

INDUSTRY OVERVIEW

Certain information and statistics set out in this section and elsewhere in this document relating to the global and Chinese mainland’s retired lithium-ion battery market and lithium-ion battery recycling and reutilization solution market are derived from different official government publications and the market research report prepared by Frost & Sullivan, an independent industry consultant which was commissioned by us (the “F&S Report”).

No independent verification has been carried out on the official government publications and such information and statistics by us, the Joint Sponsors, [REDACTED] or any other parties, excluding Frost & Sullivan, involved in the [REDACTED] or their respective directors, officers, employees, advisers, or agents, and no representation is given as to the accuracy or completeness of such information and statistics.

SOURCE AND RELIABILITY OF INFORMATION

We have commissioned Frost & Sullivan, an Independent Third Party, to conduct a study of the global and Chinese mainland’s retired lithium-ion battery market and lithium-ion battery recycling and reutilization solution market. We agreed to pay Frost & Sullivan a fee of RMB964,000 for the preparation of the F&S Report, and our Directors consider that such fee reflects market rates and are of the view that the payment of the fee does not affect the fairness of conclusions drawn in the F&S Report. Founded in 1961, Frost & Sullivan is an independent global consulting firm that conducts industry research and prepares industry report on a wide range of industries, among other services. Our Directors confirm to the best of their knowledge, and after making reasonable enquiries, that there have been no adverse changes in the industry since the date of the F&S Report which may qualify, contradict or have an impact on the information set out in this section.

RESEARCH METHODOLOGY

During the preparation of the F&S Report, Frost & Sullivan conducted primary research that involved discussing the status of the industry with leading industry participants and industry experts, as well as secondary research that involved reviewing company reports, independent research reports and Frost & Sullivan’s own database.

BASIS AND ASSUMPTION

The F&S Report was compiled based on the following assumptions: (i) global economy is likely to maintain steady growth in the next decade; (ii) global social, economic, and political environment is likely to remain stable in the forecast period; (iii) market drivers like favorable policies and regulations, surge in supply of retired lithium-ion batteries, effectively relieve the shortage of raw materials supply, among others.

GLOBAL AND CHINESE MAINLAND’S RETIRED LITHIUM-ION BATTERY MARKET

Market Definition and Overview

Retired lithium-ion batteries refer to lithium-ion batteries that are no longer suitable for their original application due to degradation or damage. Power batteries and consumer electronics are the main sources of retired lithium-ion batteries, accounting for 53.2% and 46.4% of the global total of retired lithium-ion batteries in 2025, respectively.

Power batteries, as the core component of EVs, usually have a lifespan of about five to eight years. As the number of charge/discharge cycles increases, battery performance will gradually decline, resulting in lower range and charging efficiency. When battery performance no longer meets the vehicle’s power requirements, they will be replaced or retired. Another major source of retired lithium-ion batteries is consumer electronics, such as smartphones, laptops, tablets and digital cameras. The high penetration rate and rapid update frequency of consumer electronics have resulted in a large number of retired lithium-ion batteries.

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Depending on the battery material, retired lithium-ion batteries are categorized into retired LFP batteries, retired ternary lithium-ion batteries, and other types of retired lithium-ion batteries.

Recycling Channels of Global and Chinese Mainland’s Retired Lithium-ion Batteries

Retired lithium-ion batteries are typically collected and initially sorted at retired battery recycling sites and then transported to battery recycling and processing facilities. Lithium-ion battery recycling and reutilization solution providers recycle or reuse retired batteries based on battery type, battery performance and downstream demand. The main suppliers of retired lithium-ion batteries include lithium-ion battery manufacturers, EV manufacturers and dedicated lithium-ion battery recycling companies that collect retired batteries and battery scrap materials from various sources.

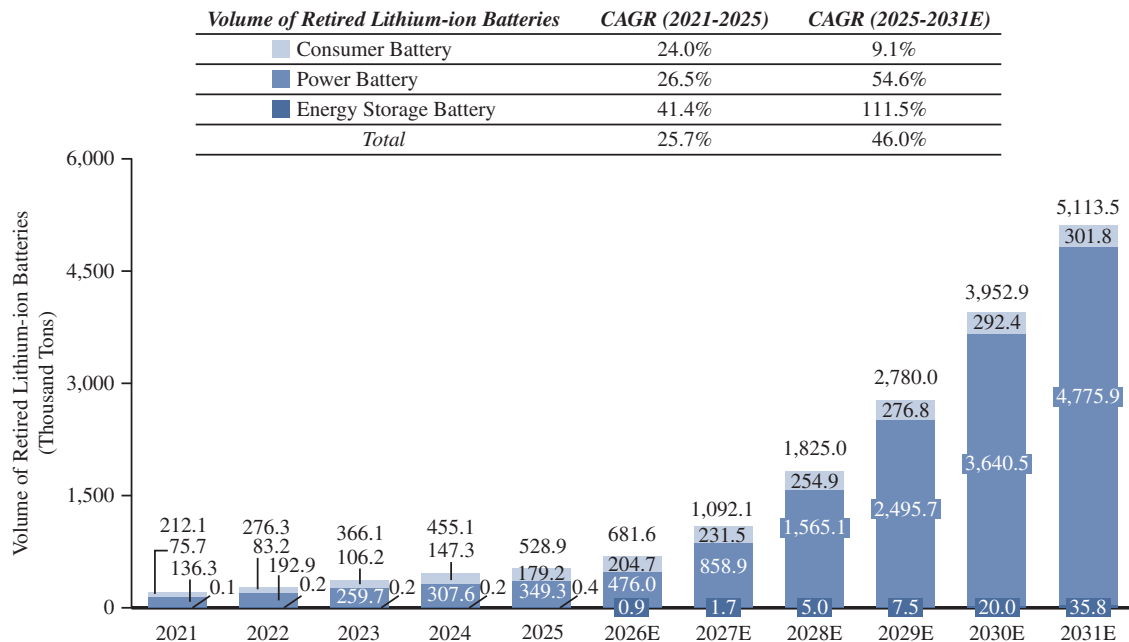
Lithium-ion battery manufacturers provide consumers with convenient battery recycling services through their extensive sales networks and after-sales service systems. They usually set up recycling points throughout the country to facilitate the collection of retired batteries. EV manufacturers typically collect retired lithium-ion batteries through their own sales and service networks, including authorized stores, service centers, and collection points established in partnership with other recycling companies. EV manufacturers utilize these channels to provide consumers with convenient battery replacement and recycling services. Dedicated lithium-ion battery recycling companies have formed a stable and large supply of retired lithium-ion batteries by establishing an extensive recycling service network, including setting up recycling points in major cities and cooperating with retailers to provide recycling services.

The competitive landscape of the black mass market is relatively fragmented, and the main market participants include lithium-ion battery recycling and reutilization enterprises, specialized lithium-ion battery recycling enterprises, and battery manufacturers. Lithium-ion battery recycling and reutilization enterprises possess the complete industrial chain capability for retired lithium-ion batteries. They have professional technologies and equipment that enable the efficient extraction and recovery of black mass, achieving the circular utilization of resources. Specialized lithium-ion battery recycling enterprises are mainly responsible for the collection, preliminary disassembly and transportation of black mass. They do not directly engage in the deep processing and reutilization of black mass. Instead, they cooperate with downstream professional enterprises that have the corresponding processing capabilities and qualifications to jointly complete the entire process of recycling and reutilization of retired batteries. Furthermore, in order to ensure a stable supply of raw materials and reduce production costs, lithium-ion battery manufacturers conduct recycling and reutilization business for retired lithium-ion batteries and black mass. They reuse the recycled materials in battery manufacturing, realizing the full lifecycle management of batteries.

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Market Size of Chinese Mainland’s Retired Lithium-ion Batteries

Volume of Retired Lithium-ion Batteries by Sources in Chinese Mainland, 2021-2031E



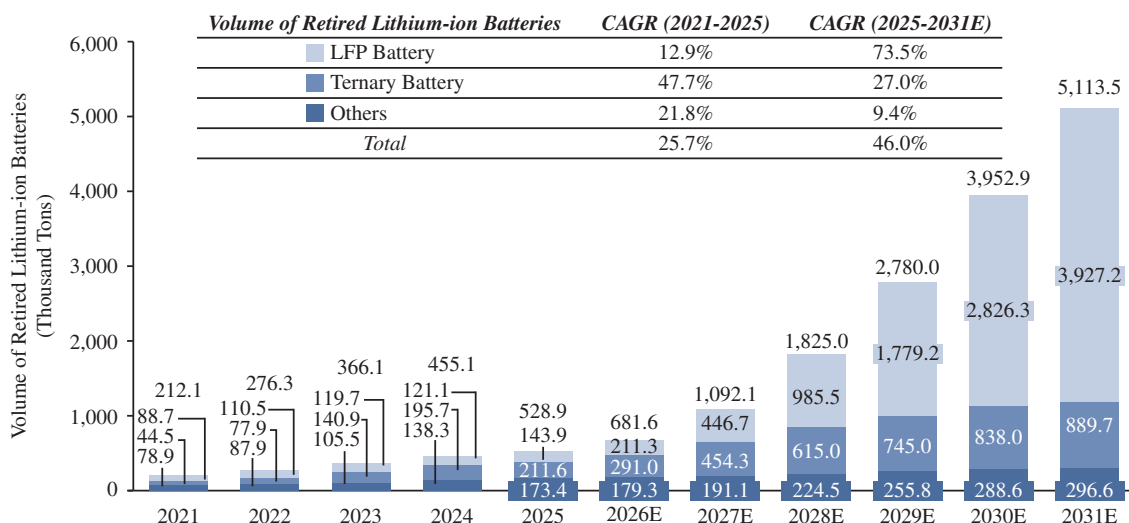
Source: China Automotive Battery Innovation Alliance; China Energy Storage Alliance; Frost & Sullivan analysis

In recent years, with the rapid development of Chinese mainland’s EV industry and the accelerated replacement of consumer electronics products, the supply of retired lithium-ion batteries has grown significantly. In Chinese mainland, the total amount of retired lithium-ion batteries increased from 212,100 tons in 2021 to 528,900 tons in 2025, with a CAGR of 25.7%. Specifically, the volume of retired consumer batteries increased from 75,700 tons in 2021 to 179,200 tons in 2025, with a CAGR of 24.0%, and the volume of retired power batteries increased from 136,300 tons in 2021 to 349,300 tons in 2025, with a CAGR of 26.5%.

The total amount of retired lithium-ion batteries in Chinese mainland is expected to reach 5.1 million tons by 2031, with a CAGR of 46.0% from 2025 to 2031. Among the retired lithium-ion batteries, the volume of retired consumer batteries, power batteries and energy storage batteries is expected to reach 301,800 tons, 4.8 million tons and 35,800 tons, respectively, with a CAGR of 9.1%, 54.6% and 111.5% from 2025 to 2031, respectively.

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Volume of Retired Lithium-ion Batteries by Types in Chinese Mainland, 2021-2031E



Source: China Automotive Battery Innovation Alliance; China Energy Storage Alliance; Frost & Sullivan analysis

The volume of retired LFP batteries increased from 88,700 tons in 2021 to 143,900 tons in 2025, at a CAGR of 12.9%. The volume of retired ternary batteries increased from 44,500 tons in 2021 to 211,600 tons in 2025, with a CAGR of 47.7%. With the rapid development of EVs and energy storage, the volume of retired LFP batteries, ternary batteries and other types of batteries is expected to reach 3.9 million tons, 0.9 million tons and 0.3 million tons, with CAGRs of 73.5%, 27.0% and 9.4% from 2025 to 2031, respectively.

The price of ternary batteries is higher than that of LFP batteries due to different raw material costs and production processes. In 2025, the average prices of LFP battery cells and ternary battery cells were approximately RMB300-400 per kWh and RMB420-500 per kWh, respectively.

The performance differences between LFP batteries and ternary batteries mainly encompass energy density, stability, and cycle life. The cathode material of ternary batteries is nickel-cobalt-manganese, which provides a higher energy density, allowing them to store more power within the same volume or weight. In contrast, the cathode material of LFP batteries is a compound of iron and phosphorus, with lower tap density and compaction density, thus limiting the battery's energy density. LFP batteries have good stability and are less likely to experience thermal runaway. Ternary batteries contain active metal components and are prone to thermal runaway under the high temperatures or external forces. LFP batteries have a long cycle life, and the number of charge - discharge cycles is generally more than 2,000 times. The cycle life of ternary batteries is relatively short, and the number of charge-discharge cycles is generally from 1,000 to 1,500 times.

The volume of retired LFP batteries is closely related to their installed capacity. Since 2022, the overall installed capacity of LFP batteries has increased significantly, exceeding that of ternary batteries and accounting for approximately 60% of the total battery installed capacity in China, and the proportion of installed capacity of LFP batteries in China is expected to exceed 80% in the future. The lifespan of LFP batteries is usually from 5 to 8 years. Therefore, a large number of LFP batteries are expected to enter the retirement stage in 2027 and thereafter, resulting in a higher CAGR of LFP batteries in the forecast period from 2026 to 2031.

The lithium-ion batteries will develop towards the extension of lifespan and the improvement of energy density in the future. Battery manufacturers have been dedicated to increasing R&D investment to reduce the losses during the charging and discharging processes and increase the cycle life of batteries. In addition, battery manufacturers are exploring new materials to enhance performance such as energy density and safety, in order to adapt to the growing requirements from downstream applications.

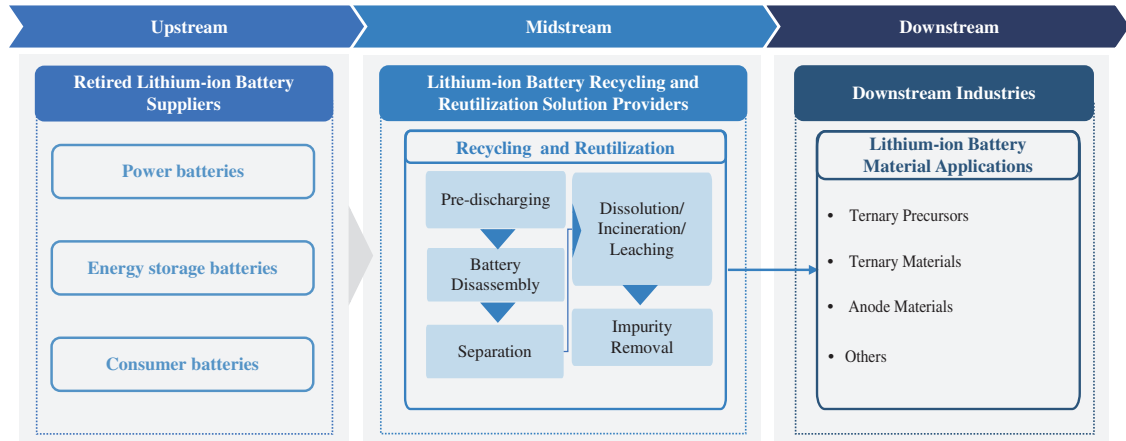
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GLOBAL AND CHINESE MAINLAND’S LITHIUM-ION BATTERY RECYCLING AND UTILIZATION SOLUTION MARKET

Market Definition and Overview

Lithium-ion battery recycling and reutilization solution refer to the process of recovering, dismantling and extracting valuable metals and materials from lithium-ion batteries at the end of their life cycle. These solutions are designed to maximize the recycling and reutilization of valuable materials in batteries, reduce negative environmental impacts, and achieve the goals of resource reuse and environmental protection. The process of lithium-ion battery recycling and reutilization primarily includes the dismantling and material recovery of retired lithium-ion batteries, and then using the recovered materials to produce new batteries or battery materials. The process involves physical dismantling and chemical extraction to recover valuable materials from the battery, such as lithium, nickel, cobalt and manganese. These materials can then be used to manufacture new batteries, creating a closed-loop supply chain. Recycling can reduce dependence on newly mined resources and the overall environmental impact of battery production.

Value Chain of Lithium-ion Battery Recycling and Reutilization Solution Market



Source: Frost & Sullivan analysis

The value chain of the lithium battery recycling and reutilization solution market consists of the following three major segments:

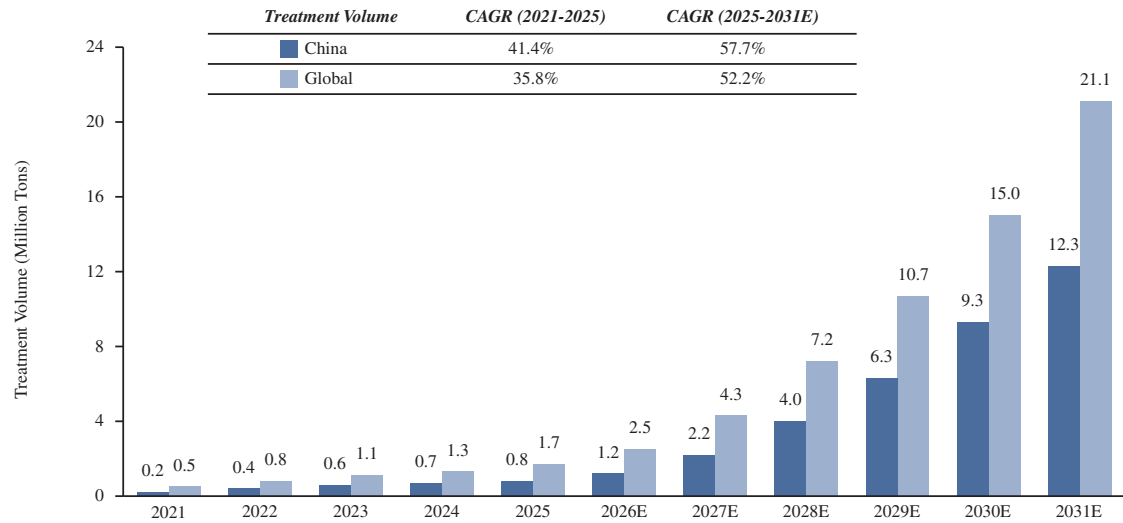
- Upstream suppliers of retired lithium-ion batteries:* These suppliers mainly provide retired lithium-ion batteries. They include lithium-ion battery manufacturers, EV manufacturers and dedicated lithium-ion battery recycling companies. These suppliers are responsible for the collection and initial sorting of retired lithium-ion batteries, which are then transported to midstream recyclers and processors.
- Midstream providers of lithium-ion battery recycling and reutilization solution:* These solutions providers are responsible for the recycling and treatment of retired lithium-ion batteries. They extract lithium-ion cells, lithium-ion battery components, valuable metals and other materials from retired batteries through recycling and reutilization solutions. These solutions providers typically have advanced technology and equipment to efficiently dismantle batteries, safely separate hazardous substances, and recover valuable materials.

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- Downstream industries applicants:* Downstream applicants include industries that use recycled lithium-ion batteries or recycled lithium-ion battery materials. Lithium-ion battery materials recycled with regeneration reutilization method are typically used by lithium-ion battery material manufacturers to produce ternary precursors, ternary materials, anode materials and other products. The competitive landscape of China’s ternary cathode material market is relatively concentrated. As of December 31, 2025, there are less than 50 market participants in China’s ternary cathode material market. In terms of sales volume in 2025, the top five participants in China’s ternary cathode material market accounted for approximately 69%. The competitive landscape of China’s LFP cathode material market is relatively concentrated. As of December 31, 2025, there are less than 50 market participants in China’s LFP cathode material market. In terms of sales volume in 2025, the top five participants in China’s LFP cathode material market accounted for approximately 58%.

Market Size of Global and Chinese Mainland’s Lithium-ion Battery Recycling and Reutilization Solution

Treatment Volume of Lithium-ion Battery Recycling and Reutilization Solution Market (Global and Chinese Mainland), 2021 to 2031E

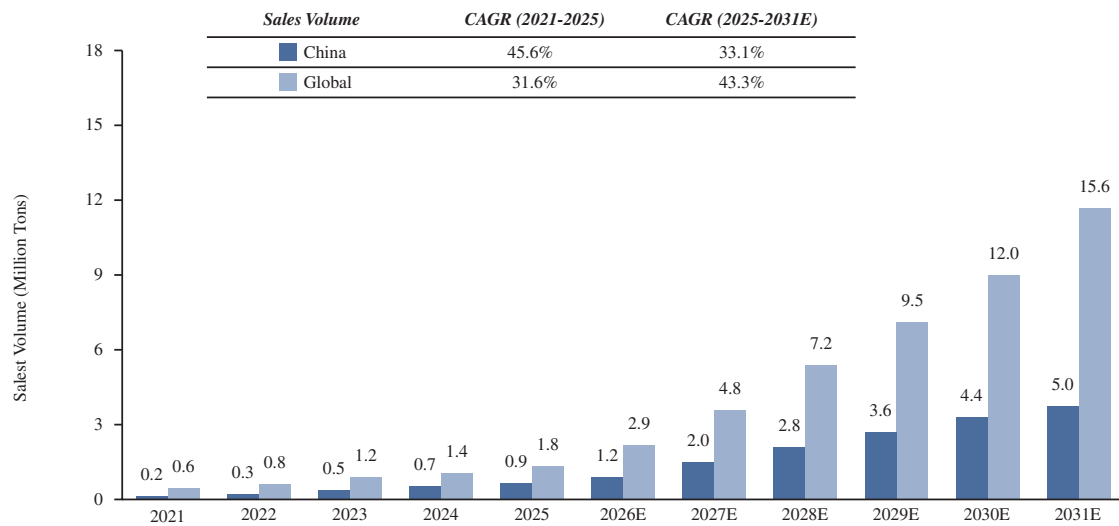


Source: Frost & Sullivan analysis

From 2021 to 2025, global treatment volume increased from 0.5 million tons to 1.7 million tons, with a CAGR of 35.8%. During the same period, Chinese mainland’s treatment volume increased from 0.2 million tons to 0.8 million tons, representing a CAGR of 41.4%. Due to the surge in supply of retired lithium-ion batteries, global treatment volume is expected to reach 21.1 million tons by 2031, growing at a CAGR of 52.2% from 2025 to 2031. Meanwhile, Chinese mainland’s a treatment volume is expected to reach 12.3 million tons by 2031, growing at a CAGR of 57.7% from 2025 to 2031.

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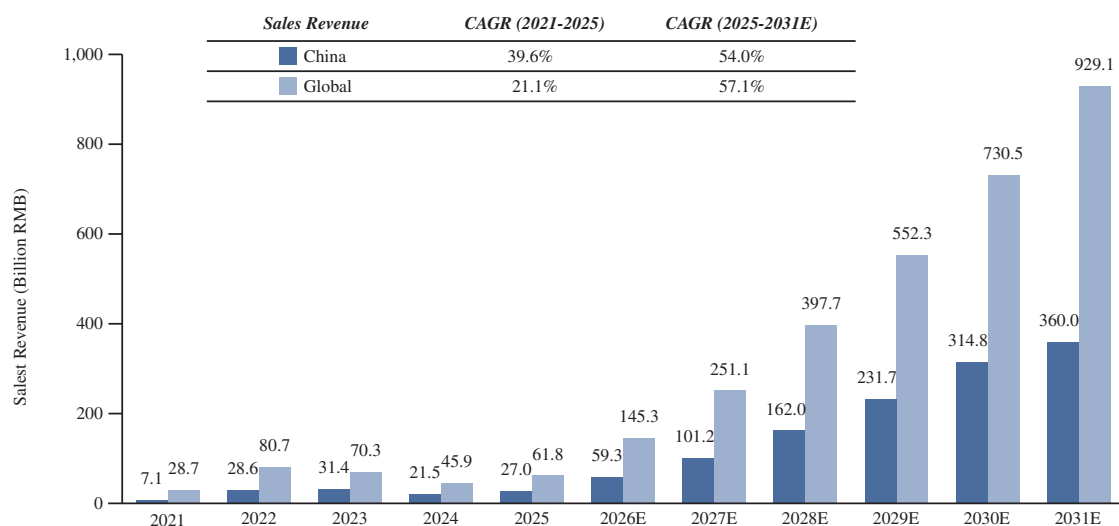
Sales Volume of Recycled Materials of Lithium-ion Battery Recycling and Reutilization Solution Market (Global and Chinese Mainland), 2021 to 2031E



Source: Wood Mackenzie; Shanghai Metals Market; F&S analysis

Global sales volume of recycled materials increased from 0.6 million tons in 2021 to 1.8 million tons in 2025, at a CAGR of 31.6%. During the same period, the sales volume of recycled materials in Chinese mainland increased from 0.2 million tons in 2021 to 0.9 million tons in 2025, at a CAGR of 45.6%. Global sales volume of recycled materials is expected to reach 15.6 million tons by 2031, growing at a CAGR of 43.3% from 2025 to 2031. Meanwhile, sales volume of recycled materials in Chinese mainland is expected to reach 5.0 million tons by 2031, growing at a CAGR of 33.1% from 2025 to 2031.

Sales Revenue of Recycled Material of Lithium-ion Battery Recycling and Reutilization Solution Market (Global and Chinese Mainland), 2021 to 2031E



Source: Wood Mackenzie; Shanghai Metals Market; F&S analysis

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From 2021 to 2025, global sales revenue of recycled materials increased from RMB28.7 billion to RMB61.8 billion, at a CAGR of 21.1%. During the same period, the sales revenue of recycled materials in Chinese mainland increased from RMB7.1 billion to RMB27.0 billion, at a CAGR of 39.6%. With the growth in sales volume of recycled materials, global sales revenue is projected to reach RMB929.1 billion by 2031, growing at a CAGR of 57.1% from 2025 to 2031. Meanwhile, the sales revenue of recycled materials in Chinese mainland is expected to reach RMB360.0 billion by 2031, growing at a CAGR of 54.0% from 2025 to 2031.

Market Drivers of Global and Chinese Mainland’s Lithium-ion Battery Recycling and Reutilization Solution

Surge in supply of retired lithium-ion batteries: The demand for lithium-ion batteries is growing along with the development of downstream industries. Lithium-ion batteries are used in a variety of fast-growing industries, such as EVs, energy storage and consumer electronics. When lithium-ion batteries are no longer suitable for their original use due to degradation or damage they will be demission but still with remaining capacity. The electrochemical performance of a lithium-ion battery deteriorates when the remaining life of the battery is reduced to less than 80%. Such battery needs to be recycled when it is unable to meet the relevant power requirements. Recycling and reutilization of retired lithium-ion batteries is ideal alternatives for the production of lithium-ion batteries from primary metal compounds as retired lithium-ion batteries can help downstream customers to reduce production costs of lithium-ion batteries by using recycled materials with lower prices. Moreover, governments worldwide have introduced a series of policies to encourage the recycling of retired lithium-ion batteries or mandate the use of recycled materials. Therefore, the surge in supply of retired lithium-ion batteries can spur demand for battery recycling and reutilization solutions. The volume of retired lithium-ion batteries globally and in Chinese mainland had grown at a CAGR of 28.9% and 25.7%, respectively, from 2021 to 2025, and is projected to grow at a CAGR of 39.5% and 46.0%, respectively, from 2025 to 2031. The surge in the supply of retired lithium-ion batteries has spurred high demand for battery recycling and reutilization solution.

Effectively relieve the shortage of raw materials supply: The rapid development of downstream industries such as EVs has intensified demand for lithium-ion batteries and their key metals (including lithium, nickel and cobalt), resulting in a shortage of mineral resources. By 2030, the global demand for lithium, nickel and cobalt is expected to reach 531 thousand tons, 4,754 thousand tons and 344 thousand tons, respectively, while the supply shortfall of lithium, nickel and cobalt is expected to reach 81 thousand tons, 450 thousand tons and 18 thousand tons, respectively. Recycling valuable metals from retired batteries helps meet this growing demand while reducing reliance on foreign raw material imports and effectively alleviating supply shortages.

Favorable policies and regulations: Governments globally are actively promoting comprehensive policies and regulations to support the development of the lithium-ion battery recycling and reutilization solution market. In Chinese mainland, the regulatory framework has been further enhanced in recent years. In February 2025, the State Council issued the “Action Plan for Improving the Recycling and Utilization System of Power Batteries for New Energy Vehicles” (健全新能源汽車動力電池回收利用體系行動方案), setting out a roadmap to strengthen regulatory mechanisms, improve recycling networks and enhance lifecycle management and traceability. The “Interim Measures for the Administration of Recycling and Comprehensive Utilization of Retired Power Batteries for New Energy Vehicles” (新能源汽車廢舊動力電池回收和綜合利用管理暫行辦法), which took effect on April 1, 2026, proposed to establish a more stringent and standardized framework covering the entire lifecycle, including mandatory traceability systems, strengthened supervision and clearer compliance requirements. These developments indicate a transition toward a more enforceable and closed-loop regulatory system. Internationally, the European Union’s Regulation (EU) 2023/1542 concerning batteries and waste batteries introduces comprehensive lifecycle requirements, including collection targets and recycled content thresholds. In July 2025, the European Commission further published implementing rules specifying methodologies for the calculation and verification of recycling efficiencies and material recovery rates, enhancing the enforceability of the regulatory framework and promoting high-quality recycling of battery materials.

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Future Opportunities and Challenges of Global and Chinese Mainland’s Lithium-ion Battery Recycling and Reutilization Solutions

Increasing market concentration: Due to limited coverage of professional lithium-ion battery recycling network, there are many small-scale recycling enterprises that lack advanced recycling equipment and mature recycling processes. These participants usually merely recover the most valuable battery components and discard the rest, which has a significant impact on the reutilization rate of retired lithium-ion batteries and may result in environmental pollution. As regulatory and environmental standards tighten and profitability pressures increase, the market is expected to consolidate toward more professional operators with comprehensive recycling capabilities such as our Group. Moreover, third-party solution providers with comprehensive recycling capabilities for both ternary and LFP batteries can effectively integrate diversified recycling channels and consolidate the resources from those small-scale players that cannot fully reutilize retired lithium-ion batteries, further accelerating the market consolidation.

Growing downstream demand facilitates expanding business layout: The rapid development of the EV industry has driven widespread adoption of lithium-ion batteries, significantly increasing demand for lithium-ion batteries. With their access to recycled raw materials (including lithium, nickel and cobalt), lithium-ion battery recycling and reutilization solution providers are well positioned to expand into manufacturing ternary precursors, lithium iron phosphate cathode materials, anode materials and other lithium-ion battery materials, further capitalizing on additional business opportunities arising from the rapid development of lithium-ion power batteries industry.

Technological advancements: Emerging automated equipment and digital technologies present significant opportunities to transform recycling operations. These advancements enable better process control, higher material recovery rates, and lower production costs. As leading solution providers continue to innovate recycling technologies and optimize processes, the increasing penetration of automation and digitalization is expected to drive improvements in operational efficiency, environmental performance and cost competitiveness.

Diversification of Recycling Channels: Leading solution providers are establishing diversified collection channels by leveraging their industry advantages. These include partnering with battery manufacturers’ after-sales service networks, collaborating with EV manufacturers’ authorized service centers and charging stations, and building proprietary recycling networks. The expansion of these recycling networks enables solution providers to secure stable battery supply while offering efficient and convenient recycling services across the value chain.

Entry Barriers of Global and Chinese Mainland’s Lithium-ion Battery Recycling and Reutilization Solution

Technology barrier: Wet recycling, the industry’s mainstream technology, offers high recovery rate and low energy consumption. However, the process requires sophisticated technical expertise to manage corrosive chemicals safely and meet environmental requirements, whilst strong technical capabilities are required to achieve the recovery of all valuable materials from retired lithium-ion batteries, and reutilization of both battery cathodes and anodes. Further, with the continuous upgrading of battery materials and battery pack structures, established players have been dedicated to improving recycling processes and positioning themselves at the forefront of industry advancement with continuous investment in R&D, presenting a significant barrier for new market participants.

Customer barrier: Established players enjoy strong reputations and long-term strategic relationships with downstream customers. New entrants face significant challenges in building similar customer relationships and securing market share against these established partnerships.

Channel barrier: As the current recycling volume of retired lithium-ion batteries in Chinese mainland is less than the total recycling capacity of all market participants, establishing stable and sufficient recycling channels has become one of the important factors to success. Leading players have secured partnerships with key suppliers such as EV manufacturers, lithium-ion battery manufacturers and retired vehicle dismantlers, making it difficult for new entrants to establish comparable supply networks in the short term.

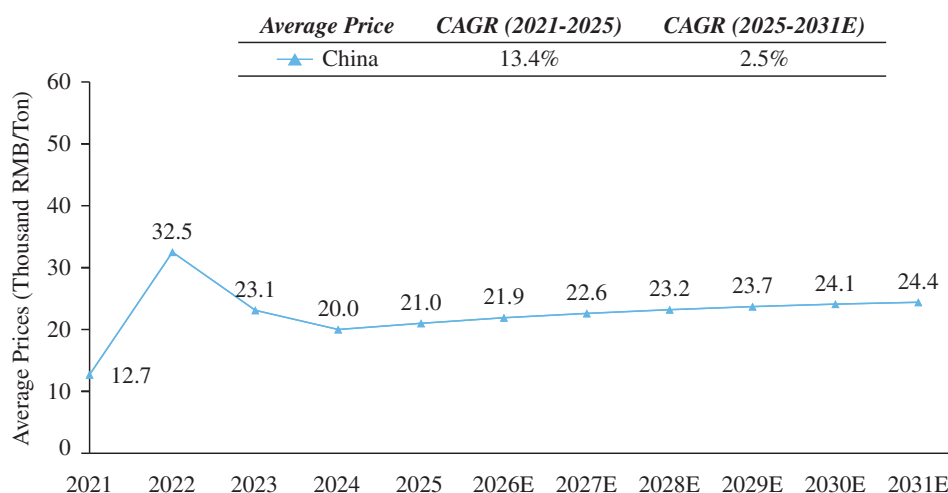
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Qualification barrier: The PRC government has issued the Industry Normative Conditions for the Comprehensive Reutilization of Retired Power Batteries for New Energy Vehicles (新能源汽车廢舊動力蓄電池綜合利用行業規範條件) since 2019, established a whitelist system, and certified and cultivated a number of backbone enterprises for lithium-ion battery recycling in order to improve industry standardization. While not mandatory and new applications for inclusion in the whitelist have been suspended in recent years, being on this whitelist still significantly influences partnerships with lithium-ion battery manufacturers and EV manufacturers. At present, regulatory focus has shifted from administrative qualification management toward full-lifecycle supervision and traceability. Following the introduction of the “Interim Measures for the Administration of Recycling and Comprehensive Utilization of Retired Power Batteries for New Energy Vehicles” (新能源汽车廢舊動力電池回收和綜合利用管理暫行辦法) in 2026, the entry barriers are increasingly driven by capability-based requirements, with a growing emphasis on traceability management, full value chain compliance and standardized operational capabilities.

Capital barrier: The lithium-ion battery recycling and reutilization solution industry is a capital-intensive industry. Obtaining retired batteries, configuring production equipment, and research and development processes all require significant capital investment. Leading market players with strong financial background can better capitalize on market opportunities in a fast-growing industry while new entrants face significant challenges in funding substantial up-front capital investment.

Average Prices of Retired Lithium-ion Batteries

Average Price of Retired Lithium-ion Batteries Excluding VAT (Chinese Mainland), 2021-2031E



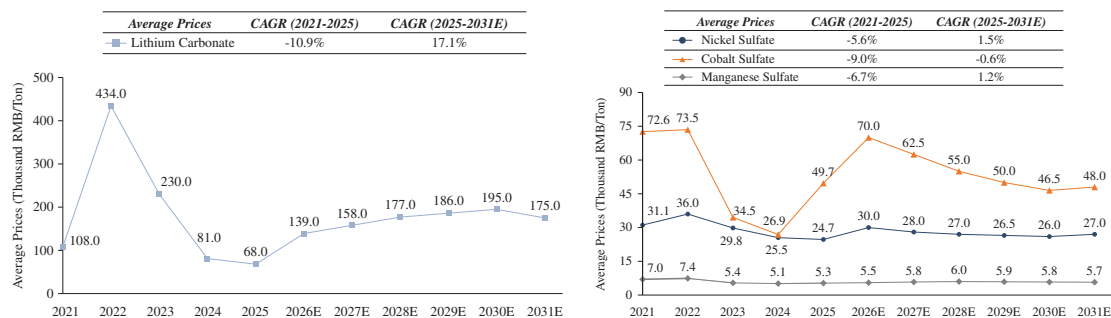
Source: Shanghai Metals Market, Frost & Sullivan analysis

The average price of retired lithium-ion batteries in Chinese mainland increased from RMB12.7 thousand per ton in 2021 to RMB21.0 thousand per ton in 2025, with a CAGR of 13.4%. In addition to market demand and battery prices, the price fluctuations of metal raw materials such as lithium, cobalt and nickel in lithium-ion batteries have directly impacted the average price of retired lithium-ion batteries, leading to an increase in the average price of retired lithium-ion batteries in Chinese mainland by 35.1% and 155.9% in 2021 and 2022, respectively. In the future, the average price of retired lithium-ion batteries in Chinese mainland is expected to reach RMB24.4 thousand per ton in 2031, with a CAGR of 2.5% from 2025 to 2031.

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Average Prices of Recycled Materials of the Lithium-ion Battery Recycling and Reutilization Solution Market in Chinese Mainland

Average Prices of Recycled Materials Excluding VAT (Chinese Mainland), 2021 to 2031E



Source: Shanghai Metals Market, OilChem, Frost & Sullivan analysis

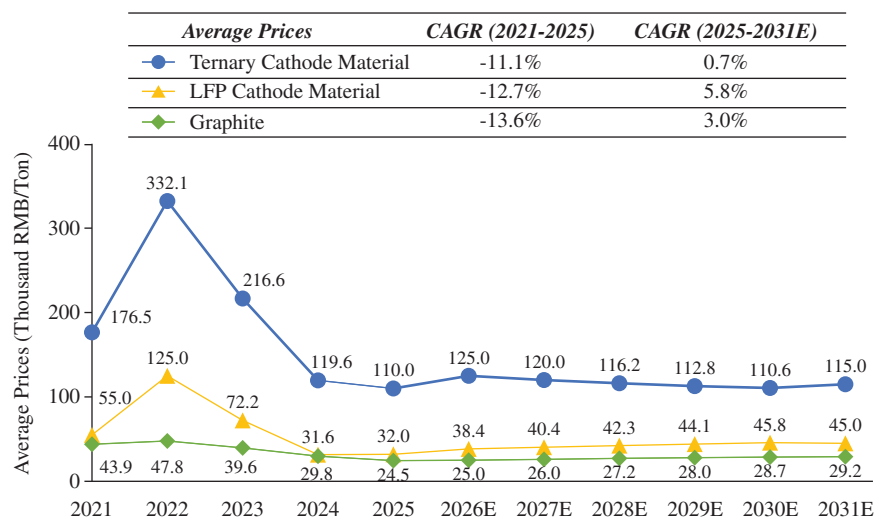
Market prices of metal compounds such as lithium carbonate typically refer to prices of such compounds from primary sources (i.e., mining). Recycled metal compounds prices are typically lower than primary sources. The price differential between primary and recycled metal compounds is an established industry norm, which is mainly attributable to (i) different cost structures between recycling operations and primary mining/processing, (ii) established market conventions that apply standardized discounting factors to recycled materials, and (iii) market perception differences between primary and recycled products. The price of lithium carbonate in Chinese mainland experienced significant growth from 2021 to 2022, increasing from RMB108.0 thousand per ton to RMB434.0 thousand per ton. This was mainly attributable to the surge in downstream demands from electric vehicle industry and photovoltaic industry, and the insufficient supply of lithium ore leading to a significant increase in the average price of lithium carbonate in Chinese mainland in 2022. Subsequently, the average price of lithium carbonate in Chinese mainland experienced an unprecedented decrease to RMB68.0 thousand per ton in 2025 mainly due to the increased supply of lithium carbonate. Going forward, the average price of lithium carbonate in Chinese mainland is expected to experience significant recovery from RMB68.0 thousand per ton to RMB175.0 thousand per ton from 2025 to 2031.

In Chinese mainland, the average prices of nickel sulfate, cobalt sulfate and manganese sulfate reached RMB24.7 thousand per ton, RMB49.7 thousand per ton and RMB5.3 thousand per ton in 2025, respectively. From 2021 to 2025, the average prices of nickel sulfate, cobalt sulfate and manganese sulfate in Chinese mainland grew at a CAGR of -5.6%, -9.0%, and -6.7%, respectively. In the future, the average prices of nickel sulfate, cobalt sulfate and manganese sulfate in Chinese mainland are expected to reach RMB27.0 thousand per ton, RMB48.0 thousand per ton and RMB5.7 thousand per ton in 2031, with a CAGR of 1.5%, -0.6%, and 1.2% from 2025 to 2031, respectively.

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Average Prices of Cathode Materials and Graphite in Chinese Mainland

Average Prices of Cathode Materials and Graphite (Chinese Mainland), 2021-2031E



Source: Frost & Sullivan analysis

In Chinese mainland, the average prices of ternary cathode material, LFP cathode material and graphite reached RMB110.0 thousand per ton, RMB32.0 thousand per ton and RMB24.5 thousand per ton in 2025, respectively. From 2021 to 2025, the average prices of ternary cathode material, LFP cathode material and graphite in Chinese Mainland grew at a CAGR of 11.1%, 12.7% and 13.6%, respectively. In the future, the average prices of ternary cathode material, LFP cathode material and graphite in Chinese mainland are expected to reach RMB115.0 thousand per ton, RMB45.0 thousand per ton and RMB29.2 thousand per ton in 2031, with a CAGR of 0.7%, 5.8% and 3.0% from 2025 to 2031, respectively.

From 2020 to 2022, the average prices of lithium carbonate surged, leading to a significant increase in the average prices of ternary cathode materials and LFP cathode materials. Subsequently, the price of ternary cathode materials and LFP cathode materials declined as lithium carbonate prices fell in 2023 and 2024, and is expected to rebound and maintain stable after 2026. In 2021 and 2022, the demand for graphite from the downstream new energy industry drove the increase in the average price of graphite. However, due to the intensified competition in graphite market, the average prices of graphite began to fall in 2023 and 2024. As outdated production capacity in the graphite market is eliminated and supply decreases, the average prices of graphite are expected to recover from 2026.

Competitive Landscape of Global and Chinese Mainland’s Lithium-ion Battery Recycling and Reutilization Solutions

Depending on whether they have their own sources of retired lithium-ion batteries, lithium-ion battery recycling and reutilization solution providers in Chinese mainland can be generally categorized into (i) lithium-ion battery manufacturers and EV manufacturers or their subsidiaries, who have their own channels to obtain retired batteries; and (ii) third-party solution providers, who are required to set up lithium-ion battery recycling networks and procure retired batteries from upstream suppliers.

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Ranking and market share of global lithium-ion battery recycling and reutilization solution providers in terms of sales revenue of recycled materials in 2025

Ranking	Company	Type of Provider	Sales Revenue of Recycled Materials in 2025 (RMB Billion)	Market Share (%)
1	Company A	Subsidiary of Lithium-ion Battery Manufacturer	8.3	13.4%
2	Our Group	Third-party Solution Provider	2.0	3.2%
3	Company B	Third-party Solution Provider	1.8	2.9%
4	Company C	Third-party Solution Provider	1.5	2.4%
5	Company D	Subsidiary of Lithium-ion Battery Manufacturer	1.3	2.1%
Top 5			14.9	24.0%

Source: Annual Reports; F&S analysis

Notes:

Sales revenue of recycled materials includes the revenue of recycled materials derived from the provision of processing services.

Company A is a company established in 2005, headquartered in Guangdong Province and engaging in the business segments of recycling, resources and materials, and is a subsidiary of a globally leading lithium-ion battery manufacturer.

Company B is a company established in 2001, headquartered in Guangdong Province and specializing in the comprehensive utilization of waste resources and the new energy industry, forming a dual track driven business model of urban mining new energy material manufacturing.

Company C is a company established in 2017, headquartered in the United States and engaging in recycling lithium-ion batteries and producing battery materials for electromobility and electrical storage systems.

Company D is a company established in 2016, headquartered in the Jiangxi Province and engaging in the provision of lithium recycling solution, NCM precursor, among others.

The global lithium-ion battery recycling and reutilization solution market for recycled materials reached a sales revenue of RMB61.8 billion in 2025. In terms of sales revenue of recycled materials in 2025, the top five global lithium-ion battery recycling and reutilization solution providers accounted for approximately 24.0%, of which Our Group ranked second with a market share of approximately 3.2% and ranked first among third-party solution providers.

Ranking and market share of global lithium-ion battery recycling and reutilization solution providers in terms of sales volume of recycled materials in 2025

Ranking	Company	Type of Provider	Sales Volume of Recycled Materials in 2025 (Thousand Tons)	Market Share (%)
1	Company A	Subsidiary of Lithium-ion Battery Manufacturer	241.5	13.1%
2	Our Group	Third-party Solution Provider	63.1	3.4%
3	Company B	Third-party Solution Provider	52.8	2.9%
4	Company D	Subsidiary of Lithium-ion Battery Manufacturer	40.0	2.2%
5	Company C	Third-party Solution Provider	35.5	1.9%
Top 5			432.9	23.5%

Source: Annual Reports; F&S analysis

INDUSTRY OVERVIEW

Notes:

Sales volume of recycled materials includes the volume of recycled materials derived from the provision of processing services.

The global sales volume of recycled materials in lithium-ion battery recycling and reutilization solution market reached approximately 1,849.4 thousand tons in 2025. In terms of sales volume of recycled materials in 2025, the top five global lithium-ion battery recycling and reutilization solution providers accounted for approximately 23.5%, of which our Group ranked second with a market share of approximately 3.4%.

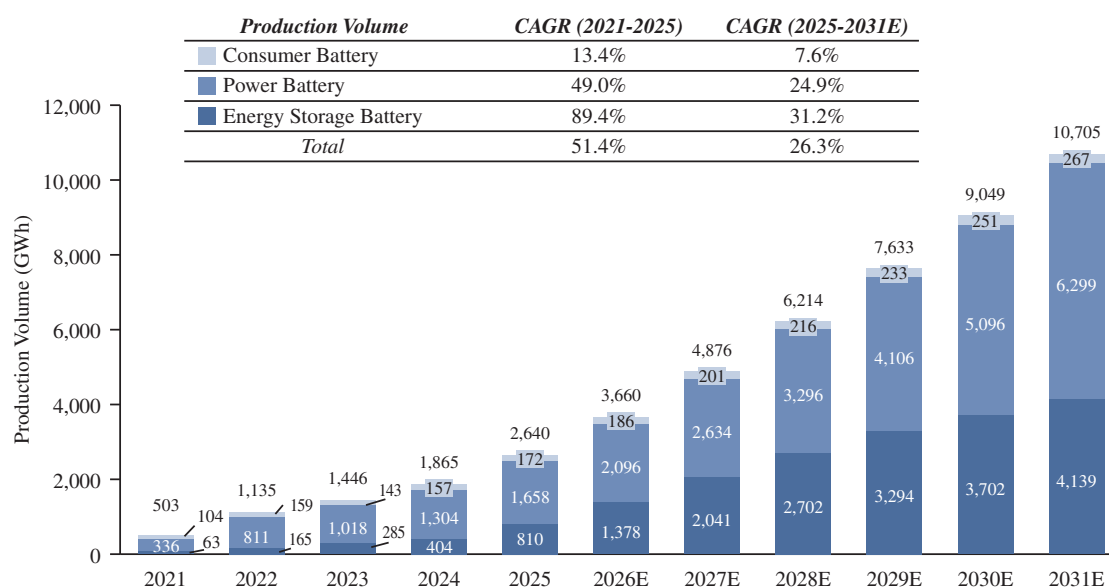
DOWNSTREAM INDUSTRIES OF LITHIUM-ION BATTERY RECYCLING AND REUTILIZATION SOLUTIONS MARKET

Overview of Downstream Industries

The major downstream industries of the lithium-ion battery recycling and reutilization solution market include the lithium-ion battery industry and lithium-ion material industry. The major downstream applications of the lithium-ion battery industry include EVs, low-speed EVs and others. The major applications in the lithium-ion battery materials industry involve ternary precursors, cathode materials, anode materials, and others.

Market Size of Downstream Industries

Production Volume of Lithium-ion Batteries (Global), 2021-2031E



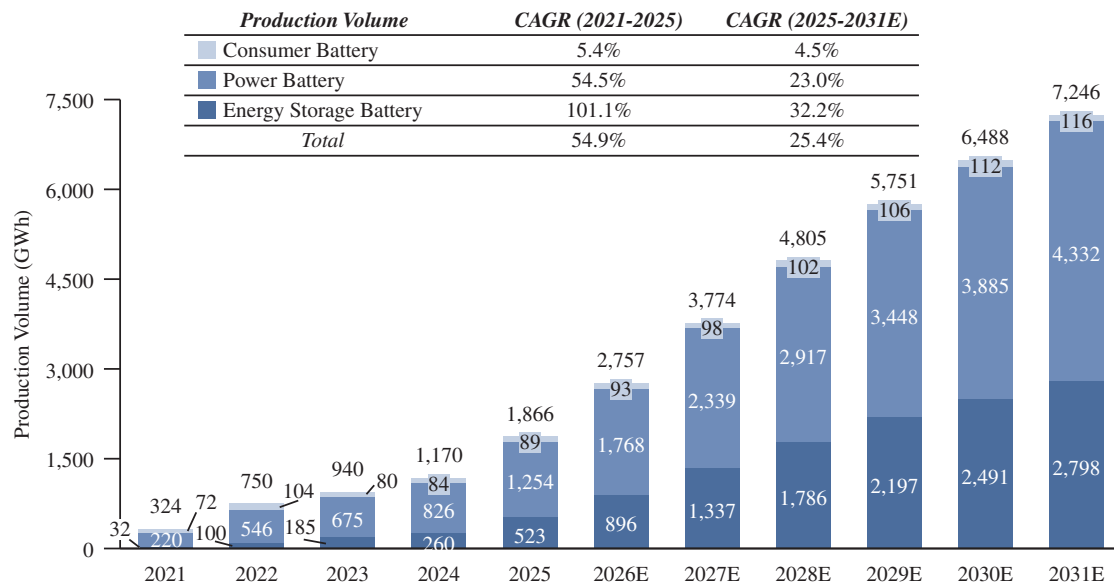
Source: F&S analysis

With the growth of EVs and energy storage industry, the global production of lithium-ion batteries increased from 503 GWh in 2021 to 2,640 GWh in 2025, at a CAGR of 51.4%. Among such lithium-ion batteries, the global production of consumer batteries increased from 104 GWh in 2021 to 172 GWh in 2025, at a CAGR of 13.4%; the global production of power batteries increased from 336 GWh in 2021 to 1,658 GWh in 2025, at a CAGR of 49.0%; and the global production of energy storage batteries increased from 63 GWh in 2021 to 810 GWh in 2025, at a CAGR of 89.4%.

With the growth in downstream demand, global production of lithium-ion batteries is projected to reach 10,705 GWh by 2031, growing at a CAGR of 26.3% from 2025 to 2031. Global production of consumer batteries, power batteries, and energy storage batteries is projected to reach 267 GWh, 6,299 GWh, and 4,139 GWh, respectively, by 2031, growing at a CAGR of 7.6%, 24.9%, and 31.2%, respectively, from 2025 to 2031.

INDUSTRY OVERVIEW

Production Volume of Lithium-ion Batteries (Chinese Mainland), 2021-2031E



Source: MIIT; F&S analysis

In line with the growing demand in the downstream industries, the production volume of lithium-ion batteries in Chinese mainland increased from 324 GWh in 2021 to 1,866 GWh in 2025, at a CAGR of 54.9%. Among such lithium-ion batteries, the production of consumer batteries increased from 72 GWh in 2021 to 89 GWh in 2025, at a CAGR of 5.4%; the production of power batteries increased from 220 GWh in 2021 to 1,254 GWh in 2025, at a CAGR of 54.5%; and the production of energy storage batteries increased from 32 GWh in 2021 to 523 GWh in 2025, at a CAGR of 101.1%.

Chinese Mainland's lithium-ion battery production is expected to reach 7,246 GWh by 2031, at a CAGR of 25.4% from 2025 to 2031, due to policy support and growing downstream demand. Chinese Mainland's production of consumer batteries, power batteries and energy storage batteries is expected to reach 116 GWh, 4,332 GWh and 2,798 GWh, respectively, by 2031, growing at a CAGR of 4.5%, 23.0% and 32.2%, respectively, from 2025 to 2031.

Future Opportunities of Downstream Industries

Increasingly robust downstream demands: Recycled materials are mainly used in fast-growing industries such as EVs. Global and Chinese mainland's production of EVs is expected to reach 53.0 million and 32.5 million by 2031, with a CAGR of 16.3% and 14.1% from 2025 to 2031, respectively. This industry growth will generate more battery retired, thereby stimulating demand for lithium-ion battery recycling and reutilization solution. In addition, the growth of these industries is leading to increasing demand for lithium-ion batteries and their raw materials, resulting in a shortage of mineral resources. By 2030, the global demand for lithium, nickel and cobalt is expected to reach 531 thousand tons, 4,754 thousand tons and 344 thousand tons, respectively, while the supply shortfall of lithium, nickel and cobalt is expected to reach 81 thousand tons, 450 thousand tons and 18 thousand tons, respectively.

Cost reduction drives downstream demands: As lithium-ion battery recycling and reutilization solution gradually penetrate the lithium-ion battery industry, the production costs of lithium-ion batteries, lithium-ion battery materials, and EVs are expected to decline. Specifically, in the production of raw materials for lithium-ion batteries, the lithium-ion battery recycling and reutilization solution market offers significant cost advantages over traditional ore mining, reducing production costs by more than 20%. This cost advantage makes recycled materials more attractive to downstream industries creating a positive feedback loop that should further drive market growth.