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Research on Power Forecasting and Its Economic Impact Based on Integration of Industrialization and Informatization under the Background of Double Carbon

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Abstract: Driven by the strategic goal of "Double Carbon", the power industry, as an important field of energy structure transformation and carbon emission reduction, is facing multiple challenges such as balance between supply and demand, optimal allocation of resources and carbon emission control. As the core path of modern industrial development, the integration of informatization and industrialization provides strong support for power forecasting and effectively. Power forecasting improves the intelligent and refined management level of power system. Accurate supply-demand technology plays an important role in the power industry through matching, resource scheduling and carbon. In practical applications, power prediction and the integration of informatization and industrialization still face economic challenges, such as high costs of technological investment, insufficient data sharing and standardization, high costs of technical operation and maintenance as well as long investment return cycle. Against the backdrop of the "Dual Carbon" goals, by combining with the technical advantages of the informatization and industrialization, this paper explores the role of power prediction in energy management, resource allocation and carbon emission reduction, analyzes its crucial position and development prospects in the power industry. With the aim of providing a reference for the power industry to achieve sustainable and high-quality development, this paper also proposes paths and strategies to address the current challenges.

1. Introduction

Under the background of "Double Carbon" target strategy, the power industry, as an important field of energy structure transformation and carbon emission reduction, undertakes the important mission of optimizing energy structure and improving resource utilization efficiency [1]. As an important part of the national energy system, the power industry is not only an important field to realize carbon emission reduction, but also the key to promote high-quality economic development. At the same time, the integration of informatization and industrialization, as the core path of modern industrial development, is profoundly affecting the operation mode and development direction of the power industry. Through the deep integration of information technology and industrial production, the integration of information technology and industrial production has

promoted the overall upgrading of the power industry in terms of energy dispatching, supply and demand balance, optimal allocation of resources, and provided strong support for the intelligent and refined management of the power system. As an important technology of power system operation and management, power forecasting can effectively reduce the risk of imbalance between power supply and demand and ensure the safety and stability of power grid operation through accurate forecasting of power demand and supply. At present, the power industry is facing many new challenges and opportunities under the background of double carbon target and integration of the two industries. On the one hand, the adjustment of energy structure and the uncertainty of power supply and demand increase the complexity of power forecasting; On the other hand, the development of information technology and data-driven provides new tools and means for power forecasting. How to improve the accuracy and timeliness of power supply and demand forecasting under the framework of integration of industrialization and modernization, combined with advanced power forecasting methods, has become an important issue to be solved urgently for the high-quality development of power industry.

2. Demand for economic transformation of power industry under the background of double carbon

Under the strategic background of "Double Carbon" goal, the power industry is facing profound economic transformation needs, but it also faces many challenges. The fluctuation of energy price increases the operating cost and the risk of supply and demand balance of power enterprises, and affects the stable development of the industry. At the same time, the increase of carbon emission cost makes enterprises face more environmental compliance pressure, which urges enterprises to accelerate the transformation of low-carbon technology and the application of green energy. Facing these challenges, the integration of informatization and industrialization has become an important driving force for the economic transformation of the power industry. On the one hand, the application of information technology in power dispatching and management improves the accuracy of power supply and demand forecasting and the flexibility of resource dispatching; On the other hand, the upgrading of industrial infrastructure has enhanced the intelligence level and production efficiency of the power grid, which has brought remarkable optimization effects to the industry. On this basis, as a key technical tool, power forecasting can effectively improve the efficiency of resource utilization, reduce the risk of imbalance between power supply and demand, and provide scientific production scheduling and operation strategies for enterprises through accurate supply and demand forecasting. At the same time, power forecasting plays a key role in reducing operating costs, reducing energy waste and improving system stability, further promoting the economic benefits and sustainable development of enterprises and providing solid support for the economic transformation of the power industry under the goal of "Double Carbon"

3. Application status and prospect of power forecasting

In the face of increasingly complex power demand characteristics and profound changes in energy structure, traditional time series forecasting methods have been difficult to meet the current power system's demand for high precision and real-time forecasting. The power forecasting model is gradually developing from the traditional time series model to the intelligent direction of integrating various algorithms [5]. Tang Zhu and others put forward a prediction model based on CEEMDAN-TCN-BiGRU, which improves the accuracy of prediction through the combination of modal decomposition and deep learning [2];Xia Mingzhang and others used CycleGAN combined with GRU and TCN networks to effectively capture the long-term dependence characteristics of time series data and enhance the prediction stability [3]; Guo Yuan and others put forward

TCN-BiLSTM-AM model, which introduced attention mechanism and genetic algorithm, significantly reduced the prediction error and improved the generalization ability [4]The accuracy and stability of the power forecasting model that combines various technical advantages have been significantly improved. The power forecasting technology will further develop in the direction of intelligence, multi-dimensional data fusion and high efficiency of renewable energy, providing more accurate and efficient technical support for the sustainable development of the power industry under the background of "Double Carbon".

4. Economic challenges and analysis of the integration of power forecasting and industrialization

Power forecasting technology has broad application prospects, but it still faces many challenges in practical popularization and application. The integration of power forecasting and industrialization shows remarkable technical advantages in promoting the high-quality development of power industry, but it faces multiple economic challenges in actual implementation, as shown in Figure 1. First of all, the high cost of technology and infrastructure investment makes it difficult for some small and medium-sized power enterprises to bear the initial investment pressure. The problem of data sharing and standardization leads to the widespread phenomenon of data islands in the industry, which affects the effectiveness of forecasting models. The high cost of technology operation and maintenance has aggravated the long-term human expenditure of enterprises, and the shortage of professional and technical talents has become increasingly prominent. The long return period of investment makes it difficult for enterprises to see significant economic returns in the short term, which reduces their enthusiasm for technological innovation. To ensure the efficient implementation, these challenges need to be solved urgently from the aspects of policy support, technological innovation, data standardization and personnel training.

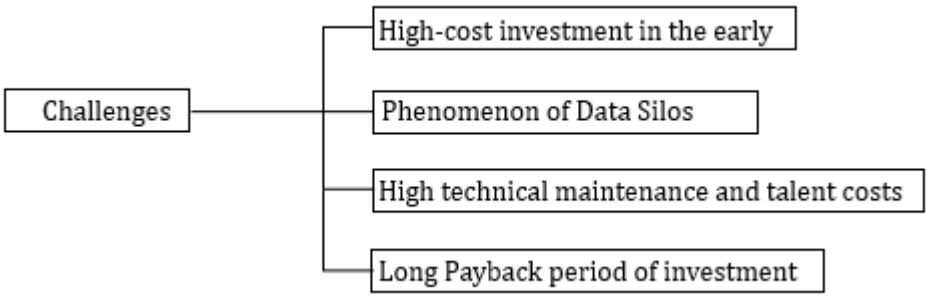

Figure 1. Challenges faced

The application of the integration of power forecasting and industrialization in power industry not only optimizes the operation and management of power system, but also brings remarkable economic benefits. First of all, through accurate demand forecasting and resource scheduling, the waste of resources caused by excessive or insufficient power supply is effectively reduced, and the operating cost of enterprises is reduced. Secondly, the efficient allocation of resources makes the distribution of power resources more reasonable, reduces the energy loss in the transmission process, improves the efficiency of power utilization, and ensures the stable operation of enterprises in the fluctuation of supply and demand. In addition, the application of power forecasting technology is helpful to reduce the cost of carbon emissions, unnecessary thermal power generation, extra expenditure of carbon emissions trading and also the environmental economic burden of enterprises. Finally, although the initial investment is large, from the perspective of long-term economic benefits, the integration technology of power forecasting and industrialization has significantly improved the

stability and operation efficiency of the power grid, reduced the economic losses caused by system failures, and these advantages provide strong support for the demonstrated sustainable economic returns, which helps the power industry achieve high-quality development in the context of the "Dual Carbon" goals.

5. Conclusion and prospect

Under the strategic background of "Double Carbon" goal, the integration of power forecasting and industrialization has become the key path to promote the green, intelligent and efficient development of power industry. Power forecasting technology significantly improves the operation efficiency and stability of power system through accurate matching of supply and demand, optimal allocation of resources and carbon emission control. The integration of the two technologies provides powerful technical support and platform guarantee for power forecasting. However, there are still many challenges in technology cost, data sharing, talent pool and investment return cycle. In the future, power forecasting will continue to develop in the direction of intelligence, multi-source data fusion and efficient consumption of renewable energy, relying on policy guidance, technological innovation and industry coordination to promote the sustainable and high-quality development of the power industry under the background of "Double Carbon".

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