

# Legal Construction of the Indicator System for New Energy Storage in the Power Industry under the 'Dual Carbon' Goals

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**Abstract:** Emerging energy storage is an important field for fostering the domestic new energy industry and seizing new international strategic heights. It is a crucial technology and basic equipment for building a new type of power system and an important support for achieving the carbon peak and carbon neutrality goals [1]. However, at the present stage, the development of laws related to energy storage projects is relatively slow, which to some extent restricts the growth pace of the new energy industry. The power industry plays a significant role in energy consumption and carbon emissions, and its transition to green and low-carbon is of great importance for achieving the "dual-carbon" goals. This paper first analyzes the impact of the "dual-carbon" goals on the power industry, then explores the application of emerging energy storage technologies in the power industry and their legal requirements. Following that, it constructs an energy storage index system encompassing technical standards, market mechanisms, regulatory frameworks, and policy support and proposes corresponding legal construction recommendations. Finally, the article emphasizes the critical role of law in the development of energy storage technologies in the power industry and in the realization of the "dual-carbon" goals.

**Keywords:** New energy storage, electric power industry, dual carbon goals.

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## 1. Introduction

Energy storage is the technological and material foundation for addressing energy consumption issues and plays an important role in various aspects, including the improvement of power system configuration, the enhancement of power supply reliability, and the upgrading of power quality. In the context of the global response to climate change and China's efforts to achieve the goals of 'carbon peaking before 2030 and carbon neutrality before 2060,' [2] new energy storage technologies, as an important measure to enhance the regulation capacity of the energy supply system and promote efficient energy use, have become a crucial part of energy development. However, China has not yet established a comprehensive system of energy laws, which imposes a certain degree of constraint on the implementation of the new energy storage industry and the development speed of the new energy sector. Therefore, this paper, from a legal perspective, aims to propose constructive suggestions conducive to the sustainable development of the new energy storage industry in the context of the new era, with the hope of promoting the formulation and implementation of laws, policies, and regulations in the energy storage and energy sectors.

## 2. The Impact of the 'Dual Carbon' Goal on the Power Industry

### 2.1. The Connotation of the 'Dual Carbon' Goals

The "dual carbon" goals refer to China's two environmental commitments: carbon peaking and carbon neutrality. Carbon peaking means that carbon emissions reach their highest point and no longer increase, while carbon neutrality refers to achieving net-zero emissions through reducing emissions and increasing carbon sinks. These two goals are crucial for global climate action, as they concern not only environmental

protection and responses to climate change, but also economic development models, energy security, and international cooperation. Achieving the "dual carbon" goals requires international collaboration and promotes the transition of social and economic development toward an environmentally friendly model.

### 2.2. The Role in the Power Industry

The power industry plays a central role in achieving the 'dual carbon' goals. It needs to lead the transformation of the energy structure, shifting from reliance on fossil fuels to clean energy, and improve energy efficiency and system stability through technological innovation and intelligent management. Additionally, it undertakes the task of building a new type of power system to adapt to the rapid development of new energy sources and changes in the electricity market. The power industry also needs to innovate in policies and market mechanisms to promote a green and low-carbon energy transition. While ensuring energy security, it should also enhance the electrification level across society, which can effectively reduce carbon emissions.

### 2.3. Transformation Challenges

As the power industry faces significant transformational challenges in achieving the "dual carbon" goals, a comprehensive legal framework is required to support this process. The law should guide and incentivize the transition of the energy structure from coal to low-carbon energy, ensure the safety and stability of power supply through innovative mechanisms in the electricity market, and enhance the efficient use and rational allocation of power resources. At the regulatory level, the legal framework also needs to be strengthened, particularly by improving the legal protection and institutional arrangements for market transactions and pricing mechanisms, providing a solid legal foundation for the green transformation of the power industry.

### **3. The Application of New Energy Storage Technologies in the Power Industry and Their Legal Needs**

#### **3.1. Overview of New Energy Storage Technologies**

New energy storage technologies refer to emerging technologies and devices in the field of energy storage, which are innovative in addressing energy transition and enhancing the flexibility and sustainability of energy systems. These technologies mainly include three categories: electrochemical energy storage, mechanical energy storage, and electromagnetic energy storage. [3] Specifically, electrochemical energy storage technology mainly refers to the use of electrochemical devices such as batteries or supercapacitors to store electrical energy. Its advantages include high efficiency, reliability, environmental friendliness, and the ability to flexibly respond to varying energy demands. Mechanical energy storage technologies include compressed air energy storage, gravitational energy storage, and flywheel energy storage, whose advantages are long lifespan and high energy density. Electromagnetic energy storage technology, on the other hand, utilizes electromagnetic fields to store energy, primarily through electromagnetic components such as capacitors or inductors to achieve energy storage and release. It features rapid response and high cycle efficiency, making it suitable for applications requiring fast charging and discharging.

New energy storage technologies are characterized by diversified technological development and rapid market growth potential in the power industry. Electrochemical energy storage, particularly lithium-ion batteries, has become the mainstay of new energy storage technologies due to its advantages in application scenarios, technology, and cost, as well as its high energy density and mature industry chain support. At present, the Chinese government has attached great importance to the development of new energy storage technologies and has formulated a series of policies to promote their stable and healthy development.

#### **3.2. Legal Needs Analysis**

China's legislation in the field of energy storage is relatively lagging. Since the 2010 Amendment to the Renewable Energy Law proposed that power grid enterprises should develop and apply energy storage technologies, no specific provisions on energy storage have been made at the legislative level. New energy storage plays an important role as an emerging entity in the power system, but there is a practical situation of lacking high-level and effective legal norms. Therefore, it is necessary to provide a clear legal positioning from the legal perspective to ensure the development of the new energy storage industry, continuously provide policy guidance in line with the actual development of the industry, and further refine and improve existing energy storage policies in terms of market access, review and approval, market supervision, incentive policies, and other aspects.

Market mechanisms and business models suitable for the development of the domestic energy storage industry are still being explored. On the user side, energy storage has no other profit models besides peak-valley arbitrage, which restricts the development of the energy storage industry in many aspects, such as unclear market mechanisms and business

models. It is necessary to construct and optimize a pricing system for new energy storage, develop diversified business operation models, and formulate clear electricity pricing policies to reasonably compensate for the economic and environmental dual benefits brought by energy storage.

The development of the energy storage market is outpacing the construction of standardization and regulatory systems, resulting in increased difficulty in regulating the energy storage industry. Currently, new energy storage technologies are still generally in the research and demonstration stage, and their technical standards remain largely uncertain. Priority should be given to establishing demonstration construction standards for new energy storage technologies in terms of safety, stability, operational efficiency, and environmental friendliness, while gradually improving the technical standards for each new energy storage technology pathway.

### **4. Construction of Energy Storage Evaluation System**

#### **4.1. Technical Standards**

Building a standard system for new energy storage technologies is key to ensuring the safety and reliability of the technology. According to the "Guidelines for the Construction of a New Energy Storage Standard System" issued by the National Standardization Administration and the National Energy Administration, the framework of the new energy storage standard system is divided into eight aspects: basic general standards, planning and design, equipment testing, construction and acceptance, grid-connected operation, inspection and monitoring, operation and maintenance, and safety emergency. These standards cover the entire process from the planning, design, and construction of energy storage power stations to their operation and maintenance, providing comprehensive technical specifications and guidance for the safety and reliability of new energy storage technologies.

#### **4.2. Market Mechanism**

Build market mechanisms by promoting the shift of new energy storage technologies toward scale and commercialization. Establish the independent market participant status of new energy storage, and promote the entry of energy storage technologies into medium- and long-term power trading, spot markets, and ancillary service markets, including the formulation of market access rules, trading rules, and technical standards, thereby creating greater space for users to develop energy storage, according to the National Development and Reform Commission and the National Energy Administration's "Guiding Opinions on Accelerating the Development of New Energy Storage" and other releases. Promote the entry of energy storage technologies into medium- and long-term power trading, spot markets, and ancillary service markets, including the formulation of market access rules, trading rules, and technical standards, thereby creating greater space for user-side energy storage development.

#### **4.3. Regulatory Framework**

The regulatory framework system needs to ensure that new energy storage projects comply with national laws, regulations, and standards at all stages from planning and construction to operation. This includes supervision of the safe operation of the energy storage systems, environmental protection, market behavior, and other aspects. The regulatory

framework also needs to consider the environmental impact of the energy storage systems to ensure environmental friendliness throughout their entire lifecycle.

#### 4.4. Policy Support

The construction of a policy support system involves various aspects such as fiscal subsidies, tax incentives, and green finance. According to the guidance of the National Development and Reform Commission and the National Energy Administration, policy support measures include reducing non-technical costs such as taxes, financing, and interest rates, and providing policy support in aspects such as grid connection dispatching and green finance. It also includes supporting the international promotion of new energy storage technologies and standards, promoting the construction of national high-tech industrialization bases for energy storage, and enhancing the international competitiveness of the energy storage industry.

### 5. Legal Construction Suggestions

#### 5.1. Strengthen Legislative Work

First, establish through legislation the legal status of new energy storage as an independent market entity, including the access conditions, trading mechanisms, and technical standards for its participation in various electricity markets such as medium- and long-term trading, spot, and ancillary services. Second, build and optimize the pricing system for new energy storage, including establishing a capacity pricing system for grid-side independent storage stations, incentivizing storage stations to join electricity market competition, and exploring the inclusion of the costs and benefits of grid-replacement storage facilities in the recovery mechanism of transmission and distribution fees. Third, clarify the incentive mechanisms for "new energy + storage" projects, providing appropriate preference in aspects such as competitive allocation, project approval (filing), and grid connection sequence for new energy power projects that implement complementary construction or shared-mode new energy storage. Fourth, guided by power system demand, establish and improve local policies for new energy storage accompanying new power installations, optimize dispatch and operation mechanisms, and study and formulate the dispatch operation procedures and utilization standards for various types of storage facilities.

#### 5.2. Improve the Regulatory Mechanism

First, according to the notice issued by the National Energy Administration, power dispatching organizations should formulate operation procedures for dispatching new energy storage, scientifically determine dispatching methods, and fairly utilize new energy storage resources. Management of the operation of new energy storage should be strengthened, and the implementation rules for assessing various types of new energy storage should be clarified and detailed. Second, provincial energy authorities should enhance the construction of management systems for new energy storage projects, and power grid companies and power dispatching organizations should provide grid access services to new energy storage in a fair and non-discriminatory manner, while optimizing the grid connection process. Finally, localities should take into account the characteristics of new energy storage, accelerate the improvement of detailed rules for the participation of new energy storage in the electricity market and ancillary services

market, diversify trading varieties, and promote the 'multi-use, time-sharing reuse' of new energy storage through market-based measures.

#### 5.3. Promote International Cooperation

First, strengthen cooperation with internationally advanced energy storage technologies, introduce advanced technologies, and promote the domestic technology and industry to "go global." [4] Through international cooperation, it is possible to facilitate the high-quality introduction of new energy storage technologies and industries, as well as their high-level international expansion, thereby enhancing international competitiveness. Second, carry out international scientific and technological research and development cooperation in the frontier fields of new energy storage, and explore win-win mechanisms for advanced technology introduction and industrial chain and supply chain collaboration. This includes strengthening international technology exchanges and information sharing, and promoting new models of cooperation between domestic and foreign enterprises. Third, actively participate in international energy storage industry cooperation organizations and platforms to promote international cooperation and exchanges, share technological achievements and market information, and expand cooperation opportunities and market channels. By participating in the formulation of international standards, China can enhance its influence and voice in the international energy storage field [5].

### 6. Summary

New energy storage technologies, especially electrochemical energy storage technologies, have become key support for the transformation of the power industry due to their high energy density, rapid response characteristics, and environmental friendliness. These technologies can not only improve the flexibility and reliability of power systems but also facilitate the large-scale integration of renewable energy, reduce carbon emissions, and help achieve carbon peak and carbon neutrality goals. This article emphasizes the crucial role of legal frameworks in promoting the development of the new energy storage industry. The improvement of the legal framework is essential to ensure the safety, reliability, market access, and fair competition of new energy storage technologies. By strengthening legislation, improving regulatory mechanisms, and promoting international cooperation, clear policy guidance and legal protection can be provided for the development of new energy storage technologies, promoting industrial upgrading and enhancing international competitiveness. In summary, new energy storage technologies are an important technical pathway to achieve the 'dual carbon' goals, while legal frameworks serve as a key guarantee for the development of this industry. Only through legal guidance and regulation can the healthy, orderly, and sustainable development of new energy storage technologies be ensured, contributing to global energy transition and climate change mitigation.

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