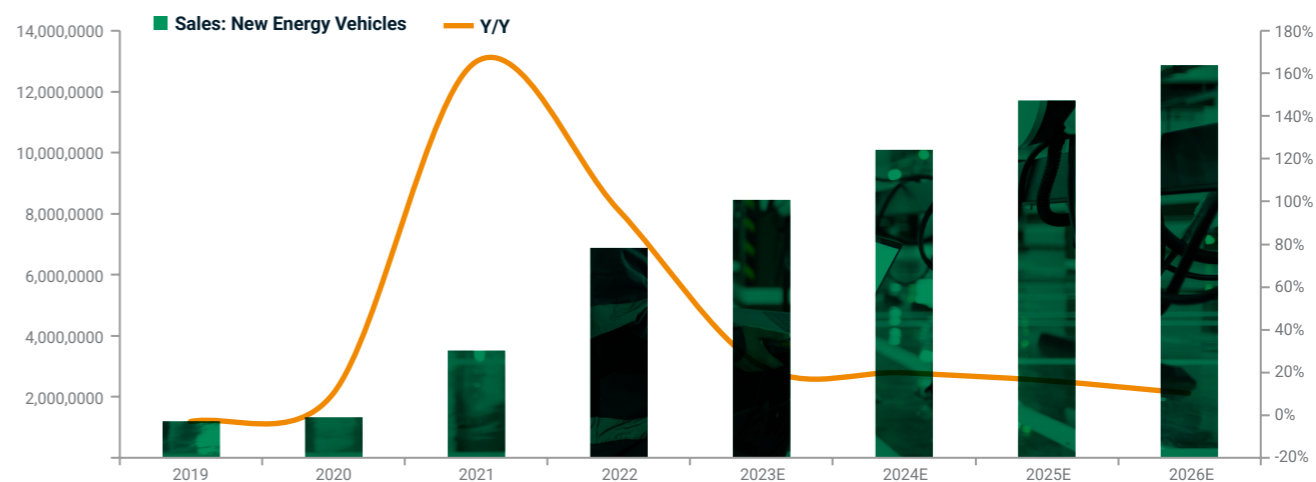
Development Goals	New Energy Vehicle Industry Development Plan (2021-2035)
2025	Average electricity consumption of new pure electric passenger cars will be reduced to 120 kWh/100 km, and the sales volume of new energy vehicles will reach about 20% of total new car sales in 2025.
	In 2025, the sales volume will reach about 20% of the total new vehicle sales, and highly autonomous vehicles will achieve the commercialization in some areas.
2035	Pure electric vehicles will become the mainstream of new sales, public sector vehicles will be fully electric, and fuel cell vehicles will be used for commercialization.
	By 2035, vehicles will be commercially available and highly autonomous vehicles will be used on a large scale, effectively promoting energy conservation and emission reduction and social efficiency. The level of emission reduction and social operation efficiency will be improved.

2. Future sales of new energy vehicles forecast to grow

According to the China Association of Automobile Manufacturers (CAAM), China's EV passenger car sales reached 6.87 million units in 2022, and according to the data of previous years and the future development trend of China's economy, China Association of Automobile Manufactures has forecasted that China's EV passenger car sales will be about 12.270M million units in 2026, almost double that in 2022 (see Figure 8).

Figure 8:
Sales (Actual, Forecast) of New Energy vehicles in China from 2019 to 2026E

Source: China Association of Automobile Manufacturers



¹⁷ http://www.gov.cn/zhengce/content/2020-11/02/content_5556716.htm

¹⁸ http://www.gov.cn/zhengce/content/2020-11/02/content_5556716.htm

Conclusion

Overall, the electrification of China's cars is relatively mature, at least in a global context, with the penetration rate of new energy vehicle sales hitting 26%. However, while the initial change has centered on a change in energy source (hardware), in the future, it will more likely be that software is the catalyst of change. With simpler engines and less differentiation in car models ("hardware"), the incremental change evident in that domain could well be dominated by the impact of software on the consumer driving experience.

This focus on "future car intelligence" has both supply and demand-side drivers. The progress in IoT, AI sophistication and big data analysis can enable new features for manufacturers to offer. Equally, on the demand-side, automotive customers increasingly expect a more enjoyable and "app-like" experience. Interest in new energy vehicles started with electrification but now the embedding of the vehicle's intelligent assisted driving, audio-visual entertainment and other software features will encourage people to have a higher expectation of the "common" driving experience. The appeal of this can then be a further support for the completion of the automotive replacement cycle for ICE vehicles.

MSCI would like to thank Tian Hou, founder & CEO of T.H. Capital, for useful discussions and insightful analysis of this megatrend which have greatly facilitated the preparation of this document. She founded T. H. Capital ("THC") in March 2011, leading the innovation and utilization of alternative data in equity research and asset management. Prior to THC, she was a MD and senior analyst at Sanford C. Bernstein, C.E. Unterberg Towbin and Pali Capital. In addition, she worked as a strategist in IBM's internal strategy department.





Contact us

AMERICAS

US	+1 888 588 4567 (toll free)
Canada	+1 416 628 1007
Brazil	+55 11 4040 7830
Mexico	+52 81 1253 4020

ASIA PACIFIC

China	North: 10800 852 1032 (toll free) South: 10800 152 1032 (toll free)
Hong Kong	+852 2844 9333
India	+91 22 6784 9160
Malaysia	1800818185 (toll free)
South Korea	00798 8521 3392 (toll free)
Singapore	800 852 3749 (toll free)
Australia	+612 9033 9333
Taiwan	008 0112 7513 (toll free)
Thailand	0018 0015 6207 7181 (toll free)
Japan	+81 3 4579 0333

EUROPE, MIDDLE EAST & AFRICA

South Africa	+27 21 673 0103
Germany	+49 69 133 859 00
Switzerland	+41 22 817 9400
United Kingdom	+44 20 7618 2222
Italy	+39 025 849 0415
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