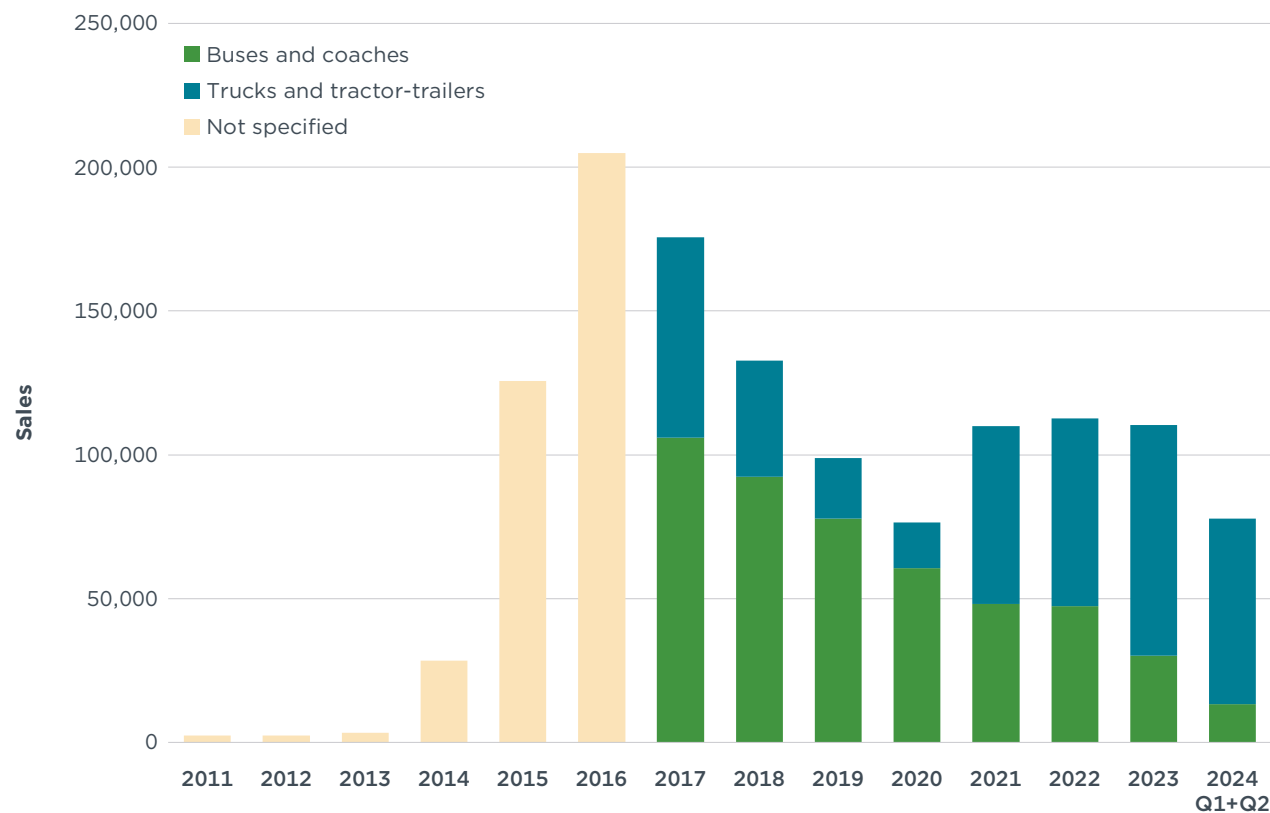


ZERO-EMISSION MEDIUM- AND HEAVY-DUTY VEHICLE MARKET IN CHINA (JANUARY-JUNE 2024)

SHIYUE MAO, LINGXIAO XU, AND FELIPE RODRIGUEZ

Sales of zero-emission heavy-duty vehicles in China, 2011 to June 2024



OVERVIEW

This overview of China’s zero-emission heavy-duty vehicle (ZE-HDV) market covers city buses and coaches, medium and heavy straight trucks, and tractor-trailers above 3.5 tonnes. Sales of ZE-HDVs in China saw two spikes in the last 13 years: first in 2015–2016, underpinned by government subsidies, and more recently in 2021, amid a rebound in domestic and foreign demand after COVID-19.

Through the first half of 2024, total ZE-HDV sales in China reached approximately 77,700, including roughly 64,500 ZE trucks and tractor-trailers and 13,200 ZE buses and coaches. Sales of ZE trucks and tractor-trailers were particularly noteworthy, as they almost matched the total number of these vehicles sold in the whole year in 2022 (65,200). Meanwhile, ZE bus and coach sales continued to shrink.

HEAVY TRUCKS

The heavy truck market saw changes in the mix of fuel types from previous years. In the first half of 2024, diesel trucks accounted for 55% of sales, down from 80% in the first half of 2023, and natural gas-powered trucks made up 35% of sales, up 8% year-on-year. Battery electric trucks reached a 9% sales share and were the third most popular powertrain technology in the market.

Sales of both battery electric and fuel-cell heavy trucks have mostly grown steadily in 2024, except for a dip in February during the Spring Festival, when most business activity is paused. In June, the market share of battery electric heavy trucks hit a new high of 14%, a 35% increase from January 2024. The market for fuel-cell heavy trucks remains nascent, with 332 vehicles sold in June 2024, a 1% market share.

FIGURE 1.1

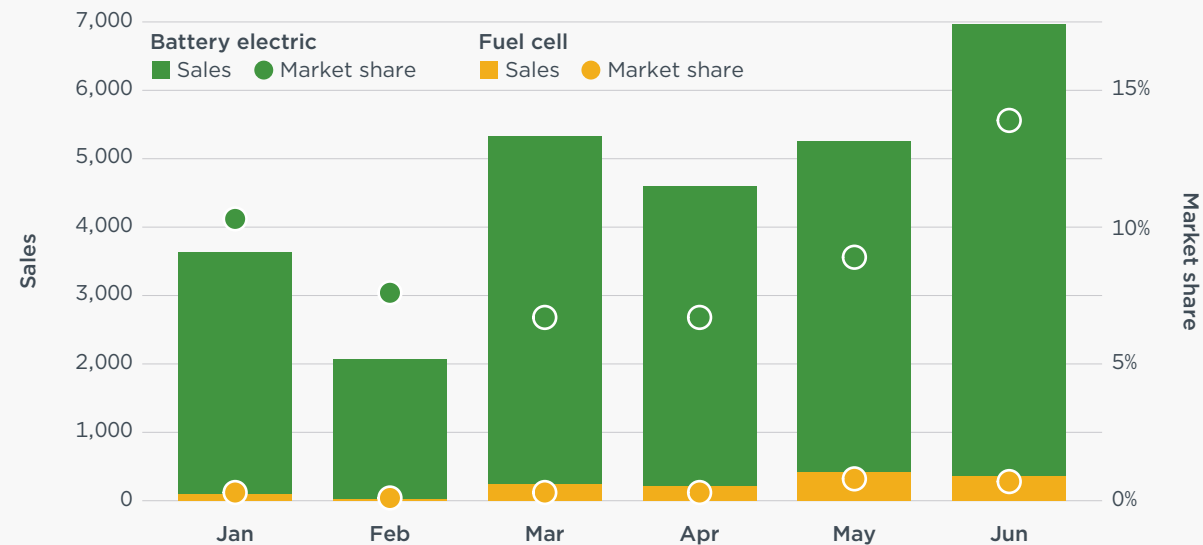
Market share of heavy trucks by powertrain, January–June 2024



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FIGURE 1.2

Sales (bars) and market shares (dots) of zero-emission heavy trucks, 2024

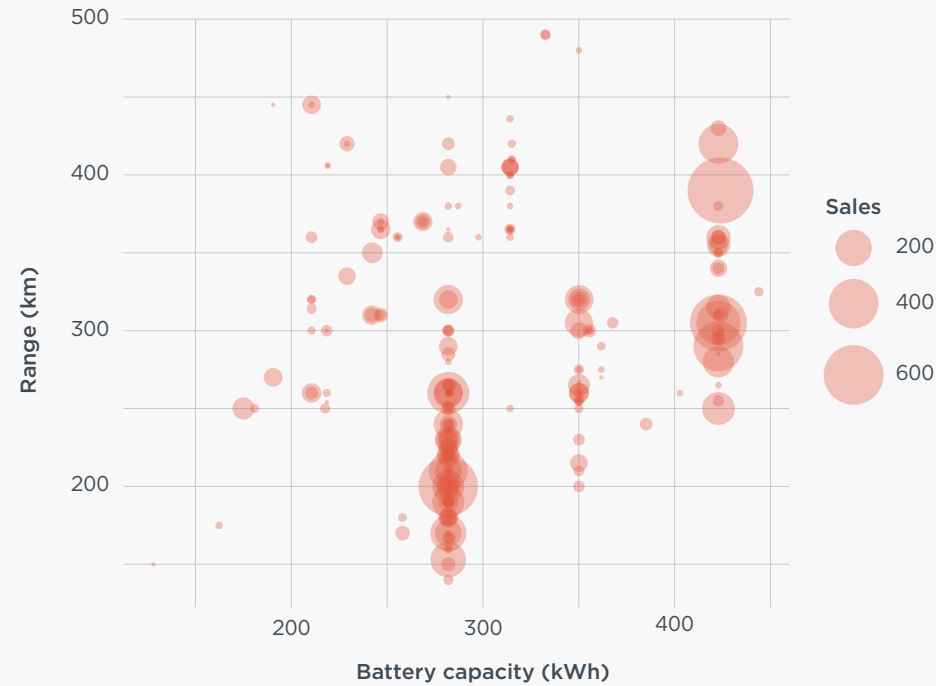


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Lithium iron phosphate (LFP) batteries dominate the heavy truck market in China due to their economy, durability, and safety. In terms of capacity, the most popular battery sizes for these vehicles were 282 kWh, 350 kWh, and 423 kWh, indicating a balance between cost and efficiency.

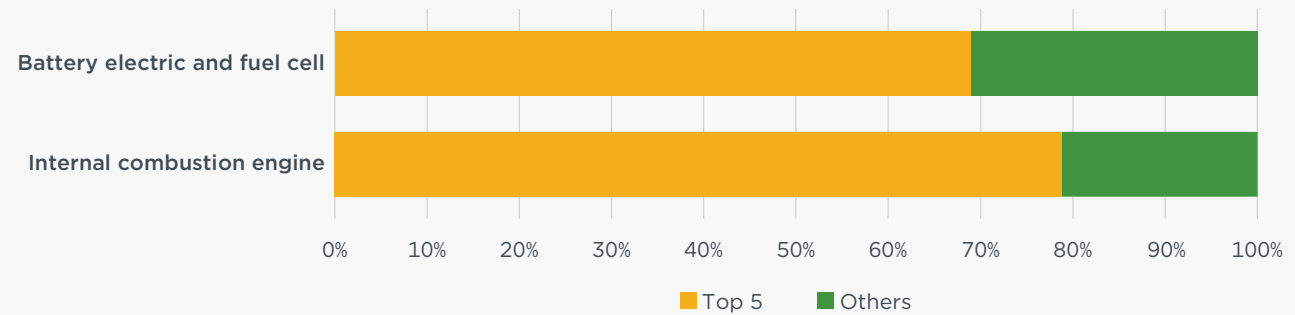
The collective market share of the top 5 original equipment manufacturers (OEMs), known as the 5-firm concentration ratio or CR5, is an indicator of market maturity. In the first half of 2024, the CR5 among internal combustion engine (ICE) heavy truck manufacturers was 79%, while the ratio among ZE manufacturers was 69%. This implies that the ZE heavy truck industry is approaching a level of market maturity similar to that of ICE manufacturers, with top OEMs capturing a growing share of the market.

FIGURE 1.3
Battery capacity and range of heavy trucks with LFP batteries, January–June 2024



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FIGURE 1.4
Top zero-emission and conventional heavy truck OEMs, January–June 2024



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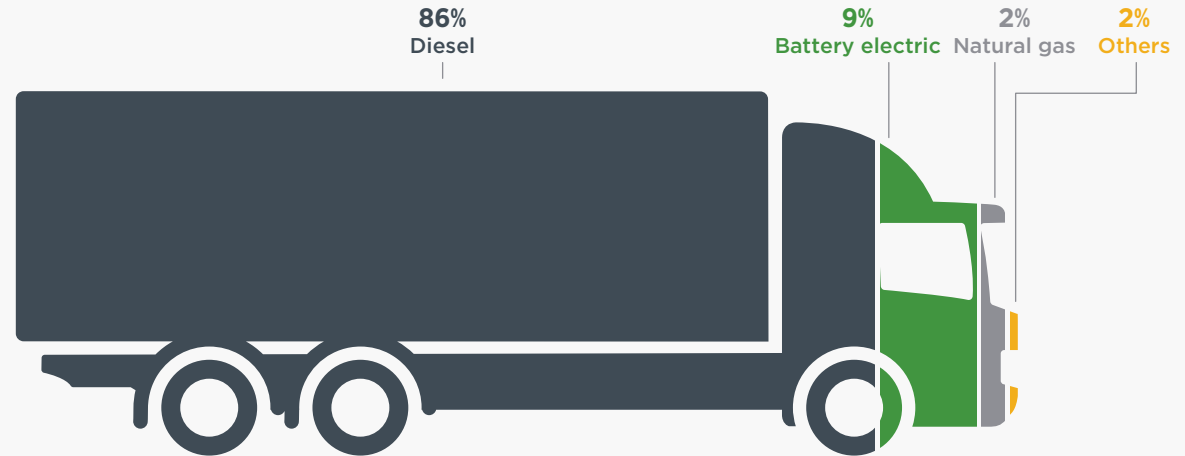
MEDIUM TRUCKS

Diesel remained the dominant powertrain in the medium truck market in the first half of 2024, accounting for 86% of total sales, a 4% year-on-year decrease. Battery electric reached a 10% market share, making it the second most popular powertrain in the segment.

By month, battery electric trucks showed steady growth in market share, reaching 14.4% in June 2024, more than double the level in January 2024. Just two fuel-cell trucks were sold in June, representing a 0.4% market share; this powertrain remains in early stages of development in this segment.

FIGURE 2.1

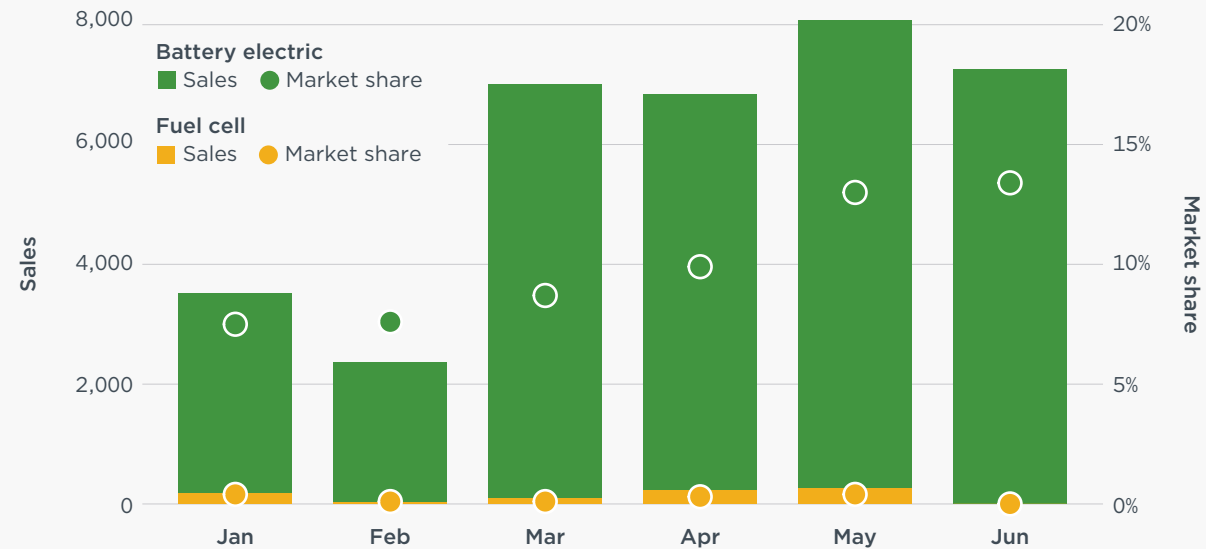
Market share of medium trucks by powertrain, January–June 2024



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FIGURE 2.2

Sales (bars) and market shares (dots) of zero-emission medium trucks by powertrain, January–June 2024

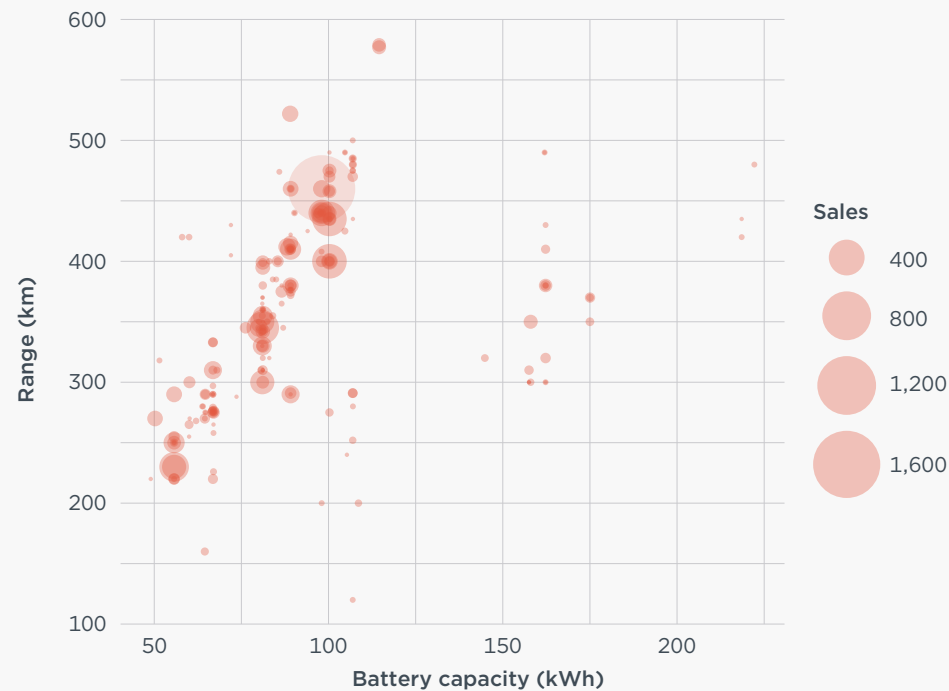


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As in the heavy truck market, LFP is the dominant battery chemistry among medium trucks in China. Most electric medium truck models were equipped with 100 kWh batteries to balance cost and available range. Equipping trucks with heavier batteries may not necessarily improve the available range, as reduced energy efficiency due to the increased weight of the battery may offset the range benefits of added battery capacity.¹

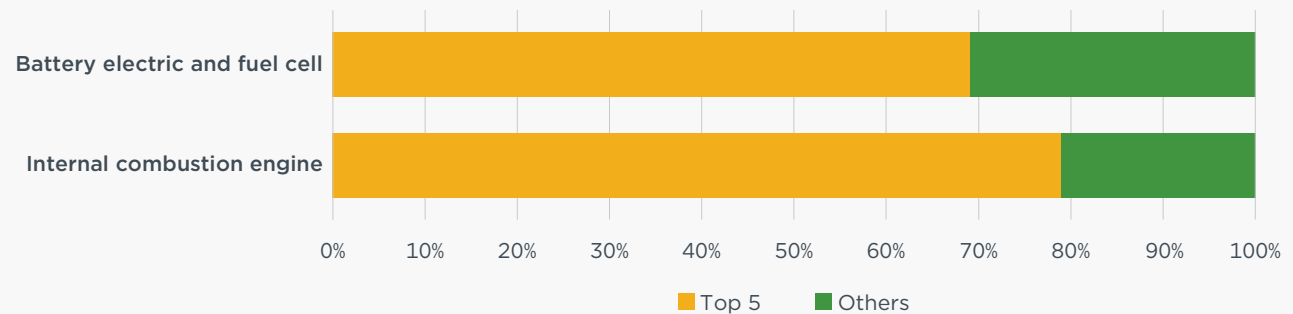
Here there is a small difference in the market share of the top 5 OEMs between the ICE and ZE medium truck industries: In the first half of 2024, the CR5 of ICE OEMs was 79%, while the CR5 of zero-emission truck OEMs was 69%.

FIGURE 2.3
Battery capacity and e-range of medium trucks with LFP battery, January–June 2024



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FIGURE 2.4
Key OEMs in zero-emission and conventional medium truck market, January–June 2024



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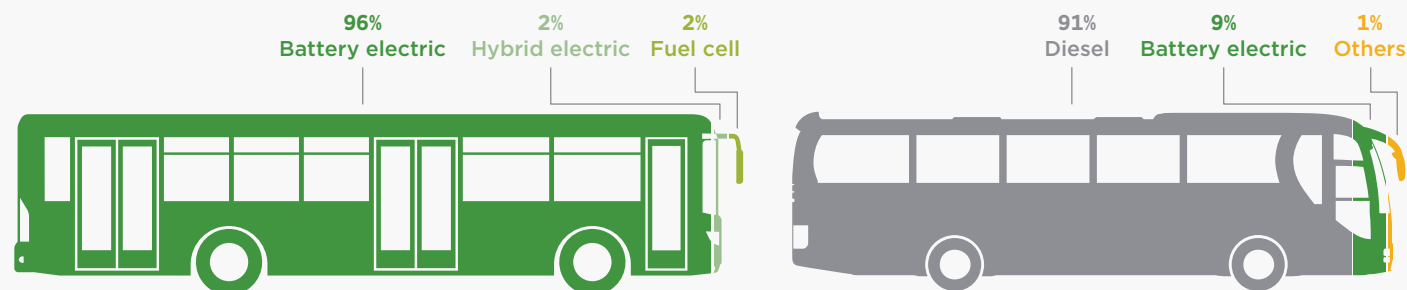
CITY BUSES AND COACHES

City buses have the highest electrification rate of all vehicle categories in China, with a cumulative battery electric, hybrid electric, and fuel-cell electric market share of almost 100% as of mid-2024. Electrification among coaches, which are used for intercity transport, has been far more limited: The market share of battery electric coaches was 6% in the first half of 2024, and most coaches were still powered by diesel. This implies that the uptake of electric commercial vehicles is driven by demonstrated applicability in certain uses, with widespread adoption for (generally shorter-distance) intra-city bus travel but not yet for (typically longer-distance) trips between cities.

In terms of market share, there were no major changes in the adoption of zero-emission technologies during the first half of 2024. City bus sales saw a peak in January with 2,670 units sold, predominantly battery electric buses, followed by a sharp decline in February and March before a bounce in April. As of June 2024, the market share of battery electric coaches was 6.0%.

FIGURE 3.1

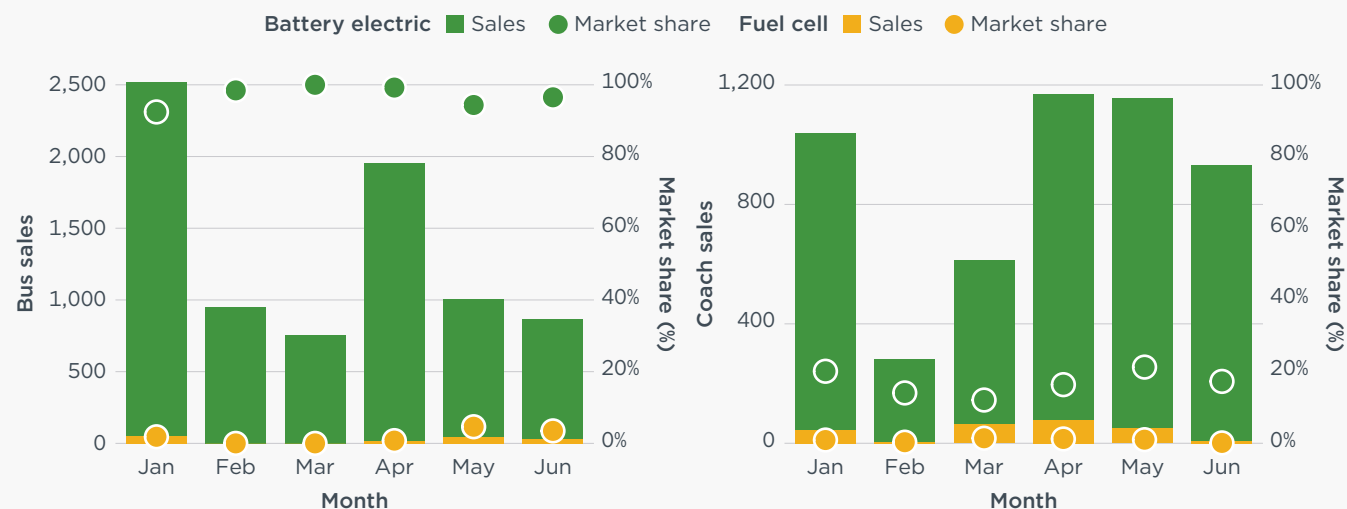
Market share of ZE city buses and coaches by powertrain, January–June 2024



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FIGURE 3.2

Sales (bars) and market shares (dots) of zero-emission city buses and coaches by powertrain, January–June 2024



THE INTERNATIONAL COUNCIL ON CLEAN TRANSPORTATION [THEICCT.ORG](https://theicct.org)

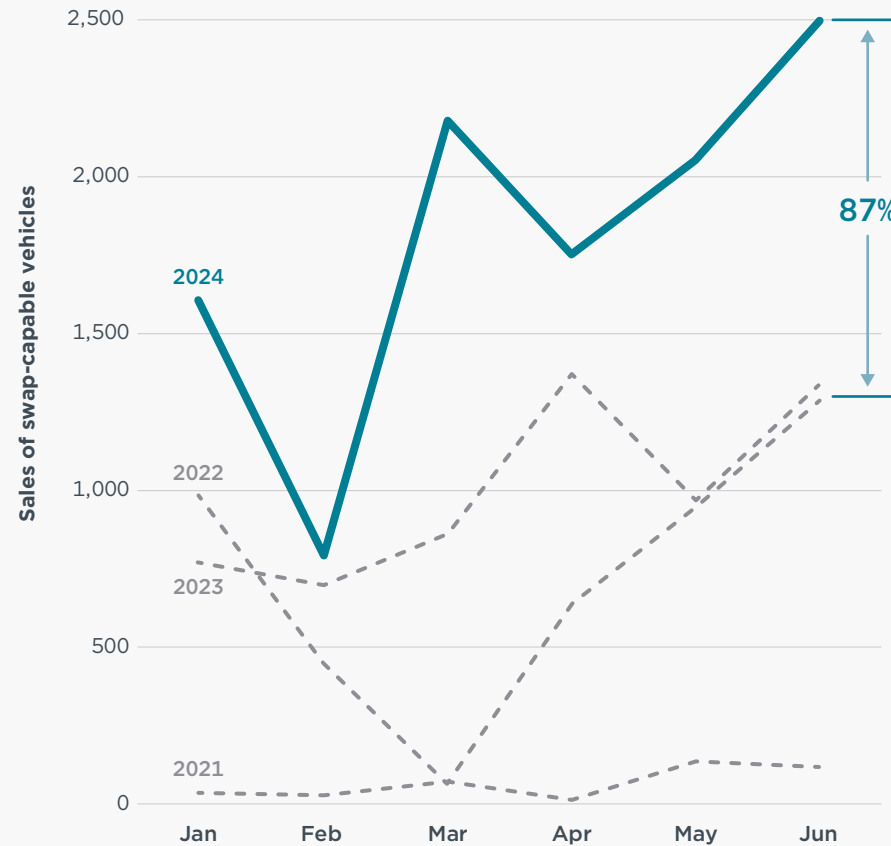
BATTERY SWAPPING

Battery swapping, whereby a depleted electric vehicle battery can be switched out for a fully charged replacement within minutes, is an innovative technology that can make battery electric vehicles operate more efficiently and affordably. Fleet operators save on the upfront investment by purchasing vehicles without batteries installed and renting batteries from third-party lessors; operators can also be free from range anxiety, assuming there is battery swapping infrastructure deployed close to their yard. Swap-capable technology has gained in popularity in China in recent years, particularly for trucks and tractors.

In the first half of 2024, sales of swap-capable vehicles increased and reached a total of 2,497 in June 2024. That is up 87% from the first half of 2023. The popularity of swap-capable vehicles has been jointly driven by policy and market developments: Several policies were introduced in 2024 to support this emerging technology (see Table 4.1), and pilot projects have been launched to assess use cases in several industries, including mining, steel, and port logistics.

FIGURE 4.1

Sales of swap-capable vehicles, January–June 2024 compared with 2021–2023



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TABLE 4.1

Selected policies to promote battery-swapping technology announced in 2024

	Title	Agencies/regions	Date	Objectives
National	Transportation equipment update action plan ²	Ministry of Transport and 12 other departments	June 7, 2024	<ul style="list-style-type: none"> Promote new energy trucks in the logistics industry Develop charging infrastructure on highways Deploy battery-swapping stations Utilize shoreline resources for green energy in transport hubs
	Automobile standardization work plans 2024 ³	Ministry of Industry and Information Technology	June 21, 2024	<ul style="list-style-type: none"> Enact safety standards for swap-capable heavy-duty vehicles Establish technical specification systems for swap-capable vehicles Promote battery-swapping technology
	Five-year action plan for the in-depth implementation of the people-centered new urbanization strategy ⁴	State Council	July 31, 2024	<ul style="list-style-type: none"> Build fast-charging facilities in public parking lots Promote battery-swapping and hydrogen refueling stations
	Press conference of the first half year of 2024 by National Energy Administration ⁵	National Energy Administration	July 31, 2024	<ul style="list-style-type: none"> Set a goal of 13.9% growth in key new energy projects Promote new energy storage, charging, and hydrogen refueling facilities
Sub-national	Implementation plan of Qingdao to promote large-scale equipment renewal and consumer goods trade-in ⁶	City of Qingdao, Shandong province	May 13, 2024	<ul style="list-style-type: none"> Accelerate deployment of charging and battery-swapping infrastructure for zero-emission vehicles Organize 10+ new energy vehicle promotion events annually
	Implementation plan of national carbon peak pilot (Nanjing Jiangning Economic and Technological Development Zone) ⁷	Jiangning Economic and Technological Development Zone, City of Nanjing, Jiangsu province	May 19, 2024	<ul style="list-style-type: none"> Develop charging and battery swapping facilities at transportation hubs Improve transportation efficiency with charging facilities Deploy high-voltage charging and vehicle-to-grid
	High-quality development action plan for new energy and intelligent connected vehicle industry in Jilin province ⁸	Jilin province	May 24, 2024	<ul style="list-style-type: none"> Build 2,000+ charging and battery swapping stations by 2026 Promote 120,000 charging piles Deploy 100% DC fast charging piles on highways
	Nanjing carbon peaking implementation plan ⁹	City of Nanjing, Jiangsu province	June 10, 2024	<ul style="list-style-type: none"> Promote networks of battery swapping facilities within cities Develop battery swapping stations for ZE heavy-duty trucks and passenger vehicles
	Shenzhen heavy truck battery swapping service network pilot program ¹⁰	City of Shenzhen, Guangdong province	June 13, 2024	<ul style="list-style-type: none"> Deploy 100,000 swap-capable heavy-duty trucks
	Three-year action plan for Hunan province's lithium battery and advanced energy storage materials industry (2024-2026) ¹¹	Hunan province	June 17, 2024	<ul style="list-style-type: none"> Promote projects with solar-storage charging facilities in rural areas
	Implementation plan for writing a new chapter of beautiful Hainan on the new journey and striving to become a model for a beautiful China ¹²	Hainan province	June 20, 2024	<ul style="list-style-type: none"> Set a ban on sales of internal combustion engine vehicles by 2030 Promote pilot applications of battery swapping or hydrogen fuel cells in medium- and heavy-duty trucks
	Panzhuhua City's special action plan for achieving carbon peak in urban and rural construction ¹³	City of Panzhuhua, Sichuan province	June 21, 2024	<ul style="list-style-type: none"> Construct charging and battery-swapping piles/stations
	Implementation plan of national carbon peaking pilot (Changzhi High-Tech Industrial Development Zone) ¹⁴	High-Tech Zone, City of Changzhi, Shanxi province	June 26, 2024	<ul style="list-style-type: none"> Develop battery-swapping projects for heavy-duty trucks

TERMINOLOGY, DATA SOURCES, METHODOLOGY, AND ASSUMPTIONS

A zero-emission vehicle is any vehicle whose propulsion system produces zero combustion emissions, such as a dedicated battery electric, fuel-cell electric, or other motor that is not driven by combustion.

A heavy-duty vehicle is a commercial vehicle intended for the transport of passengers or freight with a gross vehicle weight above 3.5 tonnes.

A heavy truck is a truck with a gross vehicle weight above 12 tonnes.

A medium truck is a truck with a gross vehicle weight between 3.5 and 12 tonnes.

Utility vehicles (专用车辆), due to their popular application in freight trucking, are categorized as trucks.

A city bus is a passenger vehicle with a gross vehicle weight above 3.5 tonnes that is used exclusively in urban environments.

A coach is a passenger vehicle with a gross vehicle weight above 3.5 tonnes that is used exclusively in inter-city environments.

All data are provided by Gasgoo Auto.

NOTES

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