ZERO-EMISSION MEDIUM- AND HEAVY-DUTY VEHICLE MARKET IN CHINA, 2024

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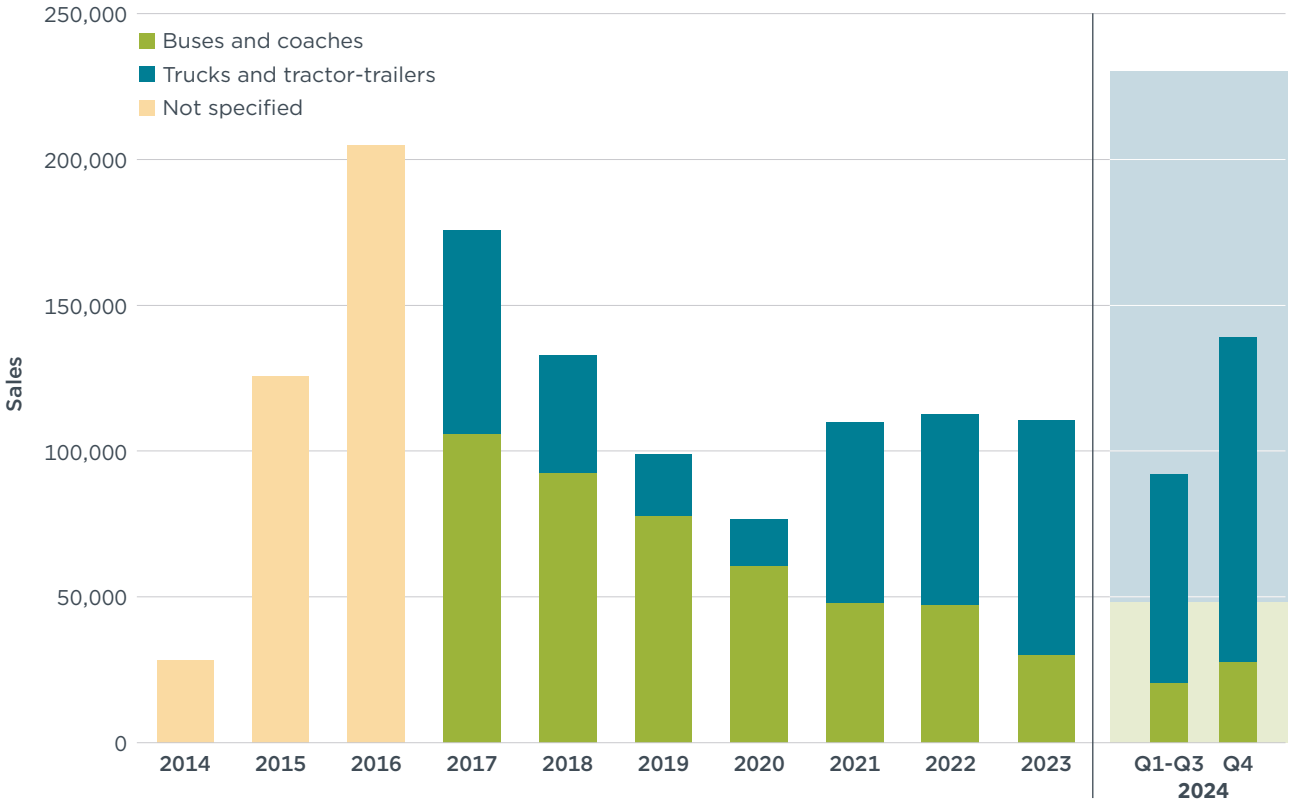
Sales of zero-emission medium- and heavy-duty vehicles in China, 2014 to 2024



OVERVIEW

This overview of China's zero-emission medium- and heavy-duty vehicle (ZE-MHDV) market covers medium and heavy straight trucks, tractor-trailers above 3.5 tonnes, and city buses and coaches. Sales of ZE-MHDVs in China spiked twice in the last decade: the first in 2015–2016, underpinned by government subsidies, and the second in 2024, with a historical high of more than 230,000 sales. Sales of ZE-MHDVs boomed in Q4, thanks to a strong macroeconomic stimulus package released by the Chinese government in September.

In 2024, trucks and tractor-trailers dominated the ZE-MHDV market with a share of about 80%, suggesting that the industry is rapidly embracing zero-emission solutions for freight and trucking. In contrast, the general decline of bus and coach sales over time indicates greater market saturation than the freight industry after being the focus of promotional policies in previous years.

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HEAVY TRUCKS

The heavy truck market in 2024 saw changes in the mix of fuel types from previous years. In 2024, diesel trucks accounted for 57% of sales, down from 70% in 2023, and trucks powered by natural gas made up 29% of total sales. Battery electric trucks reached a 13% sales share and were the third most popular powertrain technology in the market.

Sales of both battery electric and fuel-cell heavy trucks grew steadily in 2024, with the exception of a dip in February during the Spring Festival when most business activities are paused. In December, sales of battery electric heavy trucks soared to more than 14,700 and the market share hit a new high of 20.9%, more than double the sales in January 2024. The market for fuel-cell heavy trucks remains nascent, with 581 vehicles sold in December 2024, a market share of 0.8%.

FIGURE 1.1

Market share of heavy trucks by powertrain in China in 2024

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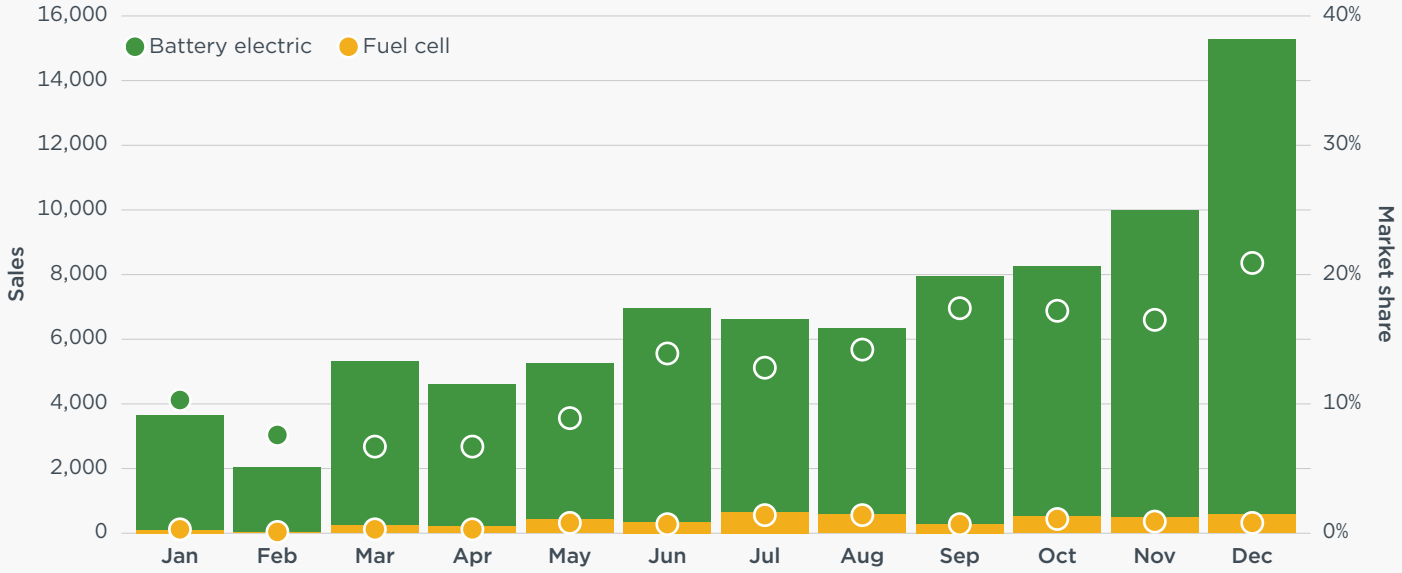
FIGURE 1.2

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



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Lithium iron phosphate (LFP) batteries continue to dominate the heavy truck market in China. In terms of capacity, the most popular battery sizes for these vehicles in 2024 were 282 kWh, 350 kWh, and 423 kWh, indicating a balance between battery cost and operational efficiency.

In 2024, the combined market share of the top five original equipment manufacturers (OEMs) of internal combustion engine (ICE) heavy trucks (FAW, Dongfeng Motor, Foton-Daimler, Shacman, Sinotruk/CNHTC) was 75%, while the market share of the top five manufacturers of zero-emission trucks (XCMG, SANY, FAW, Yutong, Shacman) was 61%. This implies that the zero-emission heavy truck market is catching up to a similar level of market maturity as that of ICE trucks, with the top OEMs dominating a growing share of the market.

TABLE 1.1

Top five manufacturers of zero-emission and internal combustion engine heavy trucks

Zero-emission	Internal combustion engine
XCMG	FAW
SANY	Dongfeng Motor
FAW	Foton-Daimler
Yutong	Shacman
Shacman	Sinotruk/CNHTC

FIGURE 1.3

Battery capacity and electric range of heavy trucks with LFP batteries in China in 2024

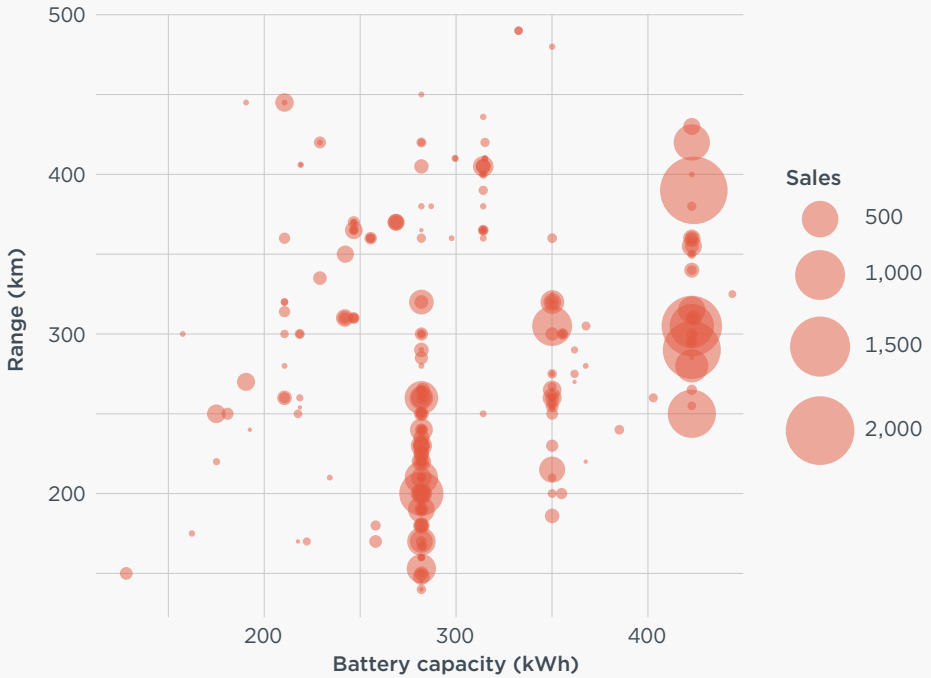

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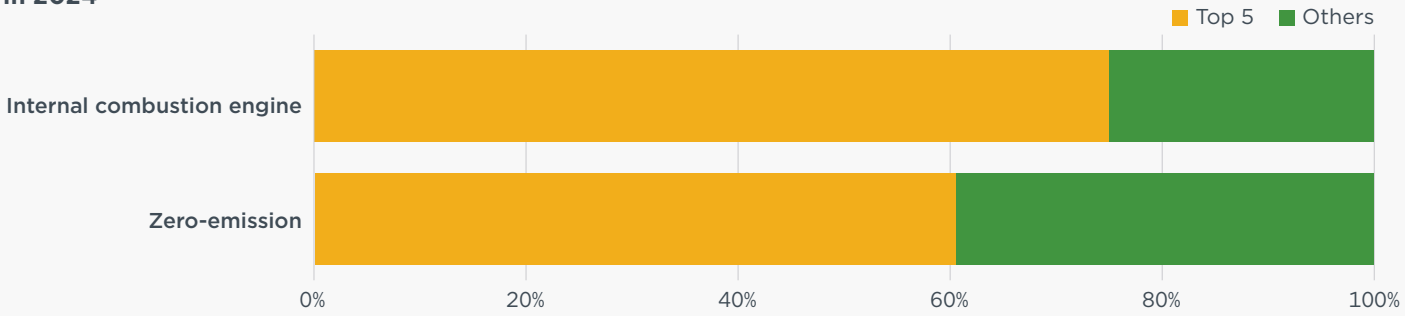
FIGURE 1.4

Market share of the top five zero-emission and internal combustion engine heavy truck manufacturers in China in 2024



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MEDIUM TRUCKS

Diesel remained the dominant powertrain in the medium truck market in 2024, accounting for 81% of total sales. Battery electric trucks reached a 14% market share, making it the second most popular powertrain in the segment.

Battery electric trucks showed steady growth in market share, reaching 22% in December 2024, almost three times the market share in January 2024. In 2024, 1,710 fuel-cell medium trucks were sold, representing a 0.25% market share; this powertrain remains in early stages of market development in this segment.

FIGURE 2.1

Market share of medium trucks by powertrain in China in 2024

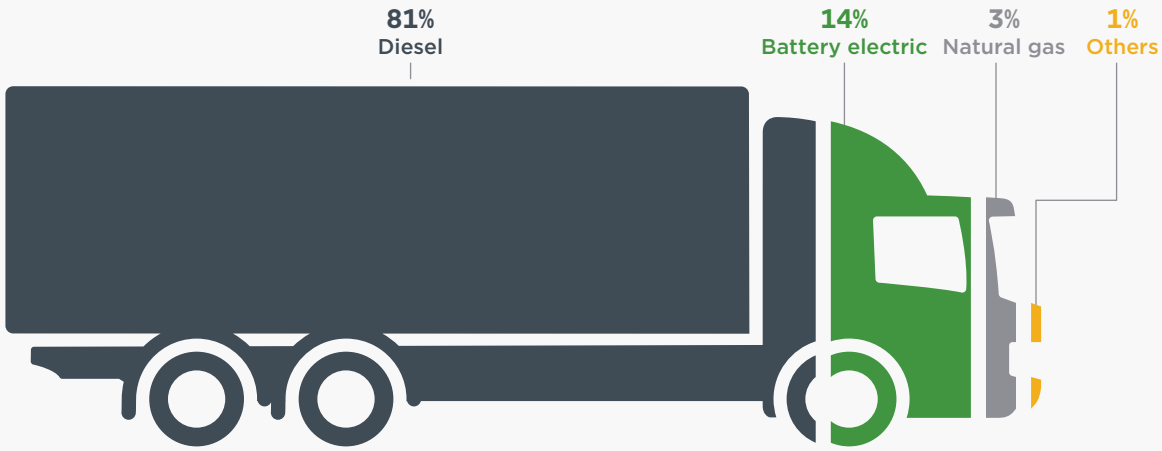

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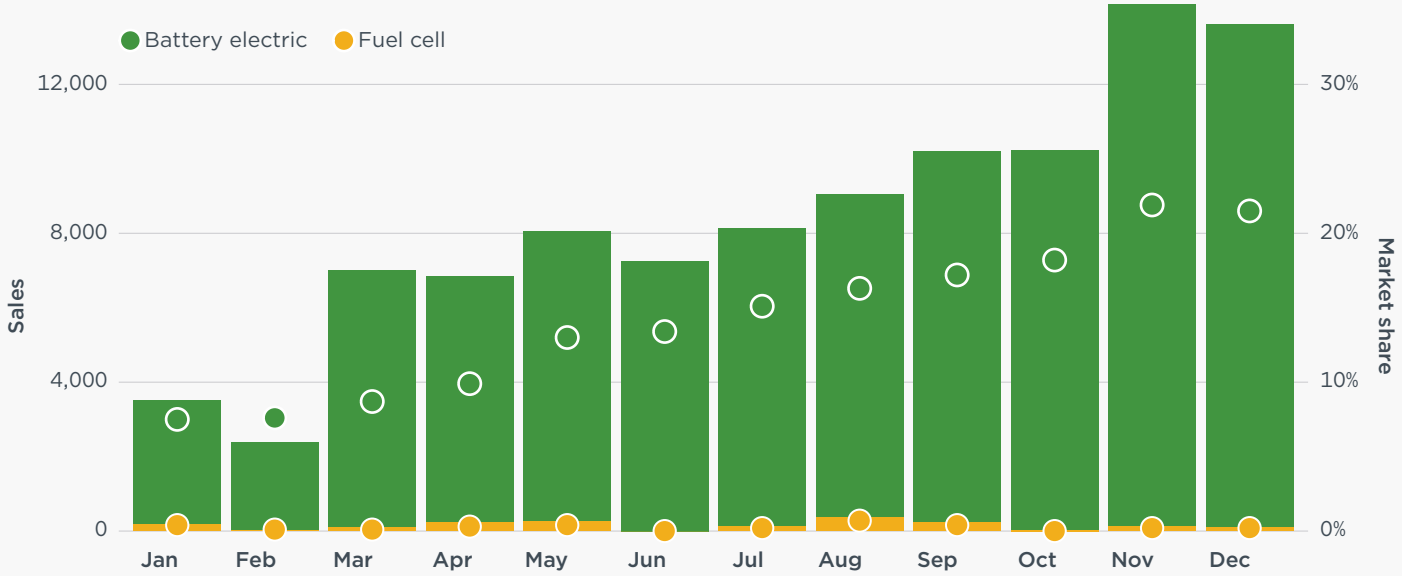
FIGURE 2.2

Sales (bars) and market shares (dots) of zero-emission medium trucks by powertrain in China in 2024



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Lithium iron phosphate is the dominant battery chemistry among medium battery electric trucks in China. Most electric medium truck models were equipped with 50 kWh to 100 kWh batteries to balance cost and available range.

In 2024, the market share of the top five ICE truck OEMs (Foton, JAC, Sinotruk/CNHTC, JMC Motors and FAW) was 64%, while the market share of zero-emission truck OEMs (Geely, Foton, Yutong, Dongfeng Motor and Shacman) was 53%. Similar to the pattern in heavy truck industry, the market shares imply that the zero-emission market is quickly maturing and becoming similar to the ICE medium truck market in terms of concentration.

TABLE 2.1

Top five manufacturers of zero-emission and internal combustion engine medium trucks

Zero-emission	Internal combustion engine
Geely	Foton
Foton	JAC
Yutong	Sinotruk/CNHTC
Dongfeng Motor	JMC Motors
Shacman	FAW

FIGURE 2.3

Battery capacity and electric range of medium trucks with LFP batteries in China in 2024

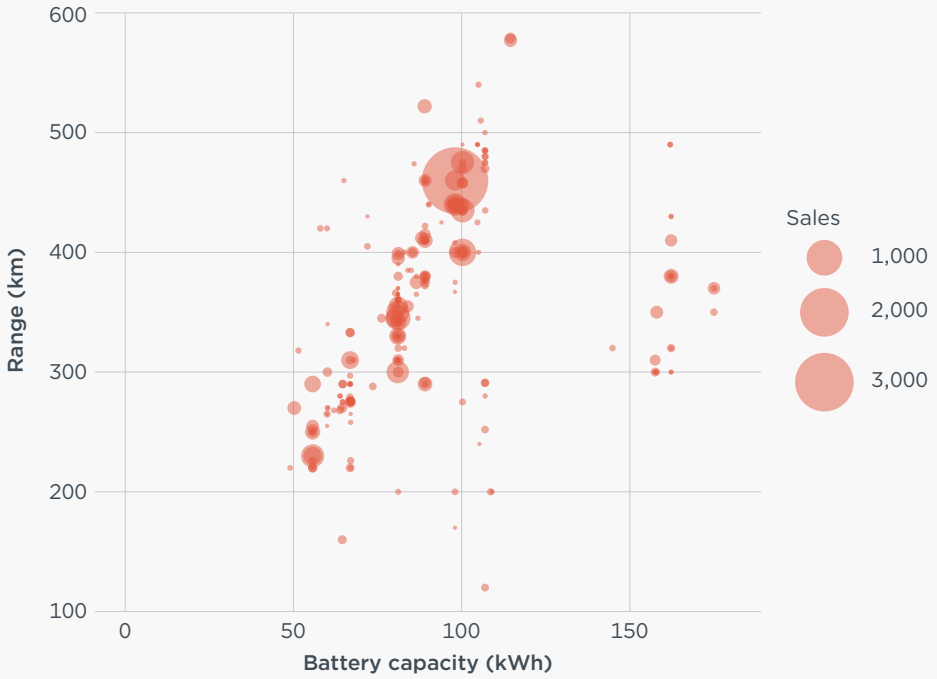

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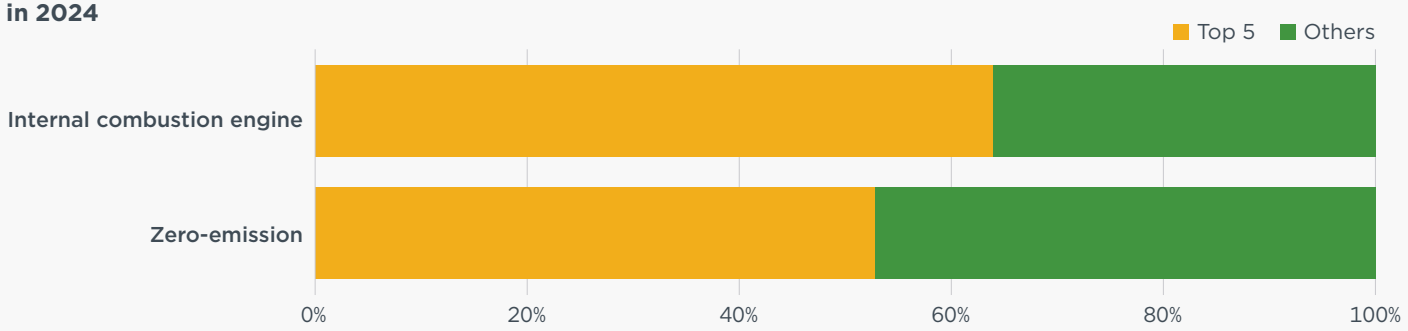
FIGURE 2.4

Market share of the top five zero-emission and internal combustion engine medium truck manufacturers in China in 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 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 2024, and most coaches were still powered by diesel.

In terms of market share, there were no major changes in the adoption of zero-emission technologies in 2024. City bus sales saw a peak in December with over 17,000 buses sold, which were predominantly battery electric (approximately 99%). The soaring sales of electric buses in December was primarily driven by incentives for the replacement of older e-buses and batteries, which were scheduled to end that month.[1] As of December 2024, the market share of battery electric coaches was 12%, the highest level in 2024. Sales of fuel-cell electric coaches were in the single or double digits of sales in most months, but peaked in July and August with 182 and 247 vehicles, respectively.

FIGURE 3.1

Market share of zero-emission city buses and coaches by powertrain in China in 2024

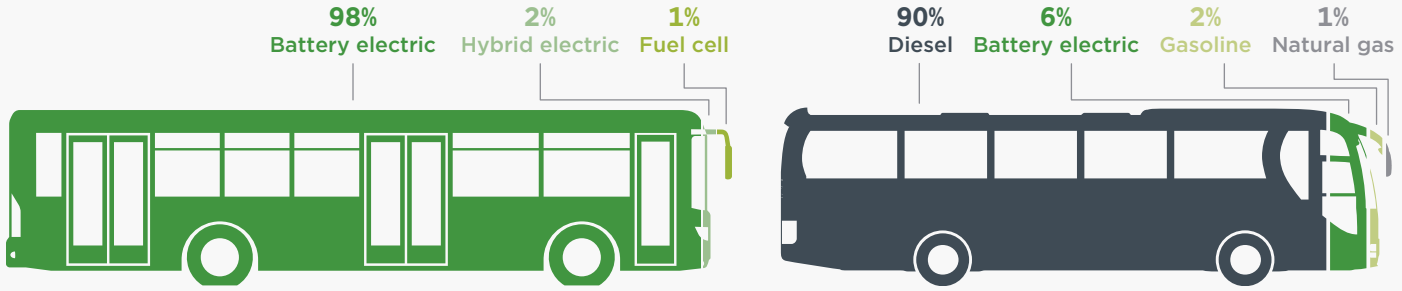

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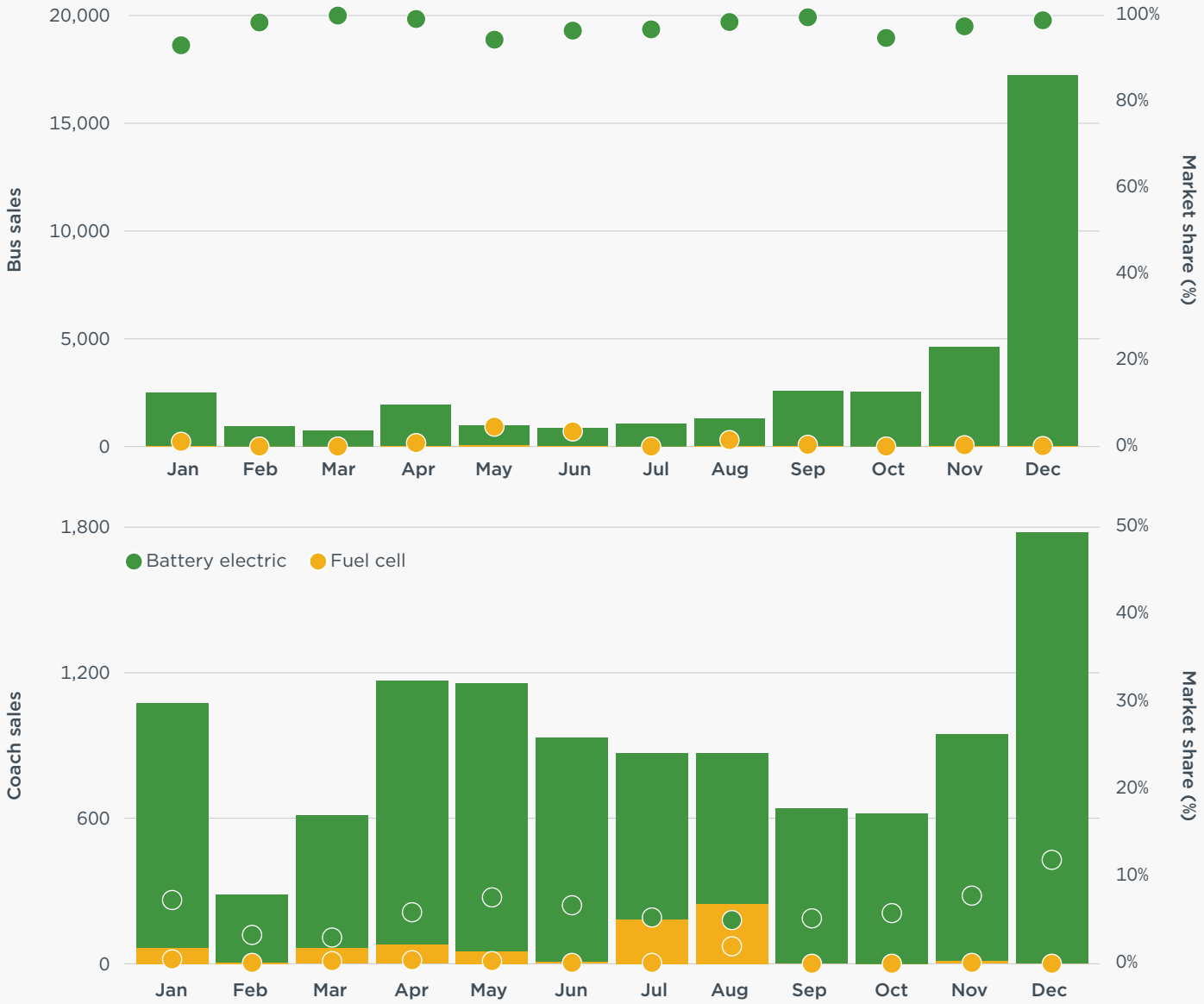
FIGURE 3.2

Market share of zero-emission city buses and coaches by powertrain in China in 2024



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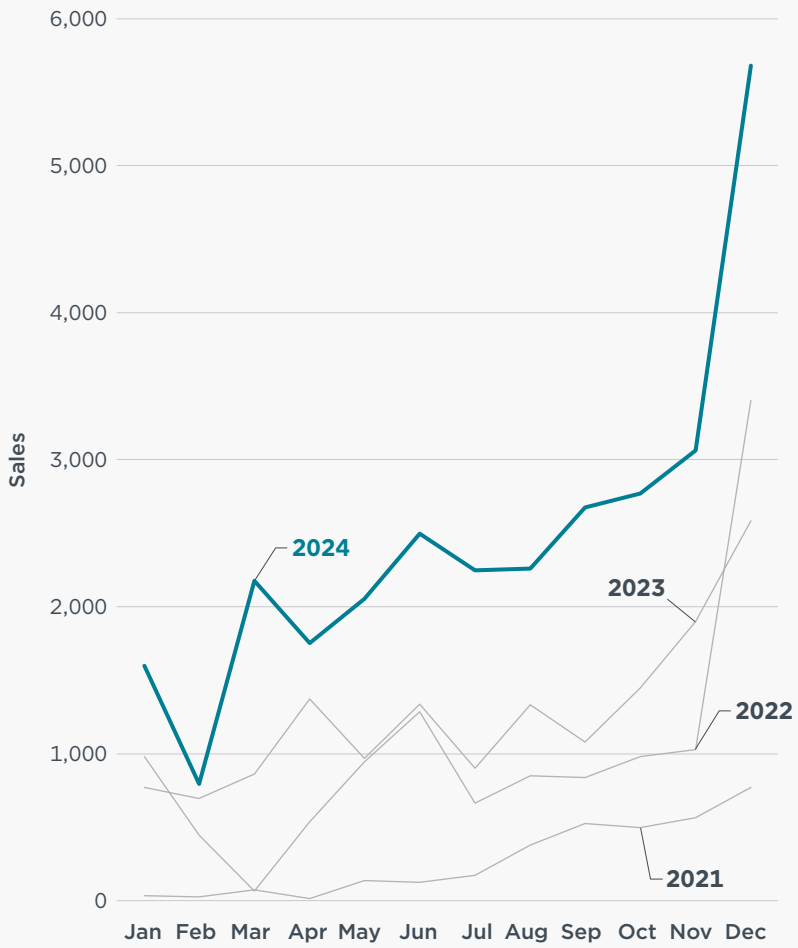
TECHNOLOGY FOCUS: BATTERY SWAPPING

The use of battery swapping technology, whereby a depleted electric vehicle battery can be switched out for a fully charged replacement, has gained in popularity in China in recent years, particularly for trucks and tractors. Fleet operators can save on the upfront investment in battery electric vehicles by purchasing vehicles without batteries installed and renting batteries from third-party lessors. Operators can also maximize running time if there is battery swapping infrastructure deployed close to their yard.

In 2024, sales of swap-capable vehicles reached a total of 29,569, a 94% growth from 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 and pilot projects have been launched to assess use cases in several industries, including mining, steel, and port logistics.[2]

FIGURE 4.1

Sales of swap-capable vehicles in China from 2021 to 2024



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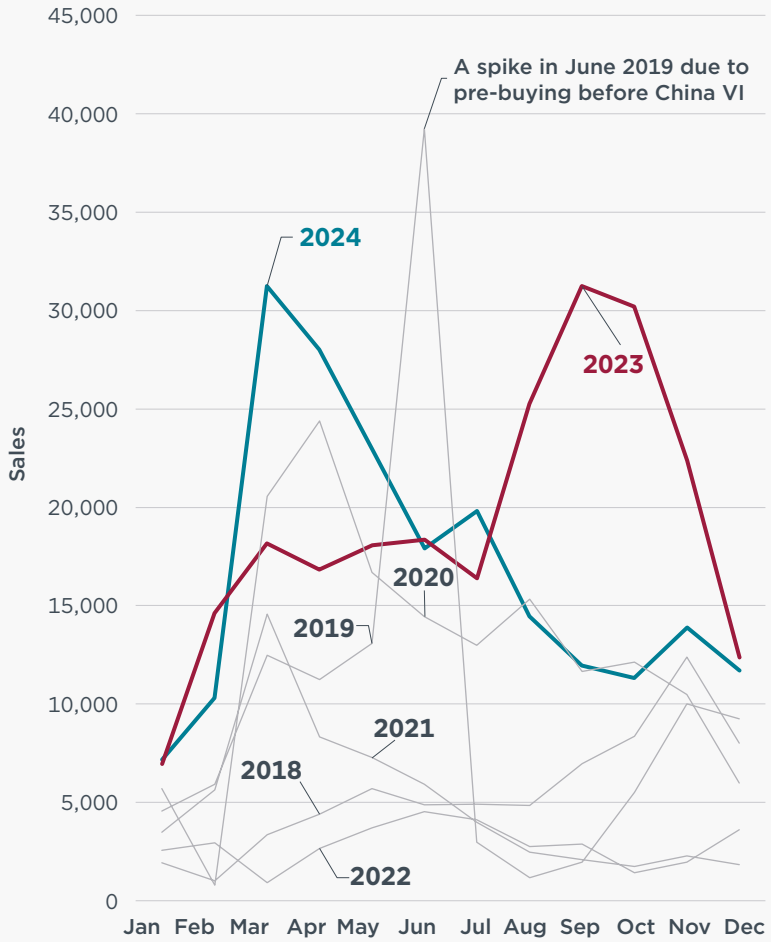
TECHNOLOGY FOCUS: NATURAL GAS

The boom of natural gas-powered trucks is an emerging phenomenon in China, particularly since 2023. The reasons are twofold: first, China had lifted all transport restrictions implemented during the COVID-19 pandemic by the end of 2022, injecting new momentum to new sales of trucks; second, natural gas imports have surged since 2022, making natural gas-powered trucks cheaper from the perspective of total cost of ownership. Two peaks in sales were observed in September of 2023 and March of 2024, likely due to decreases in the price of natural gas relative to diesel.

However, the popularity of natural gas-powered trucks raises concerns regarding pollutant emissions. Trucks powered by natural gas tend to have high nitrogen oxide and greenhouse gas emissions from combustion and methane leakage. Natural gas trucks have also been found to only provide marginal improvements compared with diesel trucks in terms of greenhouse gas and pollutant emissions.[3]

FIGURE 5.1

Sales of natural gas-powered trucks in China by month from 2018 to 2024



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TERMINOLOGY AND DATA SOURCES

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 truck** is a truck with a gross vehicle weight above 12 tonnes.

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

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, (https://auto.gasgoo.com/), an auto data aggregator in China.

NOTES

1 Ministry of Transport and Ministry of Finance, "交通运输部 财政部关于印发《新能源城市公交车及动力电池更新补贴实施细则》的通知 [Notice of the Ministry of Transport and the Ministry of Finance on the Issuance of the 'Implementation Rules for Subsidies for Renewal of New Energy Urban Buses and Power Batteries']" (2024), https://www.gov.cn/zhengce/zhengceku/202408/content_6968573.htm.

2 Shiyue Mao, Liuhanzi Yang, and Felipe Rodríguez, *The Ultra-Low Emission Campaign on Heavy Industries in China* (International Council on Clean Transportation, 2024), https://theicct.org/publication/the-ultra-low-emission-campaign-on-heavy-industries-in-china-dec24/.

3 Gonca Seber Olcay, "How Upstream Methane Leakage Further Weakens the Argument for Natural Gas Trucks," *International Council on Clean Transportation* (blog), January 21, 2025, https://theicct.org/how-upstream-methane-leakage-further-weakens-the-argument-for-natural-gas-trucks-jan25/; Moritz Mottschall, Peter Kasten, and Felipe Rodriguez, *Decarbonization of On-Road Freight Transport and the Role of LNG from a German Perspective* (International Council on Clean Transportation, 2020), https://theicct.org/publication/decarbonization-of-on-road-freight-transport-and-the-role-of-lng-from-a-german-perspective/.

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