icct
THE INTERNATIONAL COUNCIL ON CLEAN TRANSPORTATION

Zero-emission medium- and heavy-duty vehicle market in China, H1 2025

Shiyue Mao, Zihuan Qu, and Felipe Rodriguez

OVERVIEW

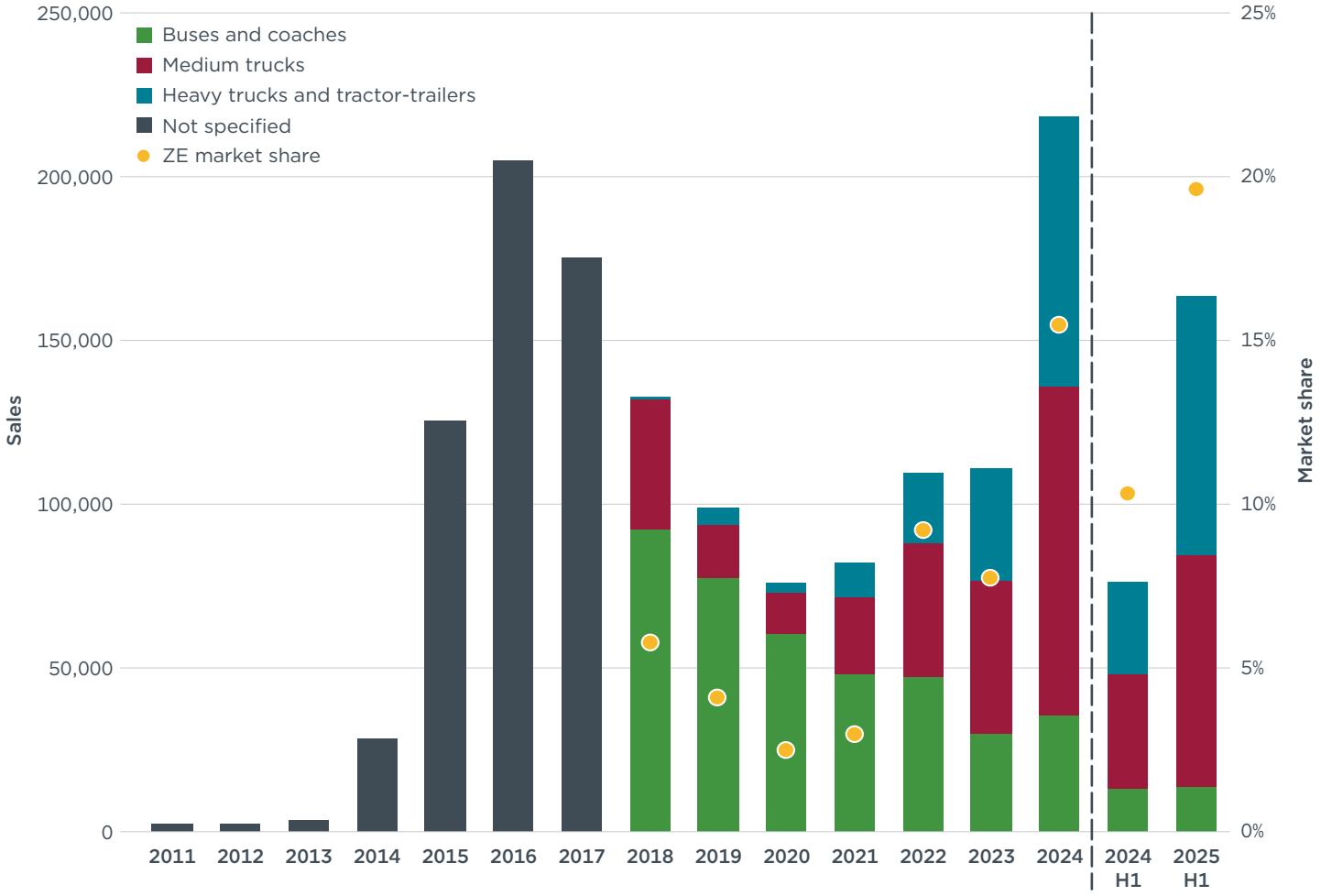
This spotlight on China's zero-emission medium- and heavy-duty vehicle (ZE-MHDV) market covers battery electric and fuel-cell electric city buses and coaches, medium and heavy trucks, and tractor-trailers above 3.5 tonnes.

Sales of ZE-MHDVs in China saw two spikes in the last decade: first in 2015–2016, underpinned by government subsidies, and then in 2024, when they reached a new peak of more than 230,000 units. In the first half of 2025 (H1 2025), the market grew by 115% year-over-year, as sales of medium trucks doubled and sales of heavy trucks and tractor-trailers nearly tripled from the same period in 2024. If this growth rate continues, total sales in 2025 will hit a new all-time high.

In H1 2025, ZE trucks and tractor-trailers accounted for 91% of the ZE-MHDV market, showing that electrification of commercial vehicles is now overwhelmingly driven by freight, whereas buses no longer contribute the large volumes of sales they once did due to market saturation.

Figure 1

Sales of ZE-MHDVs in China, 2011–H1 2025



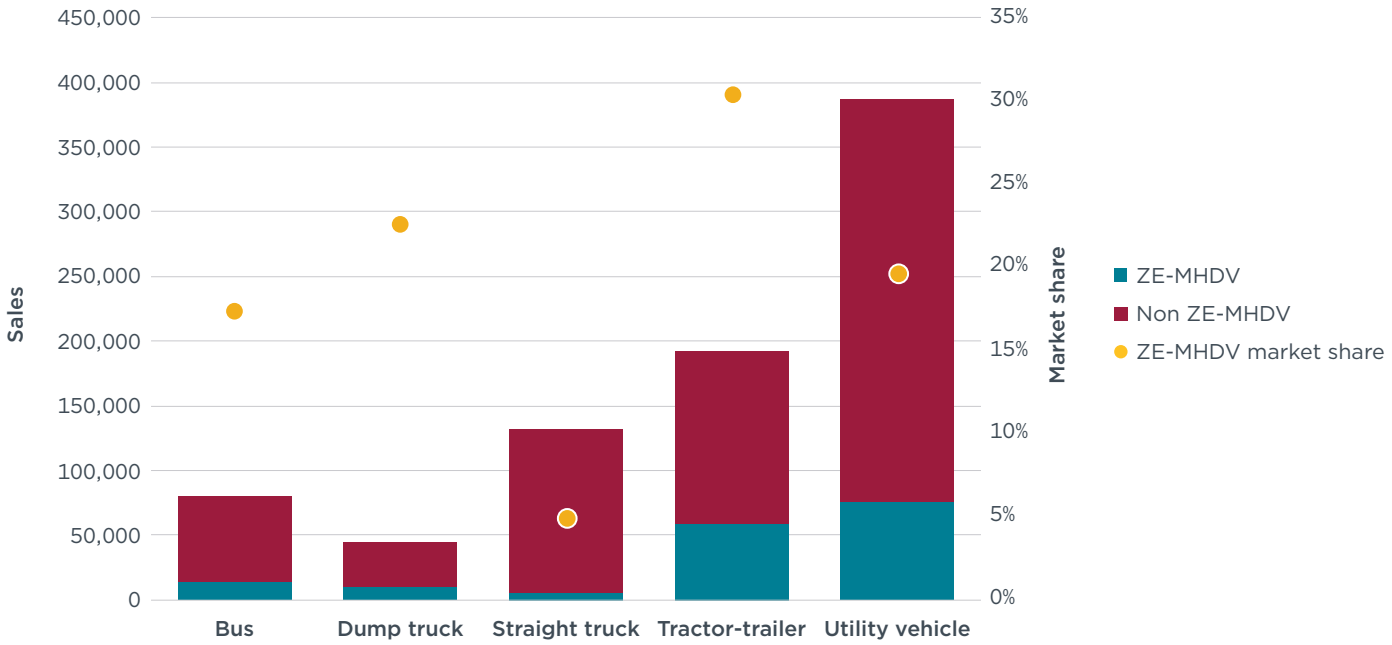
THE INTERNATIONAL COUNCIL ON CLEAN TRANSPORTATION **THEICCT.ORG**

ZE-MHDV market shares in H1 2025 varied by segment. Tractor-trailers led with nearly a 30% zero-emission vehicle (ZEV) sales share in H1 2025. The quick adoption of ZEVs in this segment—the heaviest category, once believed to be the most difficult to electrify—shows the impact of demand-side policies in strengthening the total cost of ownership case for electric trucks.[1] Tractor-trailers were followed in ZEV sales share by dump trucks (23% of sales) and utility vehicles (20%). Straight trucks had the lowest share, at slightly over 5%.

In terms of range, H1 2025 saw the release of several new models equipped for long-haul (over 800 km) operations relative to H1 2024. Utility vehicles and buses make up the majority of these longer-range vehicles.

Figure 2

Sales and market shares of MHDVs in China, H1 2025



THE INTERNATIONAL COUNCIL ON CLEAN TRANSPORTATION **THEICCT.ORG**

Figure 3

Ranges and battery capacity (bin = 50 kWh) of ZE-MHDV in China, H1 2024 and H1 2025

THE INTERNATIONAL COUNCIL ON CLEAN TRANSPORTATION **THEICCT.ORG**

OVERALL MARKET DEVELOPMENTS

Utility vehicles, which serve specific functions such as sanitation and logistics delivery, remained the largest MHDV vehicle category by sales in H1 2025. Sales of these vehicles rose from roughly 1.0 million in 2018 to close to 1.3 million in 2020, then declined to about 700,000 in 2024. Tractor-trailer sales peaked at around 700,000 in 2020 and then gradually fell to about 300,000 in 2024. Sales of city buses and coaches steadily decreased during the period, from roughly 160,000 in 2018 to around 90,000 in 2024. Sales across all categories dropped sharply in 2022 due to COVID-19-related impacts and transport restrictions.

The sales mix in H1 2025 closely resembled that of the same period the year prior. Utility vehicles continued to account for almost half (46%) of all MHDV sales. City buses and coaches saw the greatest relative change in market share, with a year-over-year decline of nearly 3.5 percentage points, followed by straight trucks and tractor-trailers, each with a 1 percentage point increase.

Figure 4

Sales mix of MHDV by vehicle category, 2018–H1 2025

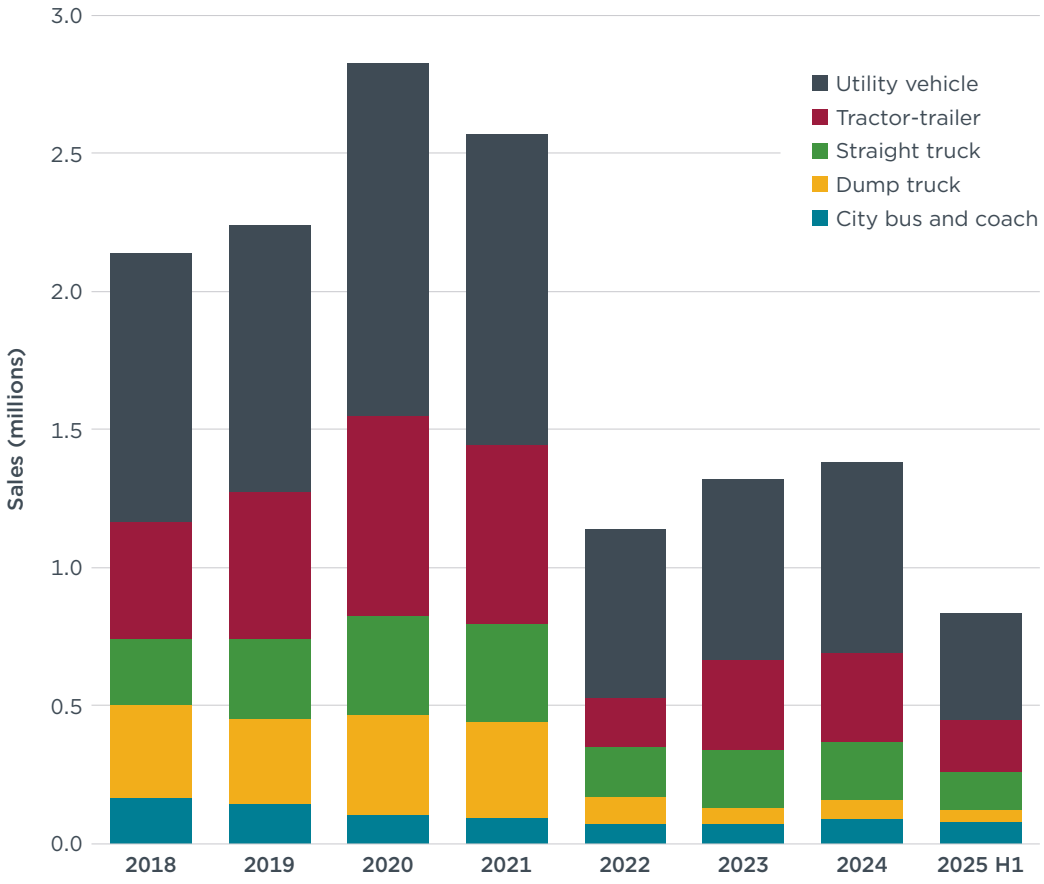
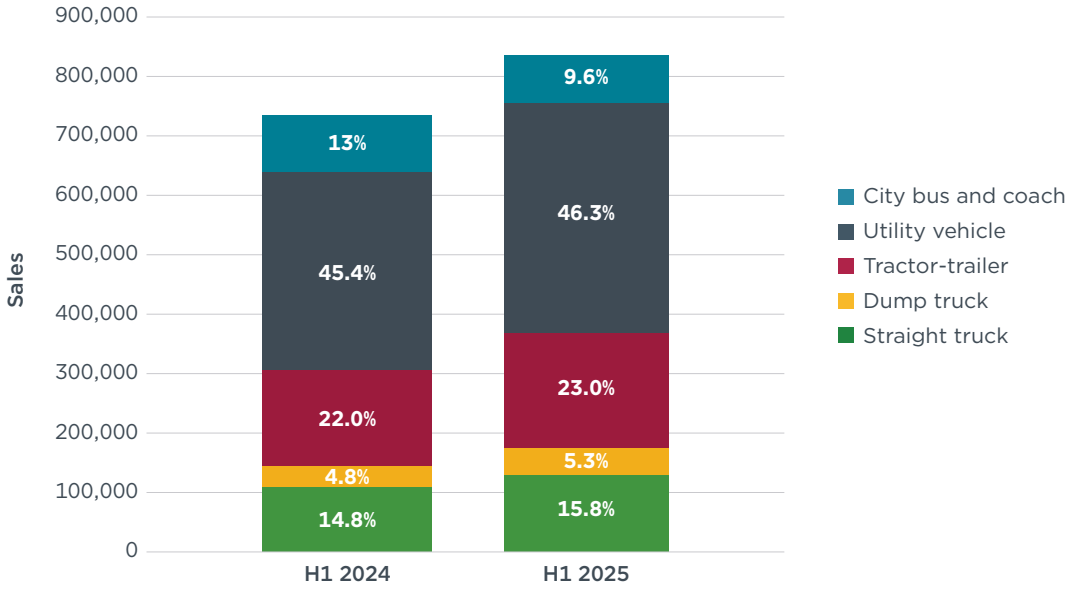


Figure 5

Sales mix of MHDVs by vehicle category, H1 2024 and H1 2025



THE INTERNATIONAL COUNCIL ON CLEAN TRANSPORTATION **THEICCT.ORG**

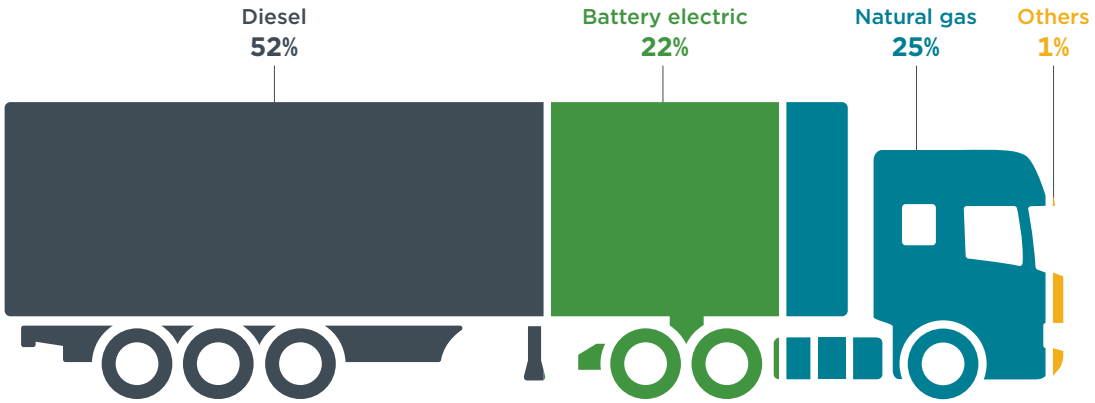
HEAVY TRUCKS AND TRACTOR-TRAILERS

The heavy truck and tractor-trailer market saw changes in the mix of fuel types from previous years. In H1 2025, diesel trucks accounted for 52% of sales, down from 57% in 2024, and natural gas-powered trucks made up 25% of sales. Battery electric trucks reached a 22% sales share and were the third most popular powertrain in the market.

Within the heavy truck and tractor-trailer market, dump trucks have experienced a notable surge in ZEV sales share since 2021, culminating at 32% in H1 2025. Tractor-trailers followed a comparable upward trajectory, reaching a peak of 30% in H1 2025. Utility vehicles showed a steadier, more gradual increase, achieving 9.0% sales share by H1 2025.

Figure 6

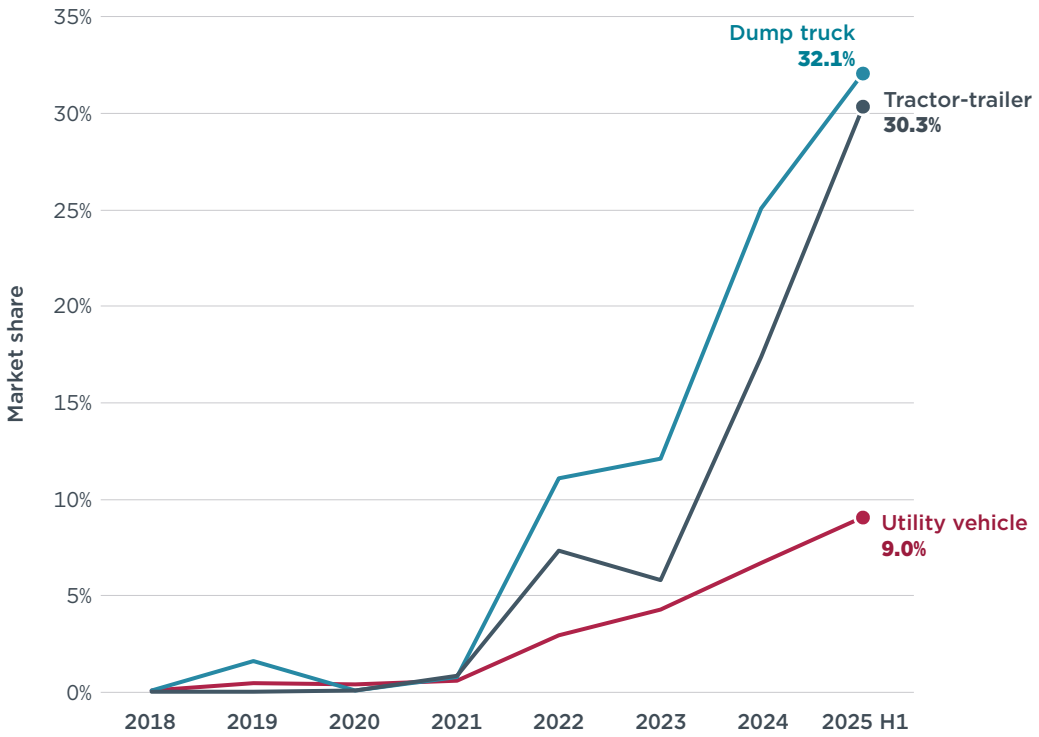
Market shares of heavy trucks and tractor-trailers by powertrain, H1 2025



THE INTERNATIONAL COUNCIL ON CLEAN TRANSPORTATION **THEICCT.ORG**

Figure 7

ZEV sales shares in the top three heavy truck and tractor-trailer categories as of H1 2025



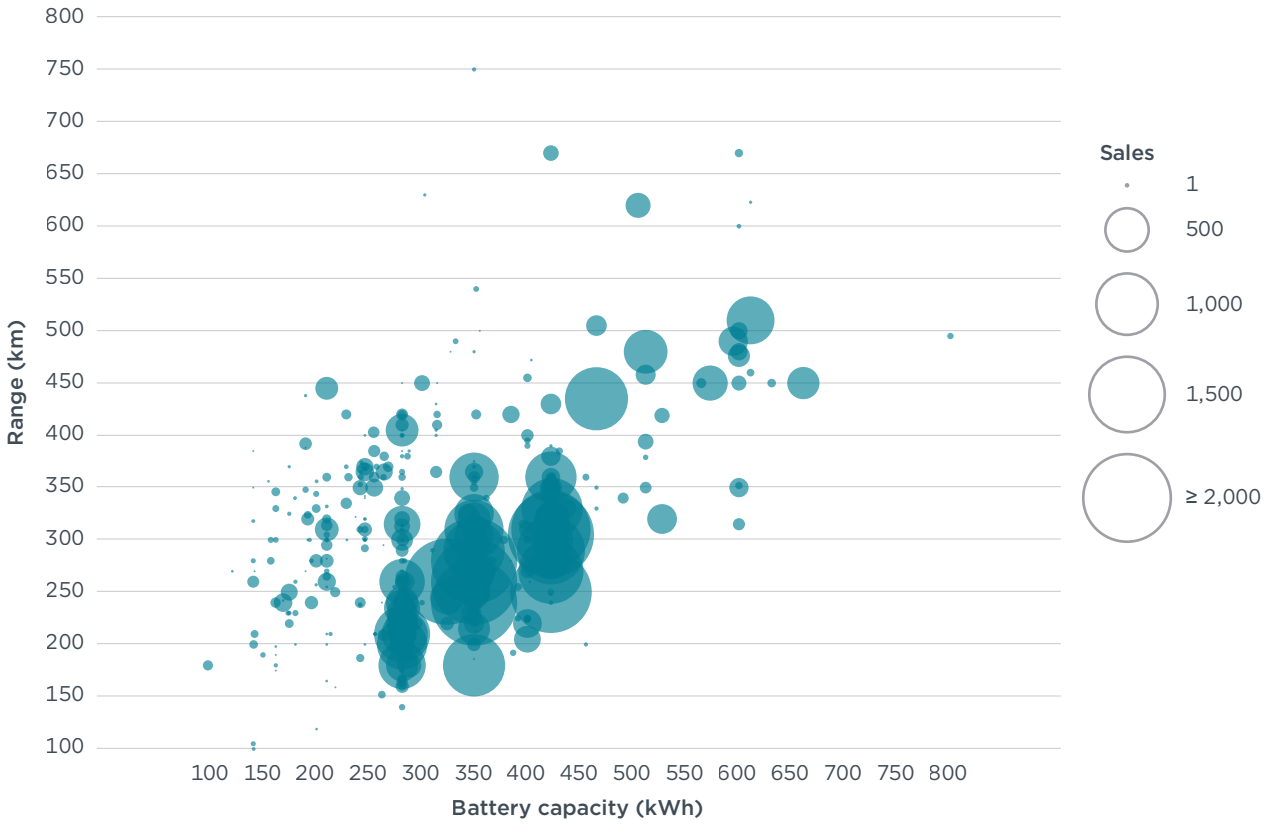
THE INTERNATIONAL COUNCIL ON CLEAN TRANSPORTATION **THEICCT.ORG**

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 five original equipment manufacturers (OEMs), known as the five-firm concentration ratio or CR5, is an indicator of market maturity. In H1 2025, the CR5 among internal combustion engine (ICE) heavy truck manufacturers (FAW, Dongfeng Motor, Foton-Daimler, Sinotruk, and Shacman) was 80%, an increase of 5% from 2024; the ratio among ZE manufacturers (FAW, XCMG, Sinotruk, Shacman, and Hunan Truck) was 66%, up 12% from 2024. This suggests that the ZE heavy truck industry is catching up to the level of market maturity among ICE vehicle manufacturers, with top OEMs dominating a growing share of the market.

Figure 8

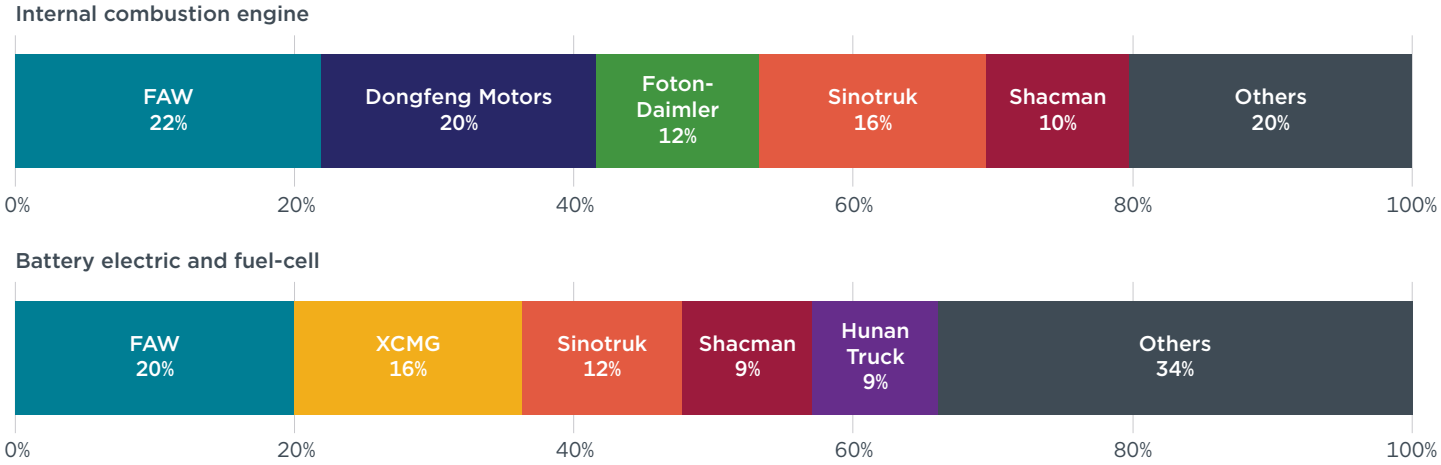
Battery capacity and range of heavy trucks in China, H1 2025



THE INTERNATIONAL COUNCIL ON CLEAN TRANSPORTATION **THEICCT.ORG**

Figure 9

CR5 of the ICE and ZE heavy truck markets in China, H1 2025



THE INTERNATIONAL COUNCIL ON CLEAN TRANSPORTATION **THEICCT.ORG**

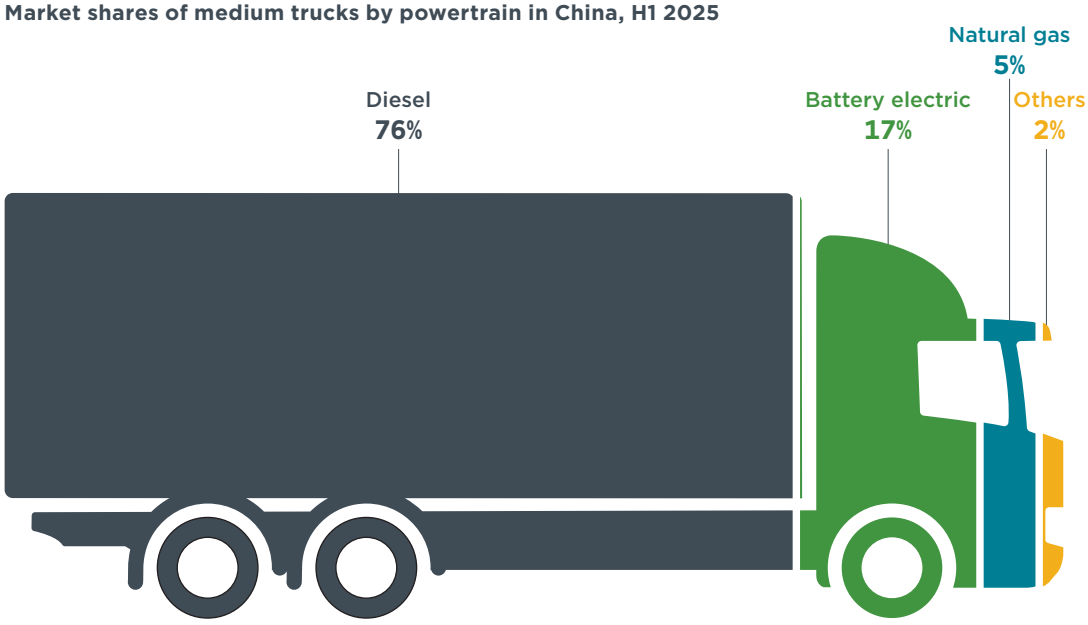
MEDIUM TRUCKS

Diesel remained the dominant powertrain in the medium truck market in H1 2025, accounting for 76% of total sales, down 5% from 2024. Battery electric reached a 17% market share, representing an increase of 3% compared with 2024 and making it the second most popular powertrain in the segment.

Within the medium truck market, utility vehicles—most of which are delivery trucks—have seen a surge in ZEV sales share since 2020, climbing to 25% by H1 2025. Straight trucks have experienced a more moderate increase, reaching a 5% market share. Medium-sized dump trucks rose to 3%, kicking off the application of zero-emission vehicles in a niche market.

Figure 10

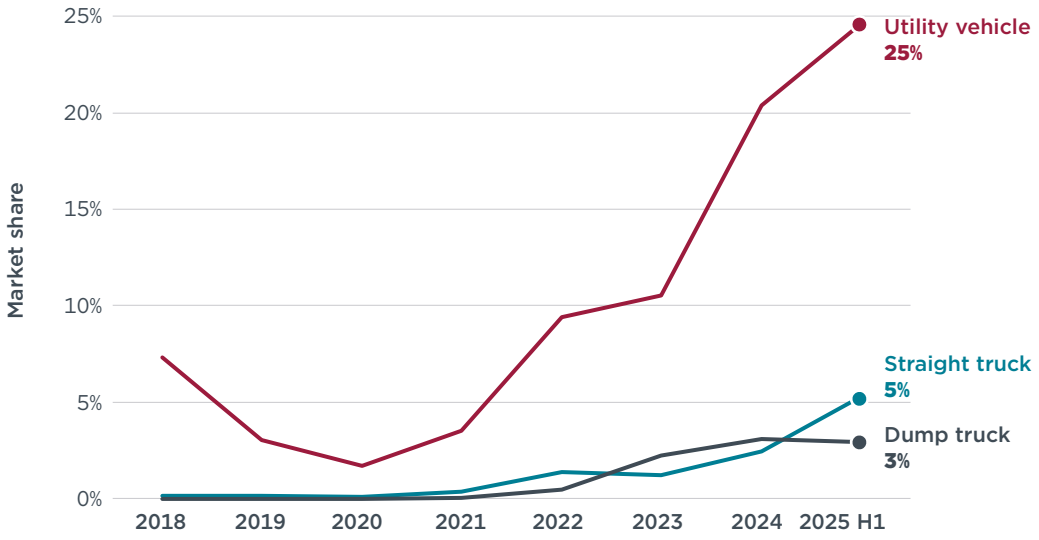
Market shares of medium trucks by powertrain in China, H1 2025



THE INTERNATIONAL COUNCIL ON CLEAN TRANSPORTATION **THEICCT.ORG**

Figure 11

ZEV sales shares in the top three medium truck categories as of H1 2025



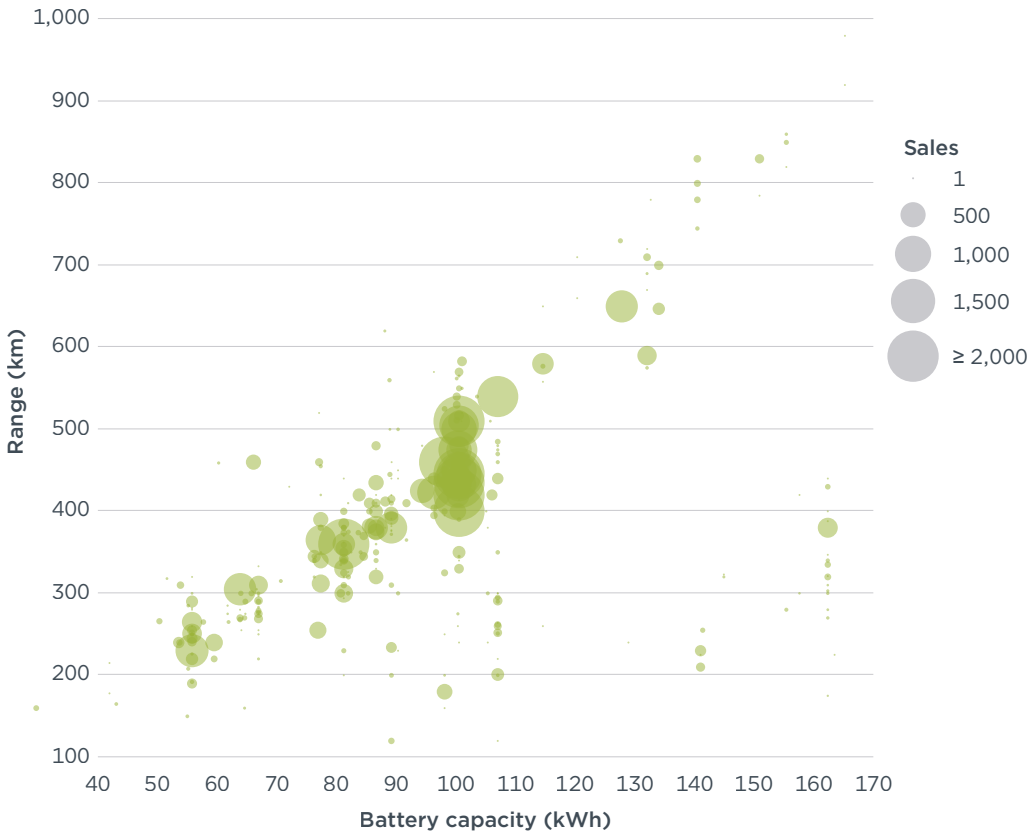
THE INTERNATIONAL COUNCIL ON CLEAN TRANSPORTATION **THEICCT.ORG**

Most electric medium truck models were equipped with around 100 kWh batteries to balance cost and available range.

In H1 2025, the CR5 of ICE OEMs in the medium truck market (Foton-Daimler, Sinotruk, JAC, JMC, and FAW) was 64%, while the CR5 of ZE truck OEMs (Geely, Foton-Daimler, JAC, SAIC, and Shacman) was 56%. As in the heavy truck segment, the narrow gap in CR5 between the ICE and ZE medium truck markets implies that the zero-emission market is catching up to its ICE counterpart in terms of market maturity.

Figure 12

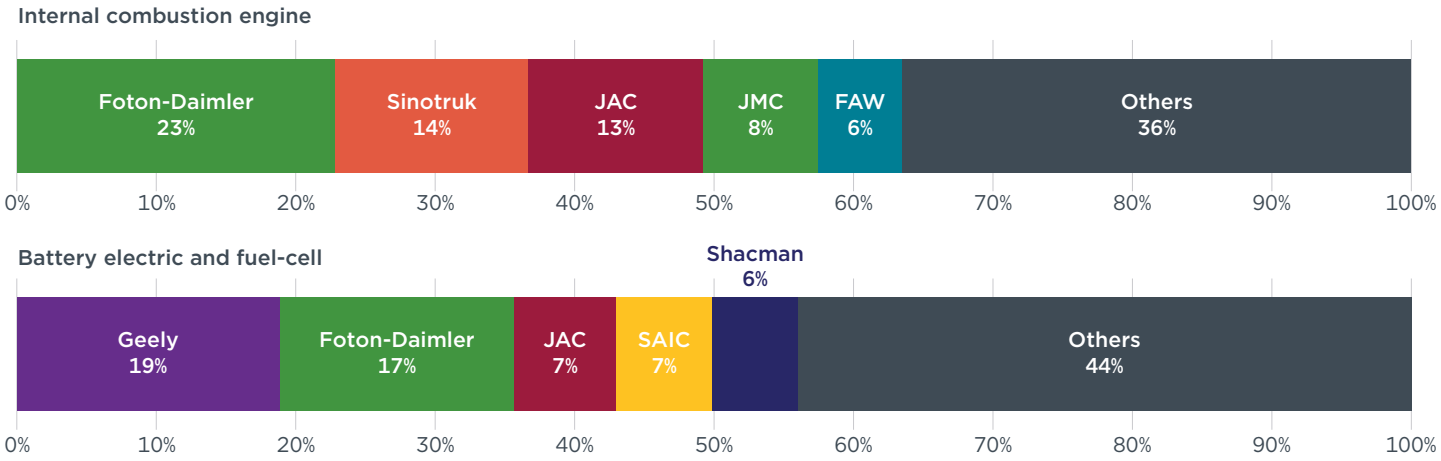
Battery capacity and range of medium trucks in China, H1 2025



THE INTERNATIONAL COUNCIL ON CLEAN TRANSPORTATION **THEICCT.ORG**

Figure 13

CR5 of the ICE and ZE medium truck markets in China, H1 2025



THE INTERNATIONAL COUNCIL ON CLEAN TRANSPORTATION **THEICCT.ORG**

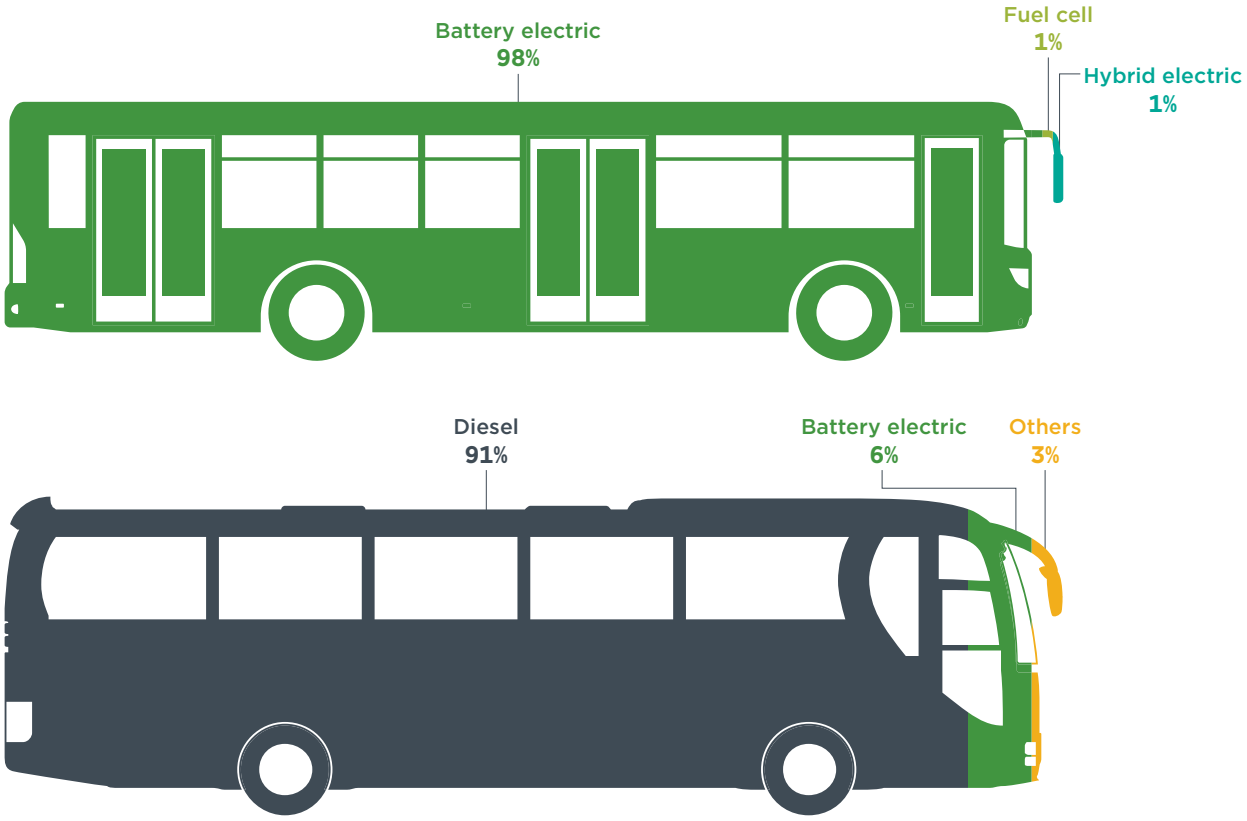
CITY BUSES AND COACHES

City buses have the highest electrification rate of all vehicle categories in China. As of H1 2025, the battery electric market share was around 98%, followed by hybrid electric (1%) and fuel-cell electric (~1%) powertrains, resulting in an electrification rate of close to 100%. Electrification among coaches, which are used for intercity transport, has been far more limited: the market share of battery electric coaches was 6% in H1 2025, a 3% decrease from 2024, and most coaches were still powered by diesel.

Sales diverged widely by bus length. Buses of 7 m or less were the most popular type, with total sales of about 57,000, of which 3,200 (5.6%) were zero-emission. Among buses over 7 m, about 45% of sales were zero-emission.

Figure 14

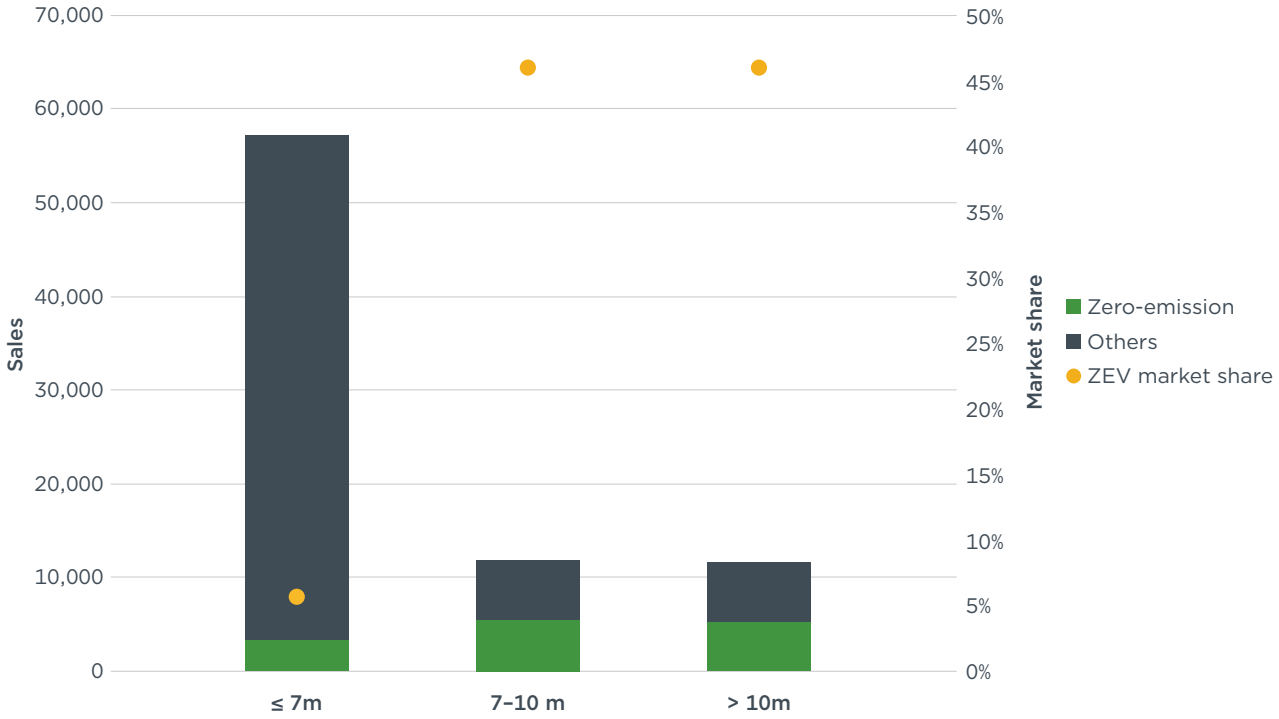
Market shares of zero-emission city buses and coaches by powertrain, H1 2025



THE INTERNATIONAL COUNCIL ON CLEAN TRANSPORTATION **THEICCT.ORG**

Figure 15

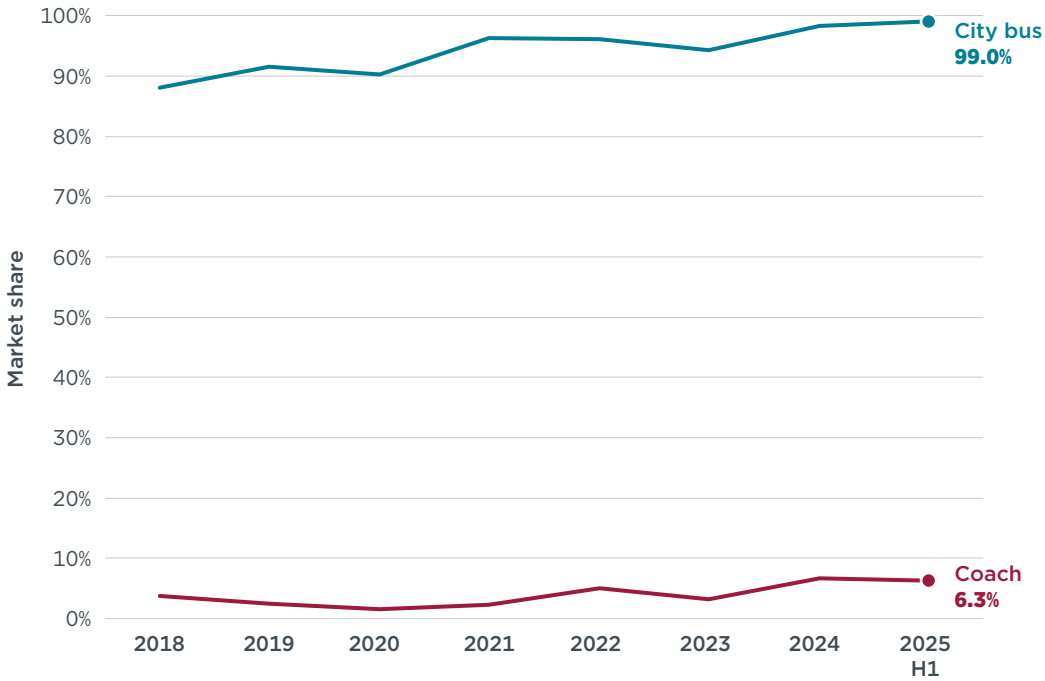
Sales and ZEV market share by bus length, H1 2025



THE INTERNATIONAL COUNCIL ON CLEAN TRANSPORTATION **THEICCT.ORG**

Figure 16

ZEV market share of city buses and coaches, 2018–H1 2025



THE INTERNATIONAL COUNCIL ON CLEAN TRANSPORTATION **THEICCT.ORG**

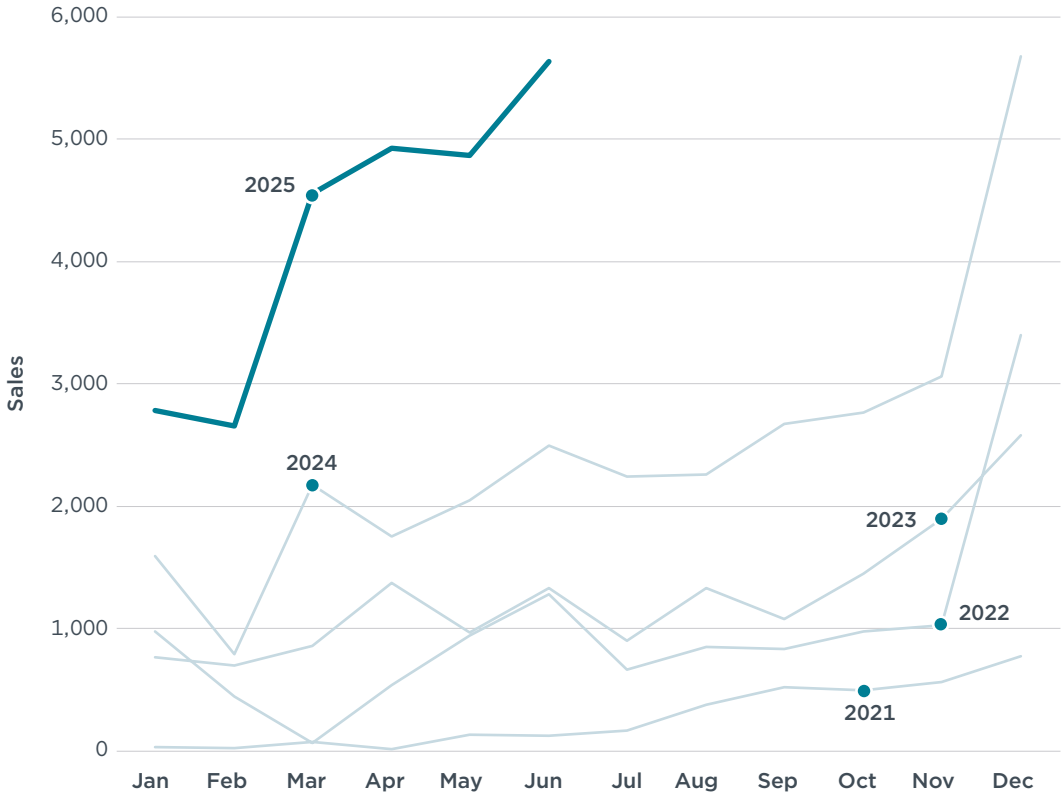
TECHNOLOGY FOCUS: BATTERY SWAPPING

Battery swapping is an emerging technology whereby a depleted electric vehicle battery can be switched out for a fully charged replacement. This allows fleet operators to save on the upfront investment by purchasing vehicles without batteries installed and renting batteries from third-party lessors. Swap-capable technology has grown in popularity in China in recent years, particularly for trucks and tractors.

In H1 2025, sales of swap-capable vehicles grew to over 25,400, representing an increase of 134% from H1 2024. Notably, the market share of swap-capable heavy trucks (over 16 tonnes) increased considerably from 2021 to 2023 and has since hovered around 30%. The success of several pilot projects in recent years has underpinned the growing adoption of swap-capable vehicles in China.[2]

Figure 17

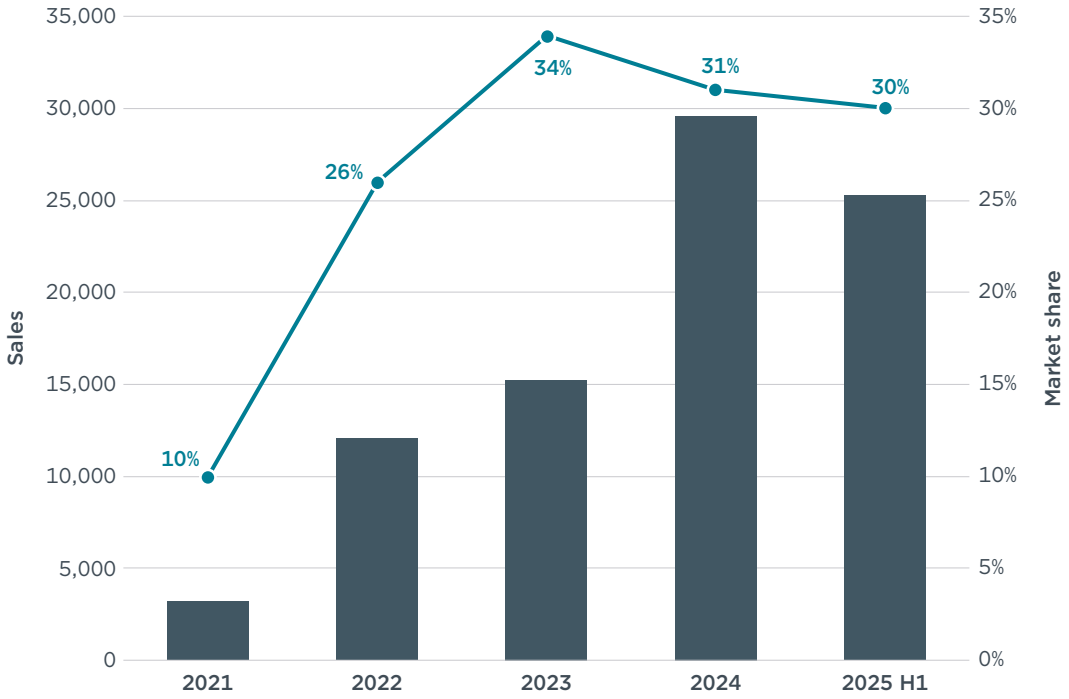
Sales of swap-capable vehicles in China, 2021–H1 2025



THE INTERNATIONAL COUNCIL ON CLEAN TRANSPORTATION **THEICCT.ORG**

Figure 18

Sales and market share of swap-capable heavy trucks, 2021 through H1 2025



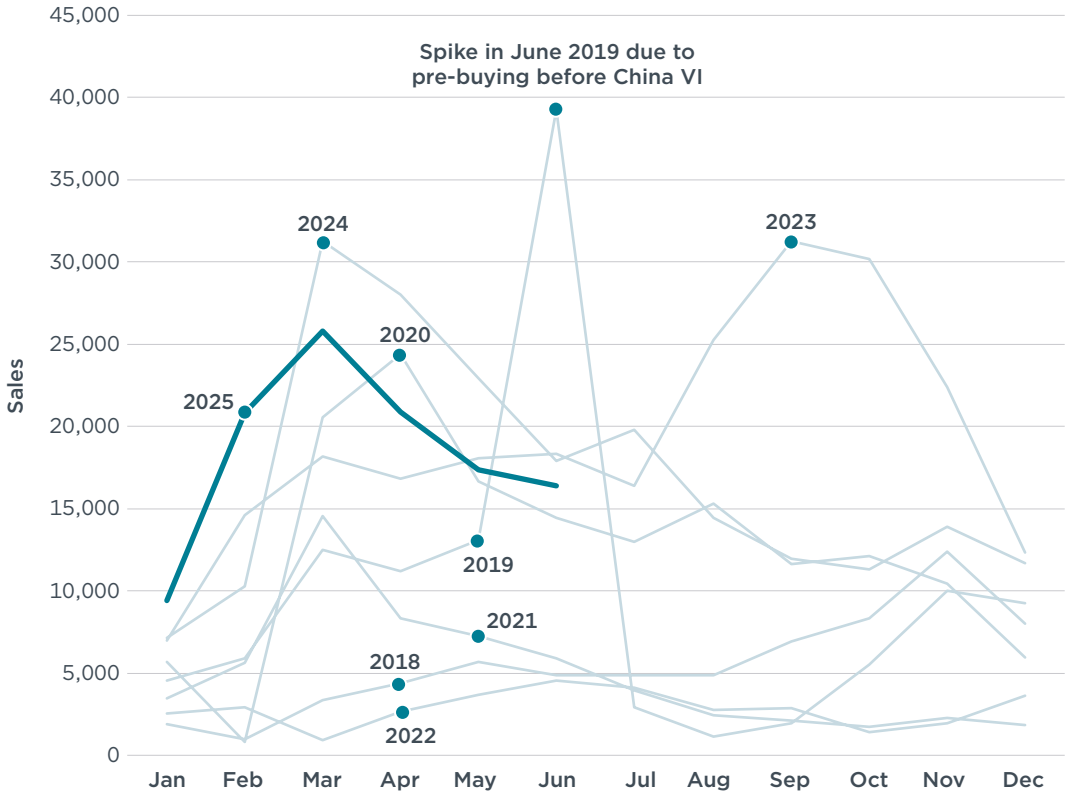
THE INTERNATIONAL COUNCIL ON CLEAN TRANSPORTATION **THEICCT.ORG**

TECHNOLOGY FOCUS: NATURAL GAS

Sales of natural gas-powered trucks have surged in China, particularly since 2023. The reasons are multifold. First, China lifted all COVID-related transport restrictions by the end of 2022, injecting new momentum into the truck market. Second, dynamics in the natural gas market have made natural gas-powered trucks cheaper on a total cost of ownership basis. Sales peaked in September 2023 and again in March 2024 due to drops in the price of natural gas relative to diesel. In H1 2025, a total of 110,700 natural gas trucks were sold—down 6% from H1 2024 but more than pre-2023 levels.

Figure 19

Sales of natural gas-powered trucks in China by month, 2018 through H1 2025



THE INTERNATIONAL COUNCIL ON CLEAN TRANSPORTATION **THEICCT.ORG**

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-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-duty vehicle** 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.

A **minibus** is a passenger vehicle with a gross vehicle weight between 3.5 and 4.5 tonnes that is used in urban environments.

A **microbus** is a passenger vehicle with a gross vehicle weight lower than 3.5 tonnes that is used in urban environments.

A **utility vehicle** is a commercial vehicle with gross vehicle weight above 3.5 tonnes that is used for specific functions such as sanitation and logistics delivery.

All data were provided by Gasgoo Auto.

ENDNOTES

1 Shiyue Mao et al., *Real-World Use Cases for Zero-Emission Trucks: A Comparison of Electric and Diesel Tractors in Tangshan, China* (International Council on Clean Transportation, 2023), https://theicct.org/publication/real-world-zero-emission-trucks-tangshan-sept23/; Tianlin Niu and Geyi Zhu, *Real-World Use Cases for Zero-Emission Trucks: Coal Freight Trucks in Yulin City, Shaanxi Province* (International Council on Clean Transportation, 2024), https://theicct.org/wp-content/uploads/2024/05/ID-144-%E2%80%93-Yulin-ZETs_final.pdf.

2 "利好政策密集发布, 2024年换电模式要腾飞" [Favorable Policies are Released Intensively, and the Battery Swap Model will Take Off in 2024], *Gasgoo Auto*, January 19, 2024, https://auto.gasgoo.com/news/202401/19I70379735C501.shtml; Shandong Provincial Department of Transportation, "山东省交通运输厅关于公布2025年度山东省交通运输绿色低碳高质量发展典型案例的通知" [Notice from the Shandong Provincial Department of Transportation on the Announcement of Typical Cases of Green, Low-Carbon and High-Quality Development of Transportation in Shandong Province in 2025], May 15, 2025, https://jtt.shandong.gov.cn/art/2025/5/15/art_16285_10324288.html.

www.theicct.org

communications@theicct.org

@theicct.org

icct
THE INTERNATIONAL COUNCIL
ON CLEAN TRANSPORTATION

BEIJING | BERLIN | NEW DELHI | SAN FRANCISCO | SÃO PAULO | WASHINGTON DC