The information and statistics set out in this section and other sections of this document were extracted from the report prepared by Frost & Sullivan, which was commissioned by us, and from various official government publications and other publicly available publications. We engaged Frost & Sullivan to prepare the F&S Report, an independent industry report, in connection with the **[REDACTED]**. *We believe that these sources are appropriate sources for such information and statistics and reasonable care has been exercised by us in selecting and identifying the named information sources, compiling, extracting and reproducing the information, and ensuring no material omission of the information. The information from official government sources has not been independently verified by us, the Sole Sponsor, the* **[REDACTED]**, *the* **[REDACTED]**, *the* **[REDACTED]**, *the* **[REDACTED]**, *the* **[REDACTED]**, *the* **[REDACTED]**, *the* **[REDACTED]** *or any of our or their respective directors, senior management, representatives or any other person involved in the* **[REDACTED]** *and no representation is given as to its accuracy.*

SOURCE OF INFORMATION

We engaged Frost & Sullivan, an independent market research consultant, to conduct an analysis of, and to prepare the F&S Report about, LEV battery-swapping market. Frost & Sullivan is an independent global consulting firm founded in 1961 in New York and its services include, among others, industry consulting, market strategic consulting and corporate training. In connection with the market research services provided, we have paid a fee of RMB 650,000 to Frost & Sullivan, which we believe to be consistent with market rates.

In compiling and preparing the F&S Report, Frost & Sullivan conducted (1) primary research includes interviewing industry participants, competitors, downstream customers and recognized third-party industry associations; and (2) secondary research includes reviewing corporate annual reports, databases of relevant official authorities, as well as the exclusive database established by Frost & Sullivan over the past decades. The market projections in the F&S Report are based on the following key assumptions during the forecast period: (i) the social, economic and political conditions in Chinese markets discussed will remain stable during the forecast period, (ii) government policies on China and SEA LEV battery-swapping market will remain consistent during the forecast period, and (iii) LEV battery-swapping market will be driven by the factors which are stated in the F&S Report.

All the data and forecasts contained in this section are derived from the F&S Report. The commissioned report has been prepared by Frost & Sullivan independently without the influence from the Company or other interested parties. Our Directors confirm that, to the best of their knowledge, after making reasonable inquiries, there is no material and adverse change in the market information since the date of the F&S Report, which may qualify, contradict or have an impact on the information in this section.

MACRO BACKGROUND FOR THE DEVELOPMENT OF THE GLOBAL BATTERY SWAPPING INDUSTRY

Driven by the dual-carbon economy, the platform economy and the sharing economy, the macro environment for the development of the global battery-swapping industry continues to improve. The dual-carbon economy is accelerating the electrification of transportation and the transition toward cleaner and more efficient energy use, creating a favorable policy and market

foundation for the adoption of Light Electric Vehicles ("**LEVs**") and related energy replenishment infrastructure. At the same time, the platform economy, supported by digital technologies such as IoT, data analytics and intelligent dispatch systems, is improving the efficiency of resource matching and operational management across mobility scenarios. In addition, the sharing economy is reshaping user behavior from ownership-based consumption toward access-based and on-demand services, supporting broader acceptance of asset-sharing models and high-frequency usage scenarios.

Against this backdrop, LEV battery-swapping has formed strong synergies with these three macro trends. Benefiting from the dual-carbon economy, battery-swapping supports green mobility by improving battery utilization efficiency, reducing charging-related safety risks and enabling the large-scale deployment of electric two-wheelers and other LEVs. Benefiting from the platform economy, battery-swapping operators are able to leverage digital platforms to optimize station deployment, battery scheduling, user management and operational efficiency. Benefiting from the sharing economy, the battery-swapping model lowers users' upfront costs, reduces barriers to adoption and enables the centralized management and circulation of battery assets. Together, these trends are driving LEV battery-swapping from a single energy replenishment solution toward a more integrated infrastructure and service model.

ANALYSIS OF CHINA'S LEV ENERGY REPLENISHMENT MARKET

Overview of China's LEV Energy Replenishment Market

Driven by the dual-carbon economy, the platform economy and the sharing economy, the electrification of short-distance transportation in China has continued to advance, and the energy replenishment system has accelerated its upgrade toward greater efficiency, safety and compliance. As of 2025, the ownership of electric two-wheeled vehicles in China had exceeded 400.0 million units, covering diversified scenarios such as personal commuting, instant delivery, and a market landscape has been formed in which three mainstream energy replenishment methods – residential charging, public charging pile charging and battery-swapping – are developing in parallel. In 2025, the overall market size of China's LEV energy replenishment market exceeded RMB100.0 billion, providing broad development space for various energy replenishment models.

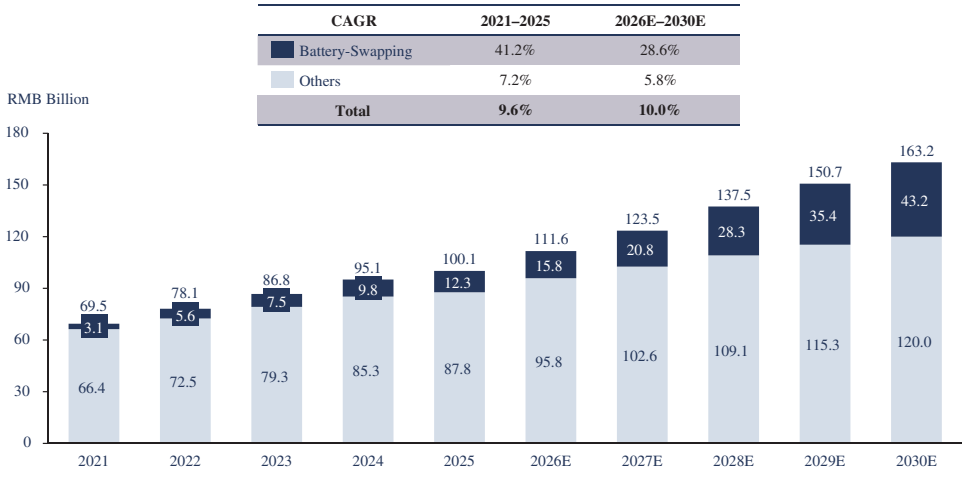
From the perspective of market structure, residential charging has the largest existing base, with expenditure reaching RMB45.5 billion in 2025. However, illegal practices such as "unauthorized external wiring charging " pose prominent safety hazards, making it difficult to form standardized and market-oriented operations. Public charging pile charging is a compliant energy replenishment method, with a market size of RMB42.3 billion in 2025, but it still faces certain limitations in terms of station supply, layout density, queuing time and energy replenishment duration. Its suitability for high-frequency and high-turnover scenarios remains relatively limited, making it difficult to meet the demand for high-frequency and high-efficiency energy replenishment. In 2025, the market size of battery-swapping reached RMB12.3 billion. By virtue of advantages such as rapid energy replenishment, centralized safety management and full-chain intelligent operation and maintenance, battery-swapping addresses the core needs of enterprise customers and individual customers, and has substantial substitution and penetration potential in a market of over RMB100.0 billion.

Comparison of the Three Major Energy Replenishment Models in China's LEV Energy Replenishment Market

	Battery-swapping	Residential Charging	Public Charging Piles
Time Required	Dozens of seconds	6–8 hours	6–8 hours
Safety	High	Low	Low
Level of Intelligence	Relies on the battery-swapping network to conduct intelligent battery health monitoring and proactive operation and maintenance, fully leveraging the advantages of intelligent battery management	No professional intelligent operation and maintenance system, and lead-acid batteries do not have the conditions for intelligent management	
Energy Replenishment Scenario	Battery swapping can be carried out at battery-swapping stations	Restricted by residential scenarios, charging can only be completed at fixed locations, making it unable to satisfy high-frequency travel energy replenishment needs	Restricted by charging locations, with a very limited number of public charging piles, which may result in competition for charging, queuing and remote locations
Battery Performance	Standard lithium batteries, with a theoretical cycle life of over 2,000 cycles, and significantly leading in energy density and convenience	Mainly lead-acid batteries, with a theoretical cycle life of only around 300 cycles, and performance degrades rapidly	Mainly lead-acid batteries, with continuous battery degradation and a sharp decline in performance as the service period lengthens
2025 China's Market Size	RMB12.3 billion	RMB45.5 billion	RMB42.3 billion
Market Attributes	Compliant and market-oriented operations, incorporated into the urban infrastructure system, with room for scaled development	Mainly in the form of unauthorized external wiring charging which is illegal; although large in scale, it does not constitute a compliant market and poses significant safety risks	A compliant and market-oriented energy replenishment method, but public charging pile supply is insufficient, layout is uneven, and price advantages are not significant

Source: Frost & Sullivan

China's LEV Energy Replenishment Market Size, China, 2021–2030E



Source: Frost & Sullivan

Note: "Others" refers to the combined market size of residential charging market and public charging piles market.

Analysis of the Substitution Trend of Battery-swapping for Traditional Energy Replenishment Methods

- ***Instant delivery scenario: Improved energy replenishment efficiency and enhanced operating benefits are driving the accelerated substitution of battery-swapping.***

  - For high-frequency user groups such as food delivery riders and couriers, vehicle energy replenishment efficiency directly affects working hours, order-taking continuity and daily income levels. Residential charging and public charging pile charging usually require a relatively long energy replenishment time. Public charging pile charging may also be constrained by factors such as site distribution, queuing time

and travel distance, making it difficult to match the high-frequency, continuous and long-distance operating needs of the instant delivery scenario. By contrast, battery-swapping can complete energy replenishment within a short period of time, significantly reducing waiting time and downtime losses, and improving vehicle utilization and rider operating efficiency. At the same time, platform-based battery management and a standardized operation and maintenance system also help reduce hidden costs arising from battery maintenance, degradation management and abnormal service suspension.

- ***Residential use scenario: Multiple factors including policy, safety, time and cost are jointly driving the gradual substitution of battery-swapping.***

  - **Safety dimension:** In residential use scenarios, user self-charging is often affected by the charging environment, operating habits and equipment conditions, and therefore involves certain safety risks. Through centralized battery management, standardized equipment operation and a platform monitoring system, the battery-swapping model can, to a certain extent, reduce safety risks caused by non-compliant charging and better satisfy residential users' demand for safe and stable energy replenishment methods.

  - **Policy dimension:** As the regulation of high-risk behaviors such as unauthorized external wiring charging, indoor charging and corridor charging continues to strengthen across various regions, the usage boundaries of traditional residential charging are being continuously tightened, and some non-compliant charging methods have been explicitly prohibited and brought within the scope of penalties. By contrast, as a more standardized, regulated and centrally manageable energy replenishment method, battery-swapping is more aligned with the future direction of urban safety governance and community management, and therefore has stronger compliance adaptability.

  - **Time efficiency dimension:** Although residential users are generally less sensitive to the timeliness of energy replenishment than instant delivery users, time convenience still has practical value. Battery-swapping can reduce the time spent waiting for charging, carrying batteries and managing daily charging, making the energy replenishment process more time-saving and convenient, and helping improve residents' daily travel experience and ease of use.

  - **Cost dimension:** In residential use scenarios, the price of a common civilian-use battery is usually around RMB500 to RMB600. Based on a two-year usage cycle, the annual battery depreciation cost is approximately RMB250 to RMB300. After adding daily charging expenses, the annual comprehensive cost of residential charging is usually above RMB500. By contrast, the annual expenditure of residential battery-swapping users is usually around RMB600, which is already relatively close to the annual comprehensive cost of residential charging. Going forward, as battery-swapping companies continue to advance in-house battery R&D, large-scale procurement, network density enhancement and refined operations, battery-swapping costs will continue to decline and are expected to fall below the comprehensive cost of residential charging, thereby further enhancing its economic attractiveness in residential use scenarios.

ANALYSIS OF CHINA'S LEV BATTERY-SWAPPING MARKET

Definition and Value of LEV Battery-swapping

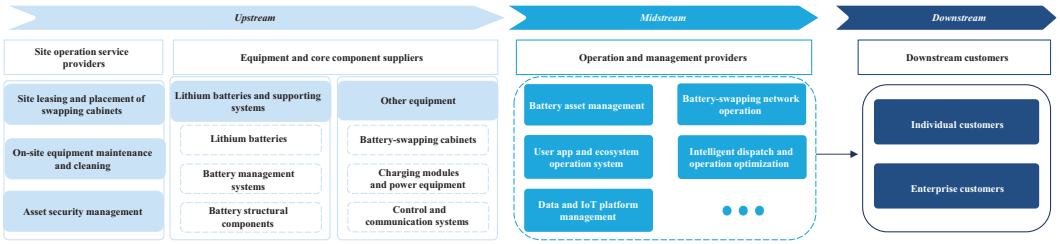
Definition: LEV battery-swapping is an energy replenishment model for LEV vehicles such as electric two-wheeled vehicles and electric three-wheeled vehicles, which provides battery sharing and rapid battery-swapping through infrastructure such as battery-swapping cabinets. Users do not need to be equipped with fixed batteries and can achieve continuous energy replenishment through shared batteries. LEV battery-swapping services cover enterprise customers (i.e., enterprises with rider resources such as delivery stations, food delivery platforms, and courier companies) and individual customers (including both B-end riders using the service directly, and C-end riders); in the future, they are also expected to expand into emerging fields such as unmanned delivery vehicle battery-swapping and drone battery-swapping.

Value: Compared with traditional charging models, it has significant advantages in efficiency, safety and economic efficiency, and is an important component of new urban energy infrastructure. It deeply serves the travel needs of enterprise customers and individual customers, and effectively supports the efficient operation of urban local life and instant delivery business formats; especially in high-density scenarios in large cities, through efficient energy replenishment and standardized safe operation, it significantly improves logistics and delivery efficiency and public travel safety, provides critical support for the low-carbon transformation of urban transportation, the intelligent development of logistics and the networking of energy services, and has prominent social value and industrial value.

Analysis of the LEV Battery-swapping Industry Chain

The LEV battery-swapping industry chain centers on the circular utilization of battery assets and the operation of battery-swapping services, covering upstream service, equipment and core component supply, midstream operation and management, and downstream applications, with all segments jointly forming a complete industry system. Among them, the upstream mainly includes site operation service providers as well as equipment and core component suppliers, which provide service, infrastructure and core components for the construction of battery-swapping networks. Site operation service providers are mostly small-scale entities including property owners, property management companies and other enterprises and institutions, among others. The midstream is the core of the industry chain and is led by battery-swapping operators, focusing on battery asset management and battery-swapping network operation, and achieving unified management and efficient coordination of batteries, equipment and users through user apps and ecosystem operation systems, intelligent dispatch and operation optimization, and data and IoT platform management. Downstream covers individual customers and enterprise customers.

Industry Chain of LEV Battery-swapping

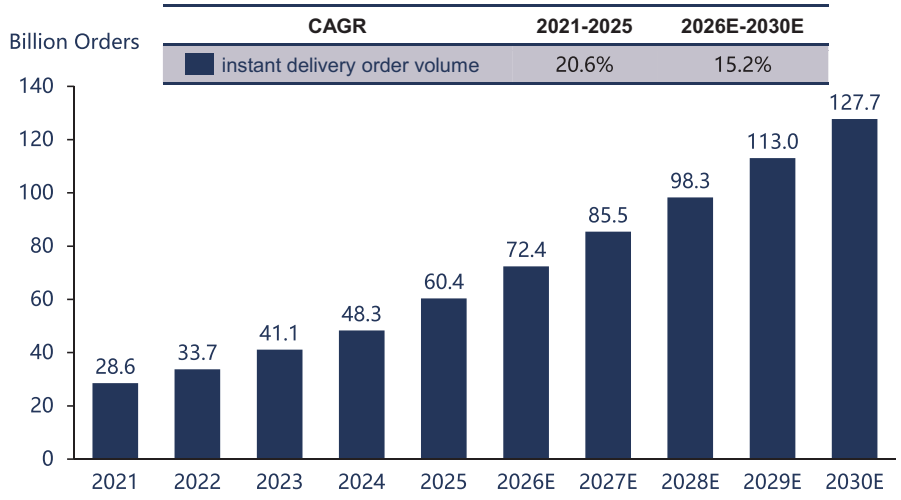


Source: Frost & Sullivan

Core Downstream Demand

The sustained expansion of China's on-demand delivery sector constitutes the fundamental downstream driver for the LEV battery-swapping market. As of 2025, the number of B-end riders in China has surpassed 14 million. However, on-demand delivery order volume has maintained robust growth from 2021 to 2025, with a further upward trajectory projected through 2030. By contrast, the growth of B-end riders has lagged far behind the rapid increase in delivery orders. The widening mismatch between surging order volume and slower rider expansion has substantially increased operational workload and riding intensity for existing practitioners. Against this backdrop, battery swapping emerges as an efficient solution to ease operational pressure, cut energy replenishment time and improve overall delivery efficiency, delivering strong operational empowerment for the on-demand delivery industry.

Instant Delivery Order Volume, China, 2021–2030E



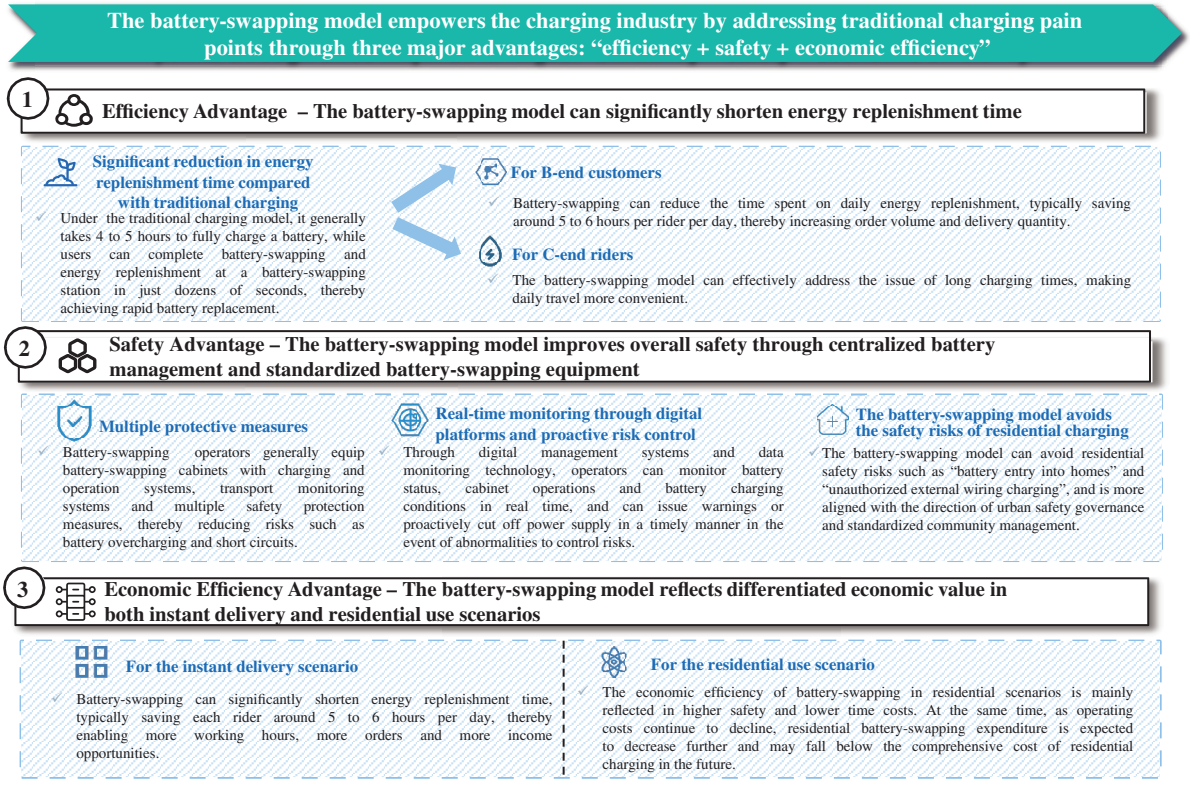
Source: Frost & Sullivan, China Federation of Logistics & Purchasing

Core Advantages of LEV Battery-swapping

LEV battery-swapping has significant advantages in efficiency, safety and economic efficiency. In terms of efficiency, battery-swapping can shorten energy replenishment time from several hours to several minutes, significantly improving the operating efficiency and operational continuity of B-end customers, while also providing C-end riders with a convenient and efficient daily travel energy replenishment experience. The B-end customer market covers

mostly both enterprise customers and B-end riders. C-end riders refer to civilian residents riders. In terms of safety, through centralized battery management and standardized equipment operation, it effectively reduces the safety risks arising from behaviors such as residential charging and unauthorized external wiring charging. In terms of economic efficiency, it not only reduces the financial burden on users from the one-time purchase of batteries, but also helps operators optimize their cost structure through scaled operations, thereby enhancing value across the entire chain.

Core Advantages of LEV Battery-swapping

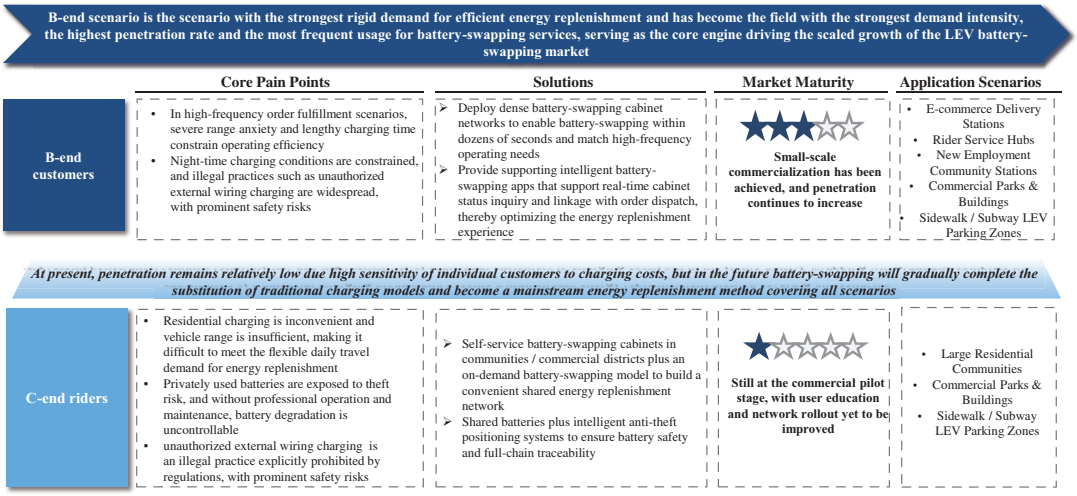


Source: Frost & Sullivan

Analysis of the Current Status and Potential of Downstream Application Scenarios for LEV Battery-swapping

China's LEV battery-swapping market presents a multi-scenario development landscape, with different scenarios demonstrating distinct development status and characteristics. The B-end customer market is the most mature and high-penetration core market. It drives steady growth through rigid demand for high-frequency, long-distance operations, while balancing efficiency, safety and compliance requirements. Meanwhile, the C-end rider market represents the major long-term potential for battery-swapping services. Though still in an early cultivation stage, its development is being supported by stricter safety regulations and the expansion of public and community-based swapping networks. Due to the operational characteristics of the industry, the vast majority of battery-swapping cabinets are placed in external or public areas of typical scenarios, such as the storefronts or exterior walls of leased premises at e-commerce delivery stations, and public roadsides, vehicle rental operator outlets, shopping malls, as well as public facility areas in large residential communities.

Current Status and Potential of Downstream Application Scenarios for LEV Battery-swapping in China

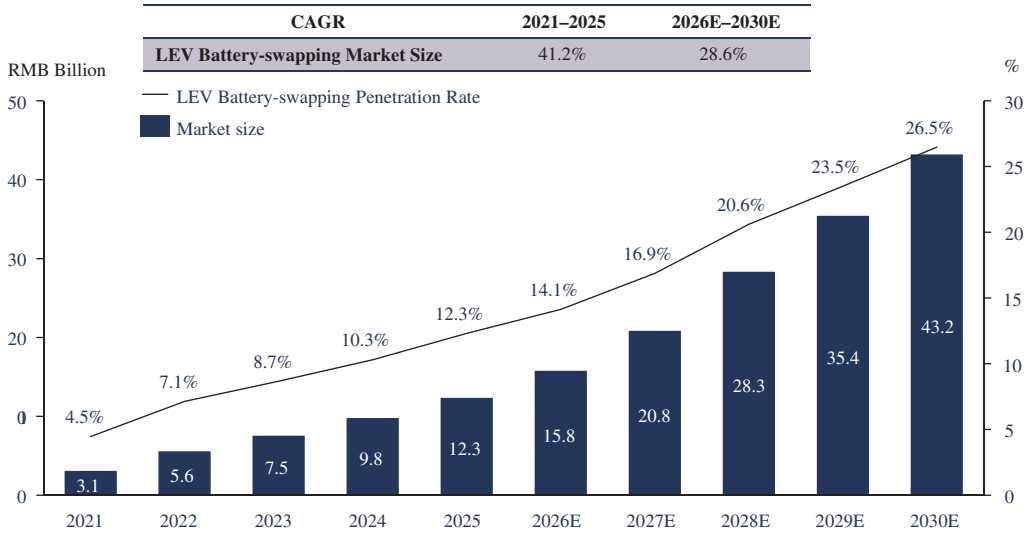


Source: Frost & Sullivan

LEV Battery-swapping Market Size and LEV Battery-swapping Penetration Rate, China, 2021-2030E

From 2021 to 2030, China's LEV battery-swapping market has shown a development trend of rapid market scale growth and continuous penetration increase, with the industry moving from the early exploration stage into the stage of scaled penetration and high-quality development. The substitution effect on traditional energy replenishment methods continues to emerge, and the industry has broad long-term growth potential.

LEV Battery-swapping Market Size and Penetration Rate*, China, 2021–2030E



Note: Penetration rate refers to the proportion of the LEV battery-swapping market size in the overall energy replenishment market (including battery-swapping, residential charging and public charging piles).

Source: Frost & Sullivan

Drivers of the LEV Battery-swapping Industry

- **Policy compliance:** As urban safety governance and green transportation policies continue to advance, multiple cities have gradually strengthened the regulation of charging safety for electric LEV vehicles, for example by regulating or restricting high-risk behaviors such as indoor charging and unauthorized external wiring charging. Against this backdrop, through centralized battery management and standardized equipment operation, the battery-swapping model can, to a certain extent, reduce the risks associated with battery use and aligns with the development direction of urban safety management and green mobility, thereby promoting the development of the LEV battery-swapping industry.

- **Market demand:** As demand for instant delivery, local life services and short-distance urban travel continues to grow, the importance of electric LEV vehicles in the urban transportation system continues to increase. High-frequency user groups such as food delivery riders and couriers have strong demand for highly efficient energy replenishment methods, while residential users' demand for convenient and safe charging methods is also increasing, thereby continuously driving the expansion of market demand for LEV battery-swapping services.

- **Last-mile logistics upgrade:** Last-mile urban distribution has emerged as a critical driver for the LEV battery-swapping industry. Traditional logistics tricycles are gradually shifting from lead-acid batteries and fuel power to lithium-ion batteries. The electrification upgrade of logistics fleets generates growing demand for safe, efficient and unified energy replenishment, making battery swapping a mainstream supplementary solution and further expanding the application boundary of the industry.

Development Trends of the LEV Battery-swapping Industry

- **Diversification of market structure:** The user structure of the LEV battery-swapping market is continuing to expand, gradually extending from B-end customers such as food delivery riders and couriers to C-end riders such as urban residents. At the same time, the applicable scope of battery-swapping services is no longer limited to electric two-wheeled vehicles, but is also gradually covering multiple types of LEV vehicles such as electric three-wheeled vehicles and small logistics vehicles. In addition, as overseas markets with relatively strong LEV demand, such as Southeast Asia, develop rapidly, the relevant regions are expected to become new growth areas for the industry.

- **Technology and model upgrades:** As industry technology continues to advance, battery-swapping equipment and battery technologies are continuously developing toward higher safety standards, longer service life and lower costs. At the same time, big data analytics and large artificial intelligence models are gradually being applied to battery-swapping cabinet site selection and planning, dynamic battery dispatch and daily operation and maintenance management. Through the analysis and forecasting of user demand, equipment operating conditions and network operation data, they further improve the operating efficiency and resource allocation capabilities of battery-swapping networks. In terms of business models, industry companies are also

gradually transforming from a single heavy-asset self-operated model to a model combining heavy and light assets, in which light-asset models include developing agency and franchise networks and providing asset custody services.

- **Integrated ecosystem synergy:** As the industry gradually matures, leading companies are continuously strengthening their industry chain integration capabilities and gradually building full-chain capabilities covering R&D, production, operation and services. By reducing intermediate links such as core component procurement and third-party outsourced operations, the integrated model reduces production and operating losses, improves resource utilization efficiency, drives down the overall industry cost curve and enhances industry profit potential.

  At the same time, companies are also cooperating with multiple parties such as vehicle manufacturers, delivery platforms, commercial property operators and financial institutions to form an industry ecosystem covering battery-swapping services, battery recycling and data services. As the degree of ecosystem synergy improves, industry resources are expected to further concentrate toward leading companies.

Industry Support Policies

At the national level, China has continuously introduced relevant policies centered on the "dual carbon" goals and the development of the new energy industry, providing institutional support for the development of the LEV battery-swapping industry. Notably, these policies also explicitly encourage the deployment of battery-swapping cabinets in outdoor, public spaces to enhance safety and accessibility. In addition, driven by environmental protection policies and industrial upgrading, the electric LEV vehicle sector is gradually showing a development trend of transitioning from lead-acid batteries to lithium batteries. Compared with lead-acid batteries, lithium batteries have clear advantages in energy density, weight and cycle life, and are also more aligned with green development requirements in terms of pollution control and resource utilization. Driven by relevant environmental protection policies and technological progress, the application proportion of lithium batteries in LEV vehicles and battery-swapping scenarios continues to increase.

Overview of Industry Support Policies at the National and Local Levels

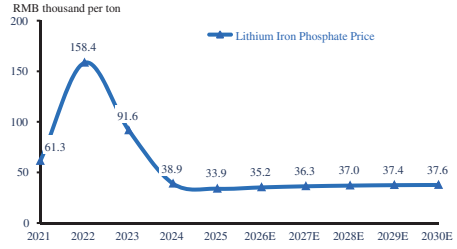
Policy Name	Policy Interpretation
Guidelines for Shared Battery-swapping for Electric Bicycles	With the core objective of comprehensively addressing safety hazards throughout the entire chain of electric bicycle use, it systematically regulates the full-process operation and management of shared battery-swapping and establishes a LEV energy replenishment system that is safe and controllable, standardized and unified, and intelligent and efficient. It prioritizes outdoor installation in open, power-accessible areas for delivery riders and residents, encouraging the use of scattered urban plots to expand coverage without obstructing sidewalks or accessibility paths, while maintaining required fire safety distances from buildings to ensure both user convenience and operational safety.
The 15th Five-Year Plan Outline for National Economic and Social Development of the People's Republic of China (2026–2030)	Guided by the carbon peaking and carbon neutrality goals, it advances the green transformation of transportation and society and promotes the development of an energy system that is low-carbon, safe and efficient in terms of infrastructure, providing an overall policy framework for the development of infrastructure related to new energy transportation.
Implementation Opinions on Further Improving the Service Support Capacity of Electric Vehicle Charging Infrastructure	Improves the network layout of charging and battery-swapping infrastructure and promotes the formation of an energy replenishment system with broad coverage and a rational structure.
Regulations on Fire Safety Management of High-rise Civil Buildings	Prohibits high-risk practices such as "unauthorized external wiring charging" for electric bicycles and bringing them into buildings or households for charging.
Notice of the Office of the Capital Urban Environmental Construction and Management Committee on Issuing the Work Plan for Further Strengthening Whole-chain Control of Electric Bicycles in Beijing	Focusing on whole-chain safety governance for electric bicycles, it specifies that infrastructure construction in residential and public areas should follow the principle of "battery-swapping/charging cabinets as the primary solution and charging piles as the supplementary solution," and encourages exploration of the vehicle-battery separation model and the shared battery-swapping model, balancing safety governance with market-oriented promotion.
Shanghai Work Plan for Promoting the Construction and Management of Charging and Battery-swapping Cabinets for Electric Bicycles	Promotes the construction and management of charging and battery-swapping cabinets around the questions of "how to build, how to manage and how to serve," clarifies differentiated positioning, classified layout, construction in key scenarios and access to digital platforms. It explicitly encourages placement in outdoor public areas such as delivery stations, residential communities, and street-level plots, avoiding pedestrian and accessibility obstructions while meeting fire safety standards, and also provides institutional support for standard setting and normalized regulation, thereby promoting the healthy and orderly development of the industry.
Technical Guidelines for the Construction of Charging and Battery-swapping Facilities for Electric Bicycles in Guangzhou	For scenarios such as residential areas, factories, enterprises and public institutions, and public places, it clarifies the types of facilities including charging sockets, charging facilities and battery-swapping facilities, and puts forward construction requirements for power supply and distribution systems, monitoring systems and supporting facilities. It requires facilities to be installed in suitable locations and prioritizes placement in outdoor areas, following the principles of "local adaptation and safe application."
Work Plan of Shenzhen on Promoting the High-quality Development of Centralized Charging and Battery-swapping Facilities for Electric Bicycles, and Advancing the Construction of "Electric Bicycle City" (Seeking Public Comments)	Focuses on the high-quality development of centralized charging and battery-swapping facilities for electric bicycles, encourages the networked deployment of battery-swapping facilities, supports the entry of battery-swapping cabinets into communities and industrial park scenarios, and promotes the formation of a safer, healthier and more intensive LEV energy replenishment system.

Source: Frost & Sullivan

Analysis of Raw Material Costs and Technological Evolution Trends of the Industry

In the cost structure of the LEV battery-swapping industry, batteries, as core assets, constitute a major component of the construction and operating costs of battery-swapping networks. As the industry advances toward scale, battery procurement and replacement costs continue to account for an important proportion. In high-frequency charging and discharging and high-turnover scenarios for LEV battery-swapping, batteries are required to simultaneously meet the requirements of high safety, long cycle life and cost stability. Therefore, lithium iron phosphate, which offers advantages such as strong thermal stability, excellent cycle performance and controllable costs, has gradually become the mainstream cathode material system.

Lithium Iron Phosphate Prices, China, 2021–2030E



Lithium Metal Prices, China, 2021–2030E

Source: Frost & Sullivan

As an important component of battery-swapping operations, electricity costs are generally relatively stable. Depending on differences in regions and electricity consumption structures, commercial electricity prices nationwide are generally in the range of approximately RMB0.6 to RMB0.8 per kWh.

National Commercial Electricity Price Range for LEV Battery-swapping Scenarios (2021–2030E)

Year	Price Range (RMB per kWh)
2021	0.60 – 0.75
2022	0.62 – 0.78
2023	0.63 – 0.80
2024	0.60 – 0.75
2025	0.58 – 0.72
2026E	0.59 – 0.74
2027E	0.60 – 0.76
2028E	0.61 – 0.78
2029E	0.62 – 0.80
2030E	0.63 – 0.82

Source: Frost & Sullivan, National Development and Reform Commission

From the perspective of technological evolution trends, the LEV battery-swapping industry is undergoing multidimensional upgrading from traditional battery solutions to high-performance battery systems, from single-point equipment to network-based operations, and from basic operation and maintenance to data-driven management.

In the early stage, the industry mainly adopted lead-acid battery solutions. With rising requirements for energy density, safety and cycle life, it has gradually evolved toward lithium-ion battery systems represented by lithium iron phosphate. At the same time, battery pack design is upgrading from non-standardized to standardized and modularized configurations in order to enhance cross-model compatibility and the universality of battery-swapping networks. At the system level, battery-swapping equipment is developing from single-point deployment toward scaled networks and intelligent dispatch systems, while gradually incorporating energy management capabilities to optimize charging and discharging strategies and achieve grid coordination. At the operational level, the industry is shifting from an equipment-driven model toward a platform-based and data-driven model, under which users, equipment and battery assets are managed in a unified manner through digital systems, and dispatch efficiency and asset turnover continue to improve based on data analysis.

Analysis of Cost Optimization Pathways for LEV Battery-swapping Companies

As the scale of LEV battery-swapping networks continues to expand, industry participants are gradually promoting the continuous optimization of their cost structures through multiple approaches such as scaled operations, technological innovation and business model optimization, thereby improving overall operating efficiency and enhancing profitability.

- **Cost reduction through scale effects:** As the density of battery-swapping network deployment increases, the number of users served by each battery-swapping cabinet continues to rise, thereby enabling operation and maintenance costs and site usage

fees to be diluted to a certain extent. At the same time, as the operating scale of industry participants expands, companies are able to form scale procurement advantages when purchasing core hardware such as lithium batteries and battery-swapping equipment, thereby reducing unit procurement costs and further optimizing the overall cost structure.

- **Cost reduction through technological innovation:** Technological progress provides important means of cost optimization for LEV battery-swapping companies. For example, through battery full-lifecycle management technologies, such as adaptive balancing technologies, companies are able to extend battery service life and reduce battery replacement frequency, thereby lowering asset depreciation costs. In addition, with the application of artificial intelligence and big data technologies, companies are able to optimize battery-swapping cabinet layout, battery dispatch and operation and maintenance management through intelligent algorithms, thereby reducing battery operation and maintenance costs and further improving operating efficiency.

- **Cost reduction through business model optimization:** In terms of business models, LEV battery-swapping companies optimize their capital input structure through a variety of approaches. For example, in battery management, companies may redeploy retired batteries from enterprise customers scenarios that still retain usable value for continued use in individual customers scenarios, thereby extending battery service cycles and reducing new battery procurement costs. At the same time, companies also expand battery-swapping networks through agent or franchise models, thereby reducing their own capital investment and improving network expansion efficiency. In addition, cooperation with electricity suppliers to obtain direct electricity supply also helps reduce energy procurement costs, thereby further optimizing overall operating costs.

Future Outlook for the LEV Battery-swapping Market

With the advancement of relevant technologies and the development of emerging industries, the application scenarios of the battery-swapping model are expected to expand further from electric LEV vehicles to fields such as robots, unmanned delivery vehicles and drones, bringing new growth space to the battery-swapping industry. As the low-altitude economy, unmanned delivery and the robotics industry continue to develop, demand from high-frequency operating equipment for highly efficient energy replenishment methods continues to increase. By virtue of characteristics such as rapid energy replenishment and continuous operation, the battery-swapping model has promising application prospects.

In the robotics field, as the market size of industrial robots and unmanned delivery robots continues to expand, their high-frequency operating characteristics impose higher requirements on battery replenishment efficiency. The battery-swapping model can achieve rapid energy replenishment and support the continuous operation of equipment, thereby providing important support for the scaled application of the robotics industry.

In the field of unmanned delivery vehicles, such vehicles have gradually entered the stage of commercial application and have achieved normalized operations in scenarios such as communities, parks and commercial districts. As unmanned delivery vehicles usually require long-duration continuous operations, the battery-swapping model can improve vehicle utilization efficiency through rapid battery replacement, thereby meeting their efficient operating needs.

In the field of low-altitude economy, as low-altitude airspace is gradually opened up and the construction of related infrastructure advances, the application of drones in scenarios such as logistics delivery, agricultural crop protection and power inspection continues to expand. The battery-swapping model can improve energy replenishment efficiency and reduce downtime to a certain extent, thereby better meeting the energy replenishment needs of drones in high-frequency operating scenarios.

ANALYSIS OF COMPETITION IN CHINA'S LEV BATTERY-SWAPPING INDUSTRY

From the perspective of the overall competitive landscape, a small number of leading players in the industry occupy major market shares by virtue of first-mover advantages, scaled network deployment, and mature battery asset management and operational capabilities, and have formed relatively strong user stickiness and network effects in core cities and high-frequency use scenarios. At the same time, leading players have further consolidated their market positions by continuously increasing the density of battery-swapping networks, optimizing operational efficiency and expanding diversified application scenarios.

Ranking and Market Share of LEV Battery-swapping Companies

In China's LEV battery-swapping market, the top five companies together accounted for 60.5% of the market share in 2025 by revenue, indicating a relatively high level of industry concentration. Among them, the Company ranked fourth in the industry, with LEV battery-swapping revenue of RMB0.7 billion and a market share of 5.8%.

Ranking and Market Share of LEV Battery-swapping Companies (by Revenue), China, 2025

Ranking	Company Name	Revenue *(RMB Billion)*	Market Share
1.	Company A	3.0	24.6%
2.	Company B	2.0	16.6%
3.	Company C	1.0	8.2%
4.	**The Company**	**0.7**	**5.8%**
5.	Company D	0.7	5.3%
	Others	4.9	39.5%
	Total	**12.3**	**100.0%**

Notes:

(1) Company A is a listed company founded in 2014 and headquartered in Beijing, China. It focuses on the construction, operation and maintenance of digital infrastructure and related services. Through its energy business, the company also provides battery swapping, charging, backup power and other integrated energy services.

(2) Company B is a private company founded in 2016 and headquartered in Shanghai, China. It focuses on local mobility and lifestyle services powered by digital technology. Its business covers two-wheeled shared mobility, ride-hailing, electric vehicle rental and battery swapping services.

(3) Company C is a private company founded in 2012 and headquartered in Hangzhou, China. It focuses on intelligent charging and battery-swapping solutions for electric two-wheelers. Its business covers battery-swapping services, charging and swapping equipment, and AIoT-enabled operating systems.

(4) Company D is a private company founded in 2019 and headquartered in Beijing, China. It focuses on battery products and battery-swapping services for two-wheeled electric vehicles. Its business covers power batteries, smart swapping cabinets, cloud-based IoT platforms and related operation and maintenance services.

Source: Frost & Sullivan, Companies' Annual Reports

In addition, in 2025, in terms of rankings in segmented areas, from the perspective of core regional deployment, the Company ranked among the top three in both the Yangtze River Delta and the Pearl River Delta with a market share of 15.3% and 19.8%, respectively; from the perspective of operating model, the Company is the only one battery-swapping companies in the industry with an integrated "R&D-Production-Operation-Service" model (integrated "R&D-Production-Operation-Service" model refers to a model in which battery-swapping enterprises fully undertake the in-house design and manufacturing of battery-swapping cabinets and battery packs); and from the perspective of sales channels, the Company ranked first in online channels.

Analysis of Industry Entry Barriers

Capital barriers: Traditionally, the LEV battery-swapping industry has been regarded as an asset-heavy sector. In the early stage, continuous investment is required in assets such as battery-swapping cabinets, battery packs, system platforms and station deployment. In the subsequent process of network expansion, investment is also required for equipment operation and maintenance, asset turnover, upgrades and iteration. Only companies with strong financial strength and sustained investment capability can take the lead in completing network deployment in key cities and forming scale effects. Therefore, capital thresholds constitute an important entry barrier to the industry.

Technological barriers: The LEV battery-swapping industry places relatively high requirements on technological capabilities such as battery management, cabinet control, platform dispatch, data monitoring and safety warning. Companies need to possess the R&D and coordination capabilities for intelligent battery-swapping cabinets, battery management systems, IoT platforms and intelligent dispatch systems, and continuously optimize operating efficiency and safety levels through ongoing data accumulation. The construction cycle of the relevant technological system is relatively long and highly comprehensive, and therefore constitutes a strong technological barrier to the industry.

Channel barriers: The LEV battery-swapping industry is highly dependent on downstream channel resources, especially in high-frequency scenarios such as instant delivery, express logistics and local mobility. Those that are able to establish stable cooperation with delivery platforms, rider service providers, LEV rental companies and vehicle rental operators are more likely to obtain core user traffic and improve network utilization. At the same time, companies' deployment capabilities in online platforms, directly operated station and business partner network also directly affect their market expansion efficiency. Therefore, the accumulation of channel resources constitutes an important barrier to the industry.

Operational barriers: Competition in the LEV battery-swapping industry ultimately manifests itself as competition in refined operational capabilities. Companies not only need to deploy battery-swapping networks efficiently, but also need to continuously improve cabinet efficiency, battery turnover efficiency, operation and maintenance response capabilities, while ensuring safety and service stability during large-scale operations. Such capabilities are highly dependent on long-term operating experience, standardized management systems and data-driven capabilities, and are difficult to replicate in a short period of time. Therefore, they constitute relatively high operational barriers to the industry.

OVERVIEW OF THE COMPANY'S KEY OVERSEAS MARKETS

Overview of the Southeast Asian LEV Battery-swapping Market

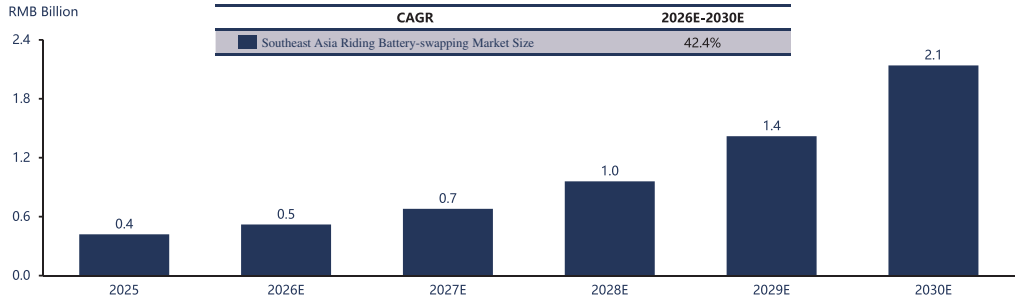
The Southeast Asian LEV battery-swapping market as a whole is still at an early stage of development, but has already shown relatively evident growth and expansion potential. Compared with earlier-developed markets such as China, the Southeast Asian LEV battery-swapping industry currently has a relatively small market size, and market participants are still continuously advancing network deployment, user cultivation and the development of operational systems. Overall, the industry is in the process of gradually transitioning from the introduction stage to the stage of scaled development. Benefiting from the widespread use of two-wheel travel in Southeast Asia, strong demand for short-distance urban transportation, and the continuous growth of delivery scenarios, the LEV battery-swapping model has a relatively solid foundation for application.

At the same time, as the penetration rate of electric two-wheeled vehicles gradually increases, users' requirements for energy replenishment efficiency, range convenience and operational efficiency continue to rise, and the commercial value of the battery-swapping model is gradually emerging. Especially in high-frequency use scenarios such as food delivery, instant retail and intra-city logistics, battery-swapping can effectively meet the need for rapid energy replenishment and help improve vehicle utilization efficiency. Overall, the Southeast Asian LEV battery-swapping market is still at an early growth stage, but as battery-swapping infrastructure is gradually improved, operating models continue to mature, and market acceptance continues to increase, the industry still has considerable room for future development.

Southeast Asia LEV Battery-swapping Market Size, 2025–2030E

From 2025 to 2030, the Southeast Asian LEV battery-swapping market is expected to show a trend of rapid market expansion. Overall, the Southeast Asian LEV battery-swapping industry is still at a stage of accelerating transition from early introduction to scaled development. Although the market size remains relatively small, its growth potential is relatively prominent. In terms of market size, the Southeast Asian LEV battery-swapping market reached RMB0.4 billion in 2025, and is expected to record a CAGR of 42.4% from 2026 to 2030, further increasing to RMB2.1 billion by 2030. Overall, as demand for LEV energy replenishment in the region continues to be released, the commercial viability of the battery-swapping model is gradually validated, and industry participants continue to advance localized operations and network replication, the Southeast Asian LEV battery-swapping market is expected to maintain a relatively rapid expansion trend, with broad room for future development.

LEV Battery-swapping Market Size, Southeast Asia, 2025–2030E



Source: Frost & Sullivan

Drivers of the Southeast Asian LEV Battery-swapping Market

- **Policy guidance and the transition toward green mobility are creating a supportive external environment for industry development.** In recent years, some Southeast Asian countries have continuously promoted transportation electrification and green, low-carbon development, while encouraging the adoption of new energy mobility modes such as electric two-wheeled vehicles. Under relevant policy support, the foundation for electric mobility has gradually improved, creating a more favorable external environment for the promotion of the LEV battery-swapping model. At the same time, battery-swapping also helps accelerate the transition from fuel-powered vehicles to electric vehicles, as it significantly shortens energy replenishment time, reduces dependence on fixed charging conditions, lowers the upfront cost burden by separating battery usage from vehicle purchase, and better supports the operational needs of users in high-frequency usage scenarios. By improving convenience, economics and operational efficiency, battery-swapping makes electric mobility more practical in everyday use and therefore provides stronger support for the replacement of fuel-powered vehicles with electric alternatives.

- **The economic efficiency of the battery-swapping model in commercial operating scenarios is gradually emerging.** For vehicles with high-frequency usage, energy replenishment time, attendance efficiency and full-lifecycle usage costs are all core considerations. The battery-swapping model can, to a certain extent, improve the continuous operating capability of vehicles, and through centralized battery management, unified operation and maintenance and standardized services, address the efficiency and management issues under traditional energy replenishment models. As industry operating experience accumulates and business models continue to be optimized, the economic efficiency and replicability of the battery-swapping model in commercial scenarios are gradually becoming evident, thereby accelerating the release of market demand.

- **The accelerated deployment by leading operators is driving the industry into an expansion stage.** As some market participants continue to increase resource investment in key countries and core cities, the Southeast Asian LEV battery-swapping industry is gradually moving from single-point pilot operations toward regional replication. The continued investment by leading players in station deployment, battery dispatch, user operations and local partnerships helps improve the industry's overall service capabilities and operational maturity, and drives the market from the stage of early validation toward commercial rollout on a broader scale.