

Pioneering the Green Revolution, Forging a New Path in Recycling

Battery Science & Technology: Innovating a Green Path for Power Battery Recycling, Dismantling and Circular Utilization

Battery Science & Technology Co., Ltd.

Project Background

Power Battery Recycling: A Global Imperative for the Sustainable Development of the New Energy Vehicle Industry



A Surge of Retired Batteries

By 2026, the global volume of retired power batteries is projected to reach 43 GWh, with China accounting for the majority share.
By 2030, China's retired battery volume may rise to 171 GWh, while the global cumulative total is expected to exceed 250 GWh.

A Global Ecological Threat

These used batteries contain large quantities of hazardous heavy metals such as nickel, cobalt, and manganese. Improper disposal can cause severe soil and water contamination, thereby endangering human health.

A Bottleneck in Lithium Resources

While global lithium reserves are sufficient in the short term, the medium- to long-term outlook points to increasing scarcity. The highly concentrated distribution of lithium resources, combined with the limitations of extraction technologies and development speed, cannot meet the surging global demand and deployment of the new energy vehicle industry. The Earth does not lack lithium—but it lacks lithium that is affordable, fast to extract, and environmentally sustainable.

A Global Consensus on Circular Utilization

In 2024, the European Union successively introduced the Batteries Regulation and the Critical Raw Materials Act, which establish explicit mandatory requirements for the proportion of recycled materials in batteries used for new energy vehicles. By 2030, at least 25% of critical raw materials must come from recycled sources.

Battery Science & Technology Co., Ltd.

Exploring New Pathways for the Circular Development of the New Energy Industry



Committed to Sustainability with a Decade-Long Strategic Deployment

Founded in 2016, Battery Science & Technology is dedicated to the sustainable development of the power battery recycling sector. Anticipating the forthcoming wave of large-scale power battery retirements, the company is pioneering new pathways for the circular development of the new energy industry. Through industry-leading technological innovation, Battery Science & Technology enables the renewable utilization of resources.

An MIIT White-Listed Enterprise & Core Contributor to National Standards

Contributing to the formulation of eight national standards;
Actively driving the industry's transformation and upgrading from a fragmented, small-scale, and disorderly sector to one that is standardized, large-scale, and environmentally sustainable.

China's First 10,000-Ton Fully Automated Discharge-Free Dismantling Line

China's first zero-carbon factory for lithium battery recycling and resource-based utilization;
A demonstration project for power battery recycling and utilization in the Beijing-Tianjin-Hebei region;
Inclusion into the Advanced Production Capacity Catalog jointly issued by the Ministry of Industry and Information Technology (MIIT) and the Ministry of Ecology and Environment (MEE) of

Innovation

Industry-First Green Dismantling Technology with a 95% Full-Component Recovery Rate



Core Technology of Fully Automated, Discharge-Free and Safe Dismantling

The company has innovated the crushing method for power batteries that allows direct crushing without discharge, eliminating manual intervention while ensuring full-process automation and high operational efficiency—effectively resolving long-standing challenges in the industry.

Zero Wastewater, Zero Exhaust Gas, Zero Solid Waste Release

Battery Science & Technology's production lines operate in a fully enclosed system that generates no wastewater or hazardous waste. Exhaust gases are collected and treated in a centralized, leak-free process. The system operates with low energy consumption, requiring no smelting or heating and no chemical reagents, thereby achieving a clean and pollution-free production cycle.

Industry-Leading Lithium Recovery Performance

Leveraging its industry-leading full-solution, full-component hydrometallurgical regeneration technology, Battery Science & Technology achieves a full-component recovery rate of 95%. Extracted elements such as copper, lithium, and iron phosphate are reintroduced into the production cycle of metals and battery materials, realizing both resource-based utilization and carbon recovery.

Closed-Loop and Traceable Carbon Footprint Across the Entire Chain

The company adopts a full life cycle technology innovation model grounded in the DFR/DFE (Design for Recycling / Design for Environment) concept, emphasizing "easy to manufacture, easy to dismantle, and easy to recycle".

Sustainability

Contributing to Global Carbon Reduction and Carbon Neutrality Goals

Effective Reduction of Carbon Emissions

Recycling 1 kilogram of power batteries with directional recycling and recycling & regeneration processes can reduce the carbon footprint by 2.76 kilograms and 3.75 kilograms, respectively—representing a 7% and 10% reduction compared to producing new materials from virgin resources[1]. Recycling one ton of used batteries can cut approximately 8.5 tons of carbon emissions.

Resource Conservation and Mining Substitution

The company's recycling technologies minimize the waste of critical mineral resources such as lithium, cobalt, and nickel, reducing dependence on primary mining activities. This approach results in 83% less energy consumption and 79% less water usage, while achieving up to 61% lower carbon emissions compared with virgin mineral extraction[2].

Enhanced Recycling Efficiency

Through its full-solution, full-component recovery technology, Battery Science & Technology achieves recovery rates of over 95% for critical metals such as nickel, cobalt, and manganese.

Reduced Energy Consumption in Production

By adopting advanced charged crushing and cascade regeneration technologies, the company reduces production line energy consumption by 40% and carbon emissions by 60%.



Data Source: 1. International Energy Agency (IEA); 2. Edith Cowan University, Australia

Sustainability

Contributing to Global Carbon Reduction and Carbon Neutrality Goals

Achieving Carbon Neutrality

Battery Science & Technology's Tianjin plant has undergone rigorous verification by an authoritative green certification body and has been awarded the PAS 2060 Carbon Neutrality Certificate, becoming the first enterprise in the industry to achieve carbon neutrality.

Remarkable Carbon Reduction Results

The company's lithium regeneration process achieves an annual carbon reduction of 454,200 tons. In addition, it has installed a distributed photovoltaic power generation system at its facilities, generating 1.13 million kWh of green electricity and saving 349 tons of standard coal annually. This system reduced 947 tons of CO_2 emissions in 2023 and approximately 194.9 tons of CO_2-equivalent emissions in 2024.

100% Prevention of Secondary Pollution

Through its discharge-free, zero-waste physical dismantling technology, Battery Science & Technology ensures 100% prevention of secondary pollution to both humans and the environment.



Scalability

Exploring a Sustainable Development Path that Balances Environmental Protection, Economic Efficiency, and Industrial Scale

Technological Breakthroughs with Industry Demonstration Value

- The technology is compatible with multiple types of retired lithium power batteries, ensuring broad industry applicability.
- The integrated "dismantling–remanufacturing–deep material processing" model has been successfully validated through a 10,000-ton project in Tianjin, laying the groundwork for rapid replication.



Low-Carbon, Cost-Efficient, and Highly Replicable

- By achieving high-value utilization of all recovered components, Battery Science & Technology has established a sustainable business model of "funding emission reduction with waste-derived revenue", offering significant demonstration value for building a closed-loop circular and remanufacturing system.
- The company's technological process has reduced the per-ton treatment cost by 45%, proving that environmental investment and economic benefit can form a positive cycle.

Building a Synergistic and Coexistent Industrial Ecosystem

- The company collaborates with automakers, battery manufacturers, and materials enterprises across the industrial chain to ensure regulated recycling channels for retired batteries.
- As a demonstration project for power battery recycling and utilization in the Beijing-Tianjin-Hebei region, the company has pioneered a cross-regional collaboration model, providing a replicable blueprint for national city clusters and circular economy parks.
- By exporting its technological expertise, the company empowers partners and elevates industry standards.



Leading the Establishment of National Standards

- In partnership with government agencies and industry associations, Battery Science & Technology actively advocates for raising industry entry thresholds, establishing an Extended Producer Responsibility (EPR) system, and promoting the development of quantifiable regulatory rules and carbon footprint assessment mechanisms—creating a fair competitive environment for compliant enterprises.

Comprehensive Benefits

Driving Sustainable Industry Development and the Transformation Toward a Circular Economy

01 Advancing the Circular Economy



- Battery Science & Technology has established a complete resource loop encompassing battery production → usage → recycling and regeneration → material reuse, forming a replicable regional circular economy model in Tianjin and achieving an industrially integrated loop.
- By maintaining high technical standards and rejecting the disorderly practices of small, unregulated workshops, Battery Science & Technology is helping to reverse the "bad money drives out good" phenomenon, fostering a more standardized

02 Enhancing Resource and Energy Efficiency



- Resource efficiency multiplied: With a full-component recovery rate of ≥95%, Battery Science & Technology achieves the efficient transformation of "waste" into "raw materials", significantly improving resource utilization.
- Optimized energy consumption: Through short-process manufacturing and discharge-free technologies, the company reduces unit product energy consumption by approximately 60%, achieving energy savings from the source while ensuring full-chain carbon footprint traceability and management.

03 Yielding Significant Environmental Benefits



- Substantial emission reduction: The company's lithium regeneration process achieves an annual carbon reduction of 454,200 tons, providing tangible support for regional carbon peaking efforts.
- Model for green manufacturing: With a fully enclosed zero wastewater, zero exhaust gas, and zero solid waste process, Battery Science & Technology has built an environmentally friendly production system that sets a new benchmark for green operations in the

04 Enhancing Industry-Wide Economic Efficiency



- Lower treatment costs: Process innovations have reduced the per-ton treatment cost by approximately 45%.
- Ensuring resource security: By recycling critical metals, the company reduces dependence on upstream mineral extraction.

Expected Returns

Technology-Driven Multi-Dimensional Revenue Growth and High-Quality Talent Development



Multi-Dimensional Revenue Potential

The project embodies the combined advantages of the “urban mine” resource value, the added value of cascade utilization, policy incentives, and the vast potential of industrial chain integration.

- The company can not only charge processing service fees and cascade utilization service fees for retired batteries, but also generate revenue from the sale of recovered metal materials, forming a dual revenue stream of “service income + product sales”.
- As the carbon trading market matures, additional income can be obtained through the sale of carbon emission quotas.
- Looking ahead, by analyzing degradation data and failure patterns from large volumes of retired batteries, Battery Science & Technology will be able to provide data-driven insights to battery manufacturers and automakers, helping them improve battery design and production processes, thus developing a new value-added data services business.

Empowering Regional Talent Structure Upgrading

The company contributes to upgrading the regional human resource structure by cultivating high-quality R&D experts and technical professionals in the field of power battery recycling, fostering a skilled workforce that supports both industrial and regional growth.



Project Contribution to the United Nations Sustainable Development Goals (SDGs)

A Chinese Model with Global Relevance

Battery Science & Technology's model is typical, representative, and innovative, forming a "Chinese pathway" that provides a successful paradigm and reference for similar markets around the world.

Transforming Waste into Value and Creating Green Wealth

- Fundamental breakthrough: Battery Science & Technology has successfully addressed the industry-wide challenges of cascade utilization and end-of-life recycling of power batteries, achieving resource-based utilization and carbon recovery in a safe, environmentally friendly, and pollution-free manner.
- Value creation: The company truly transforms waste batteries into "green wealth", realizing the vision of converting waste into valuable resources.

Co-Building Industrial Ecosystem Driven by Technology

- Technological breakthroughs: Through continuous innovation in core technologies, the company enhances the economic viability and efficiency of battery recycling.
- Standard leadership: Participating in the formulation of industry standards, the company leads the standardized and orderly development of the sector.
- Ecosystem collaboration: Working hand-in-hand with partners across the industrial chain, the company fosters an industrial ecosystem of collaborative development.

Safeguarding Resource Security and Supporting Global Deployment

- Ensuring resource security: By reducing dependence on the extraction of critical raw minerals, Battery Science & Technology advances global resource conservation and promotes circular resource utilization.
- Supporting global expansion: The company contributes to the high-quality international expansion of the new energy vehicle industry.
- Driving green growth: The company injects green momentum into high-quality economic and social development.

Project Contribution to the United Nations Sustainable Development Goals (SDGs)

Sustainable Development Goals (SDGs)	Correspondence with Battery Science & Technology's Business
SDG 12: Responsible Consumption and Production	The company's core business focuses on the recycling and circular utilization of power batteries, turning waste into value through advanced technologies and promoting the development of a circular economy.
SDG 13: Climate Action	The Tianjin plant achieved carbon neutrality (Scope 1 and Scope 2 greenhouse gas emissions) in 2023, certified under PAS 2060, directly contributing to carbon reduction efforts.
SDG 9: Industry, Innovation and Infrastructure	The company has developed proprietary core technologies such as "dry-process" dismantling and participated in drafting eight national standards, driving industry upgrading through technological innovation.
SDG 7: Affordable and Clean Energy	By installing a distributed photovoltaic power generation system at its facilities, the company promotes the use of green electricity and achieves the optimization of the energy mix.
SDG 6: Clean Water and Sanitation	Its dismantling process achieves zero wastewater discharge throughout the entire production cycle, eliminating water pollution risks at the source.
SDG 15: Life on Land	Through compliant and non-hazardous recycling practices, the company prevents soil and ecosystem contamination from heavy metals and harmful chemicals.
SDG 17: Partnerships for the Goals	The company has established strategic partnerships with leading enterprises in the industrial chain, such as SANY Group, XCMG, and Goldwind, to jointly build a recycling network that fosters knowledge sharing and technology diffusion.
SDG 8: Decent Work and Economic Growth	As a compliant enterprise, it creates technology-intensive employment opportunities and ensures safe and healthy working conditions for employees through automated production systems.

巴特瑞科技
Battery Science & Technology

CHINA'S BATTERY RECYCLING SOLUTION, DRIVING GLOBAL GREEN GROWTH.