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The Impact of EU Battery Regulations for Chinese Battery Industry

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Abstract: ***The EU battery regulations have exerted significant international influence, presenting both challenges and opportunities for the Chinese battery industry. These regulations impose stringent requirements on environmental protection, technological advancement, and supply chain management for battery companies exporting to the EU market. By analyzing key provisions such as enhancing the sustainability of battery products, managing carbon footprints, increasing recycling rates, and ensuring raw material traceability, this study reveals that the regulations pose substantial challenges to Chinese battery manufacturers in terms of cost, technology, and market access. To address these challenges, the paper proposes countermeasures and suggestions aimed at bridging regulatory and policy gaps, improving green production standards, enhancing the recycling system, optimizing supply chain management, upgrading battery product technology and safety standards, and accelerating international expansion.***

Keywords: EU Battery Regulations; Power Batteries; Chinese Battery Industry; Technological Innovation.

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1. Introduction

With the continuous pursuit of clean energy and sustainable development, the battery industry has experienced explosive growth. It is predicted that by 2030, the global demand for batteries will be 14 times greater than the current level, of which the EU will account for 17% of the global demand. This rapid growth trend indicates a bright future for the battery market. As a key technology for achieving zero-emission transportation and storing unstable renewable energy, batteries play a vital role in the EU's climate neutrality goals. However, as electric vehicles and energy storage systems become increasingly dependent on batteries, the environmental footprint of the battery industry has also attracted widespread attention. The EU is highly dependent on key raw materials such as lithium, cobalt, and nickel. From the mining of rare metals and the use of hazardous substances to energy consumption and waste disposal, the entire life cycle of batteries is accompanied by a series of environmental and social issues. These issues urgently need to be regulated through strong policies and regulations. The new battery regulations aim to reduce dependence on external resources and ensure the sustainability of the supply chain by increasing recycling rates and promoting the use of recycled materials.

The EU Battery and Waste Battery Regulation (hereinafter referred to as the "EU Battery Regulation") was officially implemented on February 18, 2024, marking a new stage in the regulatory requirements of the battery industry. The regulation aims to promote the transformation of the battery industry to a more environmentally friendly and sustainable model and strengthen the EU's position in global battery technology competition. According to the EU Battery Regulation, beginning in July 2024, power batteries and industrial batteries must declare detailed information, including the product carbon footprint, when they enter the EU market. By 2027, power batteries exported to Europe must also be accompanied by a "battery passport" that meets the standards, which undoubtedly places greater requirements on battery manufacturers. The EU Battery Regulation requires relevant companies to take measures to reduce the environmental pollution of batteries and improve resource efficiency, which will have a far-reaching impact on battery manufacturers, recyclers, consumers, and industries that rely on batteries, such as automobiles and energy storage. Chinese power battery companies need to pay more attention to the carbon footprint of products and "battery passports" and other requirements in the process of going overseas, which, to a certain extent, increases the operating costs and technical challenges of enterprises.

2. Interpretation of the EU Battery Regulation

The EU Battery Regulation is an important legislation introduced by the EU to strengthen the management of batteries and promote sustainable development. It comprehensively regulates the entire cycle of batteries from production to use, reuse and final recycling. The regulation sets clear limit standards for the content of hazardous substances such as mercury, cadmium and lead. By 2030, there will be specific mandatory requirements for the recycling rates of key materials such as lithium, cobalt, nickel and lead. Since July 2024, power batteries and industrial batteries must provide detailed carbon footprint information before entering the EU market and ensure that they meet established performance and durability standards. In addition, beginning in 2027, all power batteries exported to Europe must be accompanied by a "battery passport" that details the battery manufacturer's information, material composition, carbon footprint and supply chain details to enhance transparency and traceability.

In terms of safety, the regulation requires manufacturers to conduct safety tests and risk assessments on stationary battery energy storage systems and to prove that relevant measures to reduce risks have been taken. In addition, the regulations update the requirements for battery labeling and information disclosure, stipulating that batteries must be clearly labeled to display key information, including manufacturer information, battery type, manufacturing location, production date, weight, capacity, chemical composition, etc. All batteries must be accompanied by a QR code so that consumers and regulators can easily obtain more product information. The regulations also encourage the use of recycled materials in battery production and set targets for recycling efficiency to support the sustainable development and circular economy of the battery industry. Moreover, battery manufacturers are required to conduct due diligence to ensure that their supply chains do not involve minerals from conflict areas and follow standards of social responsibility and environmental protection.

The implementation of these regulations significantly impacts battery manufacturers, recycling companies, consumers, and industries that rely on battery technology, such as automobiles and energy storage. In response to the battery bill, companies must reduce the impact of production and other processes on the environment, improve resource efficiency, and ensure the sustainability of raw material procurement. For power battery manufacturers in non-EU countries such as China, costs will increase significantly, and technical requirements will increase significantly, but this is also an opportunity for Chinese companies to improve products, enhance technology and enhance market competitiveness.

3. Comparison between EU battery regulations and relevant Chinese regulations

By comparing EU battery regulations with relevant Chinese power battery regulations, we find that there are significant differences between the two in many key areas, which are reflected mainly in the scope of application of the regulations, implementation details, environmental protection and market access mechanisms.

First, in terms of the scope of application, EU battery regulations cover a variety of battery types, including portable batteries, light mandatory batteries, electric vehicle batteries and industrial batteries, and formulate corresponding technical specifications and environmental protection requirements for each type of battery [1]. In contrast, China's power battery regulations focus on the recycling and cascade utilization of new energy vehicle power batteries, especially in terms of safety management. Detailed provisions are provided, such as the "Management Measures for the Cascade Utilization of New Energy Vehicle Power Batteries".

Second, with respect to environmental protection regulations, EU regulations clearly require the regulation of the battery carbon footprint and the use of recycled materials and battery passports and emphasize the environmental impact and resource utilization efficiency of the entire life cycle of batteries [2]. China's relevant regulations also focus on the impact of batteries on the environment but focus more on battery production, recycling and reuse processes, as well as improving the comprehensive utilization rate of resources.

In terms of market access rules, EU regulations introduce new mechanisms such as battery passports and supply chains due diligence, requiring battery manufacturers to record the raw material sources, supply chains and environmental impacts of batteries in detail and make self-declarations. China, on the other hand, has strengthened supervision of the entire life cycle of batteries by establishing a power battery traceability management platform and promoting standardized and modular production.

In terms of implementation details, EU regulations provide a detailed implementation timetable and phased goals, such as the provisions of the battery passport, which will take effect in 2027. China's policies place more emphasis

on guiding principles and industry self-discipline. The specific implementation details and timetables may vary according to different regions and are constantly being updated and improved.

Finally, in terms of technical standards and testing methods, EU regulations tend to adopt unified technical standards and testing methods to ensure the consistency and mutual recognition of battery products within the EU. China is actively promoting the formulation and revision of national standards and encouraging enterprises to participate in the formulation of international standards to promote the integration of domestic and foreign markets.

The EU battery regulations are more detailed and complete in the relevant provisions of life cycle supervision, supply chain due diligence, environmental protection and technical standards. EU battery regulations provide a more comprehensive and advanced framework for promoting environmental sustainability, market transparency and supply chain responsibility. Although EU battery regulations and China's power battery regulations differ in some aspects, they both reflect the common goal of promoting the sustainable development of the battery industry and strengthening environmental protection. As the global battery market continues to develop, these differences in China's power battery regulations may gradually decrease with technological progress and policy coordination.

4. Impact of EU battery regulations

EU battery regulations have had a profound impact internationally, reshaping not only the EU's own battery industry but also the sustainability, environmental protection, technological innovation and international trade of the global battery industry. This regulation advocates environmental protection and resource utilization efficiency throughout the battery life cycle and guides the global battery industry toward a more low-carbon, high-efficiency, and sustainable development path. By implementing the "battery passport" system, regulations require that all battery products have detailed "passport" information before being put on the market, covering key data throughout their life cycles and thereby enhancing the transparency and traceability of the global battery industry [3]. In addition, regulations encourage the use of recycled materials by setting recycling efficiencies, driving progress in global battery recycling and the circular economy. These measures not only improve the recycling rate of resources but also promote the development of related technologies and services. With the implementation of regulations, other countries and regions will follow up and update or formulate new battery-related regulations to adapt to the high standards of the EU market, thereby affecting the unification of regulations and standards in the global battery market.

The regulations also emphasize the duty of care that battery manufacturers should perform in the supply chain, requiring manufacturers to conduct due diligence to ensure compliance with environmental and social responsibility standards and promoting positive changes in environmental protection and social responsibility in the global battery industry. To enter the EU market in compliance with the high standards of EU battery regulations, global battery manufacturers will continue to innovate and upgrade technology to improve battery performance and environmental friendliness and accelerate the technological progress and industrial upgrading of the entire industry [4]. Finally, regulations put forward clear requirements for the sustainable procurement of battery raw materials, which will reshape the global supply and trade pattern of battery raw materials, encourage relevant countries and companies to improve the mining and processing of raw materials, and reduce adverse impacts on the environment and society.

The impact of EU battery regulations on China's power battery industry is multifaceted, presenting both challenges and opportunities. First, as China is a major country in terms of global battery production and exports, the implementation of EU battery regulations has undoubtedly increased the threshold for Chinese battery companies to enter the EU market [5]. To meet the EU's environmental standards and regulatory requirements, Chinese companies need to upgrade their technologies and increase their investment costs to ensure that their products comply with the new regulatory requirements. Second, the bill’s requirements for batteries’ carbon footprint, use of recycled materials, and supply chain due diligence have prompted Chinese companies to increase investment in research and development and technological innovation to improve battery performance and environmental protection. This not only helps improve product competitiveness but also promotes the sustainable development of China's battery industry.

In addition, the implementation of EU battery regulations will also encourage Chinese companies to strengthen supply chain management and ensure the sustainable procurement of raw materials, which will have a positive effect on improving companies’ international image and market competitiveness. At the same time, facing the new requirements of the EU market, Chinese battery companies actively explore the possibility of other markets

achieving market diversification strategies and reducing their dependence on a single market. In terms of the circular economy and recycling, EU battery regulations encourage battery recycling and recycling, providing new business opportunities for Chinese companies while also helping to improve the recycling rate of resources and reduce environmental pollution.
Finally, China can refer to the content of EU battery regulations and update or formulate battery-related regulations to improve the overall level and international competitiveness of the domestic battery industry. This will not only help Chinese battery companies better adapt to the requirements of the international market but also help promote the healthy development of the domestic battery industry. The impact of EU battery regulations on China's power battery industry is complex and far-reaching. Chinese companies need to actively respond to challenges and seize opportunities to achieve sustainable development.

5. Research on the path to address EU battery regulations

The first is to fill the gaps in regulations and policies. Although China has issued some relevant regulations on battery recycling, they are still not perfect in terms of enforcement, recycling channels, and qualification certification for recycling companies. Most waste batteries have not been effectively recycled, resulting in resource waste and potential environmental pollution. It is necessary to establish a more complete battery recycling system, including strengthening the supervision of recycling companies, clarifying recycling standards, encouraging manufacturers to assume responsibility for the entire life cycle of batteries, and introducing consumer incentive policies to promote the recycling of waste batteries. The safety testing standards for battery products should be strengthened; safety requirements during battery design, production and use should be strictly enforced; sufficient stability and safety of batteries under various working conditions should be ensured; and safety monitoring of power batteries throughout their life cycle should be strengthened [6]. Actively promoting the connection between domestic battery regulations and international standards, participating in the formulation and revision of international battery regulations, and ensuring the competitiveness of China's battery industry in the global market are important. Moreover, policy coordination with major battery-producing countries should be strengthened to promote the green development of the global battery industry. Actively participate in the revision of international carbon footprint standards, actively learn from relevant EU regulations, and accelerate the formulation of carbon footprint accounting methods for China’s power battery products in combination with China’s national conditions and objective development needs.

The second goal is to improve the green and sustainable standards for battery production. EU battery regulations require that the production, use and recycling of batteries meet strict environmental standards, such as carbon footprint calculations, sustainable sources of raw materials and regulations on recycling rates. China’s battery manufacturers need to accelerate the implementation of green production processes, adopt low-carbon raw materials and reduce carbon emissions. In addition, companies should conduct full life cycle environmental impact assessments and gradually meet the EU's carbon footprint and sustainability standards. Moreover, it is necessary to introduce and promote the use of clean energy in the production process to reduce reliance on traditional high-energy production methods.

Third, the supply chain should be optimized to ensure the traceability of key materials. The new EU regulations require battery manufacturers to provide traceability information on raw battery materials to ensure that the source of raw materials meets environmental and human rights standards, especially the collection of key minerals such as lithium and cobalt, which must meet ethical and environmental requirements. China’s battery manufacturers should optimize supply chain management to ensure that every link from minerals to finished products complies with the principles of sustainable development. Cooperate with raw material suppliers that meet environmental and human rights standards to ensure that the source of key materials in batteries is clear and traceable. Promote the establishment of a green supply chain system to ensure compliance with EU material compliance requirements.

Fourth, battery product technology and safety standards should be improved. EU battery regulations have put forward higher requirements for battery performance, safety and postdisposal disposal, especially for the safety, durability and recyclability of new energy vehicle batteries. Therefore, China’s battery manufacturers should continue to improve battery technology research and development and product safety and durability, especially under extreme conditions such as high and low temperatures. Moreover, the convenience of recycling and secondary use should be considered in battery design, and more disassembled and reusable battery modules should be designed [7]. In addition, safety testing and certification that meet international standards should be accelerated to ensure that export products can successfully pass EU market access.

Fifth, companies should accelerate their international layout. EU battery regulations may promote the demand for localized production in the EU market and reduce dependence on imported batteries. Chinese battery companies can consider investing in and building factories in the EU and directly entering the EU market for localized production. This can not only avoid trade barriers but also reduce logistics costs and better respond to EU regulatory requirements. They can enter the EU market through acquisitions or cooperation with local European companies and gain technical, market and regulatory advantages through local companies.

6. Conclusion

The EU battery regulations have had a profound impact on China's battery industry, mainly involving environmental protection requirements, recycling, raw material traceability, and improvements in safety and technical standards. The Act imposes strict requirements on the entire life cycle of batteries, especially the carbon footprint, recycling rate, supply chain traceability and other aspects. For Chinese battery export companies, maintaining global competitiveness while complying with these new regulations has become a key challenge. my country's battery companies can face the challenges of EU battery regulations and seize the opportunity to internationalize by increasing R&D efforts, improving battery performance and environmental protection levels, strengthening supply chain management, improving resource recycling rates, improving the international competitiveness of products, establishing and improving the product carbon footprint accounting system, and promoting the connection between domestic standards and international standards.

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