In the Background of Digital, Research on Smart City Construction Supported by Power Data

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Abstract. With the integrated development of energy revolution and digital revolution, the digital transformation of energy state-owned enterprises is imperative. The application of power data is an important starting point for energy state-owned enterprises to achieve digital transformation. As an important data bearing people's livelihood, power data has significant advantages such as high accuracy, wide coverage, high timeliness, and strong correlation. It can further optimize macroeconomic regulation, comprehensive social governance, promote ecological and green transformation, and effectively support the construction of smart cities. State Grid Hebei Electric Power focuses on the social, economic and ecological value of power data, and innovates an important strategic path for power data to support the construction of smart cities. This paper focuses on the important foothold of the application of power data by central energy enterprises in the context of digital transformation, and further deepening the work measures of smart city construction with the support of increasing the social, economic and ecological value of power data.

Keywords: digital transformation · Central energy enterprise · Power data · Data application · Smart city

1 Introduction

Driven by the integrated development of digital revolution and energy, digital transformation has become the key to the reform and innovation of central energy enterprises. *The Guidence of Digital Energy Transformation* issued by State Grid Corporation of China clearly requires energy enterprises to enable strategic support, industrial development and regional coordination through digital energy. As a significant part of digital China, smart cities empower cities through technological means and gradually reshape the mode of urban operation and governance.

As an important basic strategic resource, power data has unique advantages such as high accuracy, wide coverage, high real-time performance and strong correlation degree, and has important social governance, economic regulation and ecological construction values for promoting high-quality economic and social development. Therefore, to support the construction of smart cities with power data is an important measure for the central energy enterprises to implement digital transformation and further highlight their mission and social responsibility.

2 Interpretation of the Application Necessity and Important Foothold of Power Data of Central Energy Enterprises

Along with the acceleration of the process of our digital transformation, energy state demand growing digital construction, electric power data as the development of the digital, intelligence and network of the energy state key, is assigned to strategic support, plays an important role in promoting the economic development, based on the energy state in the electric power supply and sustainable development, green low carbon important role in areas such as bear, It is important to clarify the foothold of power data application.

2.1 Demonstration of the Necessity of Power Data Application of Central Energy Enterprises

Based on the current situation of integrated development of energy revolution and digital revolution, the application of power data has become an important guarantee for energy state-owned enterprises to realize digital transformation, respond to national strategies, promote the development of digital economy, and promote economic and social development.

2.1.1 Key Actions in Response to National Strategy

The National Big Data strategy focuses on the integration and application innovation of big data in the fields of technology, economy, governance, people's livelihood and security. As an important part of big data, power data is an important part of big data. It is a key factor to promote the innovative development of the big data industry, build a digital economy with data as the key element, upgrade the modernization level of national governance, promote the protection and improvement of people's livelihood, and effectively guarantee national data security [1].

2.1.2 The Way to Develop the Digital Economy

With the rapid development of digital economy, big data, as a new production factor, is the inevitable product of the development of digitalization, networking and intelligence. Through the deep integration of power data and traditional industries, it provides important support for the innovation, transformation, optimization and upgrading of traditional industries, leads and drives traditional industries to realize digital transformation, and promotes the evolution of traditional economic model to a digital economic model with more advanced form, more optimized division of labor and more reasonable structure.

2.1.3 An Important Guarantee for Promoting Economic and Social Development

Since China launched the strategy of "double carbon", energy state as a guarantor of economic and social stability, the leader of industry transformation, actively promote the innovation in low-carbon technologies and clean energy development, participate in the carbon market construction measures and more efforts to seize the opportunity of

low carbon transformation, promote the development of economic and social transformation, is our country's economic and social transformation, the vanguard of ecological civilization development.

2.2 An Important Foothold for Central Energy Enterprises to Apply Power Data

Based on the demonstration of the necessity of digital transformation of central energy enterprises, the important development requirements of applying power data to central energy enterprises in ensuring national energy security, promoting coordinated and sustainable development, and promoting green and low-carbon transformation are further clarified.

2.2.1 Overall Consideration to Ensure Secure Energy Supply

In order to ensure energy security environmental protection control in control, further focus on power data and the integration of the Internet of things application, strengthening equipment management, improve maintenance management mode, research to establish maintenance safeguard mechanism to adapt to the new changes and new requirements, focus on new energy production safety control, to optimize the mode of new energy production safety control, to strengthen the site safety management, Improve the level of intensive and efficient management.

2.2.2 Innovate and Seek Change to Promote Coordinated and Sustainable Development

We will resolutely implement the important instruction spirit of self-reliance and self-improvement of high-level science and technology, actively give play to the important role of power big data as an emerging production factor, deeply integrate power big data with traditional industries, strengthen key core technologies in the energy field, and achieve coordinated and sustainable development [2].

2.2.3 Go All Out to Promote Green and Low-Carbon Transformation

As the main force to achieve the "double carbon" goal, the central energy enterprises make positive contributions to the realization of the "double carbon" goal by focusing on the value reengineering of power data in carbon emission testing, carbon market construction and other sectors.

3 Value Significance of Power Data Supporting Smart City Construction

With the integration of the energy revolution and the digital revolution, electricity data, as a "barometer" of the energy field and the macro economy, plays an important role in reflecting the social and economic development and monitoring the effectiveness of policy operation. To support their mission with power data is an important measure for central energy enterprises to implement digital transformation and further highlight their mission and social responsibility.

3.1   Core Application Value of Power Data

Different from other industry data, electric power data has unique advantages such as high accuracy, wide coverage, high real-time performance and strong correlation degree, and is of great value in economic regulation, social governance and ecological construction.

3.1.1   Social Governance

Based on the characteristics that power data can monitor the electricity consumption of households, enterprises, institutions and other aspects, it is highly representative to carry out various social analysis and calculation with the help of power data, and the research results have good external validity.

3.1.2   Economic Regulation

Based on the real-time monitoring of power data on operation data and the energy consumption of users, the personalized and differentiated electricity service demand of users can be analyzed and mined. At the same time, the power supply level can be effectively improved, the regional economic development can be served, and the regional business environment can be optimized.

3.1.3   Ecological Construction

Based on the characteristics of strong real-time accuracy of power data, it can realize the real-time 24-h monitoring of power data of pollution control equipment. Therefore, the application of power data can effectively improve the assessment and early warning ability of regional environmental pollution and the implementation process of the dual carbon target, and effectively promote the realization of the "dual carbon" target.

3.2   Value Significance of Power Data Supporting the Construction of Smart Energy Cities

Based on the social, economic and ecological value of power data, the central energy enterprises take the important responsibility of ensuring national energy security, promoting coordinated and sustainable development, and promoting economic and social development, and take the multidimensional application of power data as the starting point. Support the central energy enterprises to further deepen their mission responsibilities in supporting digital strategy, adhering to the main responsibility and main business, enabling the development of the industry, building a harmonious ecology, and adhering to innovation-driven [3].

3.2.1   Support Digital Strategy and Stimulate the Power of Smart City Construction

To support the construction of smart cities with power data is an important measure for the digital transformation of central energy enterprises. Through the internal integration and external connection of power data, it can provide scientific decision-making for the

layout of digital strategy of central enterprises, refine the layout of smart city work, and provide sustained power for the acceleration of smart city construction of central energy enterprises.

3.2.2 Stick to the Main Responsibility and Main Business to Ensure the Power Supply of Smart Cities

Through real-time monitoring of power data, can quickly find the grid power sector in the process of transmission, distribution and other problems, troubleshoot and repair in time, and in the summer peak, such as through a more flexible power load management, reduce the pressure of peak season to power equipment, to ensure the safety of electric power supply.

3.2.3 Enabling the Development of Industries and Promoting the Economic Development of Smart Cities

Actively integrate into the strategy of regional industrial strong province, and build a development strategy path with regional characteristics through in-depth integration of Internet of Things data and power data, which can further the regional resource endowment and the advantage of the whole industrial chain, and create a boost for the development of emerging industries. At the same time, based on the electric power data comprehensive analysis of user behavior, optimizing the regional power, can use the service, contributing to business environment to optimize the state power, and "business" for the introduction of the downstream enterprise head, quickly promote a batch of new industrial projects in the area, thus to create more employment opportunities and local economic development, boosting industrial cluster development.

3.2.4 Build a Harmonious Ecology and Optimize Low-Carbon Governance of Smart Cities

Through the visual monitoring of the ecological environment system with power data, green development is comprehensively promoted, the construction of green mines, green factories and green products "three green projects" is vigorously carried out, and energy conservation and consumption reduction, pollution control and emission reduction and resource utilization are comprehensively promoted.

3.2.5 Adhere to Innovation-Driven, and Improve the Scientific and Technological Innovation Capacity of Smart Cities

Adhere to the innovation-driven, give full play to the advantages of power data, consolidate the foundation of data management, promote the service of computing resources and data factors, strengthen the integration and utilization of internal and external data in enterprises and the application innovation of big data, enhance the circulation vitality of data resources, and promote the continuous innovation and upgrading of smart cities. At the same time, the power data as the collection, promote multi-data fusion application, in-depth analysis and mining of the existing industrial chain development pain points demand, around the industrial chain deployment innovation chain, solve the industrial

blocking points, achieve intelligent manufacturing, advanced manufacturing upgrading, as well as traditional industry transformation.

4 In the Context of Digital Transformation, Power Data Supports the Strategic Path of Smart City Construction

Its backbone state-owned enterprises in the field of Hebei electric power grid as the energy industry, first to speed up the digital transformation, further release power data in social governance, economic adjustment, the value creation of ecological regulation, innovation to build digital infrastructure, promoting social green development, promote the development of regional industry, adhere to innovation and development five strategy path, fu can smart city construction in an all-round way, The technical route is shown in the following Fig. 1.

4.1 Build Digital Infrastructure to Support the Construction of Smart and Efficient Cities

Driven by the background of energy revolution and the dual demand of enterprise economic efficiency, the central energy enterprises are eager to apply power data to realize digital transformation and development. Therefore, State Grid Hebei Electric Power Co., Ltd. builds digital infrastructure to further standardize the application and management of data and lay a solid digital foundation for the construction of smart cities supported by power data.

4.1.1 Build a Digital Brain

Using "cloud content wise" through every link of source network storage technology, its middle Hebei electric power through enhancing data, through data, condition monitoring data, the operation of power grid equipment, electricity data acquisition data, marketing data of data between the barriers, realize the mass significant measurable
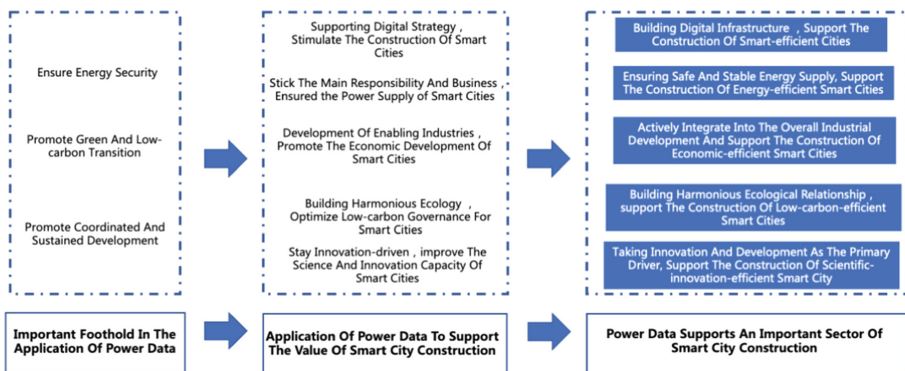

Fig. 1. Figure with technical route.

controllable power data resources, facilitate data scheduling, Contribute the strength of central enterprises for the multiple integration and fusion of data, and help the data market specification.

4.1.2 Normative Application Standards

State Grid Hebei Electric Power clearly defines the channels and methods of compliance data collection, standardises the collection frequency and caliber, and collaborates to formulate compliance energy collection, storage and call systems, so as to ensure that the obtained data source is accessible, safe and reliable, and the application is compliant.

4.2 Ensure Safe and Stable Supply and Use of Energy, and Support the Construction of Energy-Efficient Smart Cities

Energy security is an important part of national security and the material foundation and lifeblood of economic and social development. Based on this, State Grid Hebei Power focuses on its main responsibilities and business, resolutely ensuring national energy security and supporting the construction of energy-efficient smart cities.

4.2.1 Quantifying Production and Operation

Implement different frequency monitoring, the actuality of enterprise production and its comprehensive analysis of Hebei electric power enterprise's largest electricity consumption and industry expansion data compatibility, quantitative enterprise production operation, and forms the enterprise production status monitoring report, to provide recommendations for enterprises, reduce the short circuit due to insufficient voltage load, such as fire safety hidden trouble, And provide a basis for the emergency management bureau to supervise key high-risk enterprises.

4.2.2 Hierarchical and Classified Management

Power data based on the current status of the enterprise production testing, its Chinese Hebei electric power focus on electricity load case, classified to supervision and management of the enterprise, help enterprise safety in production, reduce the short circuit due to insufficient voltage load, fire safety problems, such as electricity enterprise safety, support its Chinese Hebei electric power focus on its main business to provide power for stability.

4.3 Actively Integrate into the Overall Situation of Industrial Development to Support the Construction of Economic and Efficient Smart Cities

In the face of the internal pressure of China's economic development and the complex external environment, the Central Economic Work Conference proposed to "ensure steady progress", and the central energy enterprises should play a leading role. By actively integrating into the overall situation of industrial development through power data, State Grid Hebei Electric Power is taking the lead in stability and making progress in stability.

4.3.1   Build an Industrial Analysis Model

Its Chinese Hebei electric power construction in power data analysis model as the core industry development [4], cover regional scale, the industry electricity power consumption and structure change, industry power consumption and structure change, industry economic climate index data to realize the industrial structure adjustment, industrial transfer to undertake, such as development of visualization, support its Chinese Hebei electric power building with regional characteristic industry development strategy.

4.3.2   Establish a Business Data Platform

Relying on the existing power marketing data, State Grid Hebei Electric Power Co., LTD has established a power data platform with a certain scale and high speed [5] to manage and analyze the information in the power system in a unified manner, realize the visualization of power marketing behavior, and effectively assist enterprises to identify risks, reduce energy consumption losses and optimize power supply services. Supporting State Grid Hebei Electric Power to optimize the business environment and contributing to the construction of the data factor market.

4.4   Build a Green and Harmonious Ecological Relationship to Support the Construction of a Low-Carbon and Efficient Smart City

As the main force and spearhead to achieve the "double carbon" goal, the construction of green and harmonious ecological relationship of the central energy enterprises has become an important measure to form the core competitive advantages of the central enterprises in green and low carbon and help the country achieve green and low carbon transformation. Therefore, State Grid Hebei Electric Power Co., Ltd. helps build a harmonious ecological relationship by refining carbon emission and enterprise emission supervision.

4.4.1   Draw an Electric-Carbon Map

Its Chinese Hebei electric power and energy consumption in the data depth fusion, to create the "electricity - carbon - can" data chain, through the establishment of cities linkage model, power consumption and carbon emissions form electric - carbon map, can be the main carbon source industry tendency of visualization analysis of carbon, carbon emissions are optimized by the state power to support enterprise, implement green low carbon transformation.

4.4.2   Build a Pollution Control Platform

State Grid Hebei Electric Power Co., Ltd. has installed power consumption collection equipment in production facilities and environmental protection facilities of enterprises, and used sensing technology to collect power consumption data of enterprises in real time, so as to build an enterprise emission control platform. According to enterprise

electricity load curve, the trend of electricity power information, realize the whole process supervision, the discharge of pollutants by enterprise grasp the enterprise production equipment, anti-pollution equipment power consumption data, supervision enterprise production equipment whether to limit production, service, supervision enterprise whether pollution-control equipment normal operation, support the implementation of fine drainage regulation in Hebei province, is the escort people's happy life environment.

4.5   Adhere to Innovation and Development as the Primary Driving Force, and Support the Construction of Scientific Innovation and Efficient Smart Cities

Central energy enterprises shoulder the historical mission of ensuring national energy security. Therefore, State Grid Hebei Electric Power actively serves the national energy transformation strategy, adheres to innovation-driven, integrates resources, and builds the most influential digital transformation platform for central energy enterprises.

4.5.1   Innovate the Data Sharing System

The implementation of data sharing management reform and service improvement is conducive to streamlining the data sharing process, mobilizing the enthusiasm of all levels, and stimulating the vitality of data innovation. State Grid Hebei Electric Power Co., Ltd. collects power data and establishes a data sharing system based on the negative list. While effectively promoting the standardization of data use, it minimizes and makes transparent data sharing approval, contributes to the orderly and compliant development of the data factor market, and supports the construction of a smart city with science and innovation efficiency.

4.5.2   Build a Collaborative Innovation Platform

State Grid Hebei Electric Power Co., Ltd. builds a data collaborative innovation platform with open power data sharing and application of government and enterprise data fusion, [6] constructs a trusted power data circulation environment, and implements experiments of multi-party secure computing, blockchain, privacy computing, data sandbox and other technical modes. At the same time, the construction of integrated power data brain is carried out, and the construction of "data shooting range" is tested for emergency scenarios such as public health, natural disasters and market supervision, to explore data utilization rules and coordination mechanisms under different emergency states. It supports the continuous development of Chinese electric power data application scene, and provides effective support for the construction of the computing hub of the "east digital and West computing" project and the national integrated big data center collaborative innovation system.

5   Conclusions

Based on the new task requirements put forward by the central energy enterprises in the digital transformation stage to deepen the application of power data, this paper focuses

on the mission of the central energy enterprises in ensuring energy security, promoting sustainable development, and promoting green and low-carbon transformation, and takes the social, economic and ecological value enhancement of power data as the core. Further refined energy state in building the digital infrastructure, guarantee the safe and stable power supply power, integrated into the regional industry development, building a harmonious green ecological relations, adhere to innovation and development as the primary driver of measures, such as effective support smart city construction, reveal "jack of the great powers" and "backbone" state of play, and for the energy state, And the central enterprises in other industries to fulfill the responsibilities of central enterprises, highlight the social responsibility to provide reference, and jointly promote the national digital transformation process.

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