



Research on the Construction Model and Relevant Technology of Energy Big Data Center in New Energy-Centred Energy Digital Ecosystem

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Abstract. With the rapid development of Internet Economy and Sharing Economy, Energy Internet Ecosystem promotes extensive aggregation of industrial resource elements, financing innovation and value creation, and provides support for the implementation of the strategic objectives of Power Grid enterprises in the transformation of the energy and power industry. Energy big data center provides important starting point for Power Grid enterprises to mine the value of data assets and build energy digital ecosystem, plays an important role in serving social governance, improving the operation efficiency of service companies and helping to build Energy Internet Ecosystem in recent years. However, with the profound changes in the internal and external environment of Power Grid enterprises, there are not classical idea on how to choose the construction model of Energy Big Data Center. Therefore, this paper focuses the requirement of developing new energy-centred Energy Digital Ecosystem, proposes the Construction model and Technology of Energy Big Data Center by Refining from advanced cases at domestic and abroad, which can directly support Power Grid enterprises to choose the development path of “construction while operation” or “construction before operation” [1].

Keyword: Construction model Energy Digital Ecosystem Energy Big Data Center

1 Introduction

As a new infrastructure in the energy field, energy big data center is an energy digital economy platform to break through energy data barriers, activates energy data value and builds a dual carbon digital ecosystem [2]. However, it is necessary to conduct in-depth analysis and research on the construction mode of “construction while operation” or “construction before operation” [3].

At present, the demand of different subjects for energy data is highly dispersed and different. The government has urgent demand for data sharing and public data products. Industrial enterprises and the public have high requirements for the direct service's

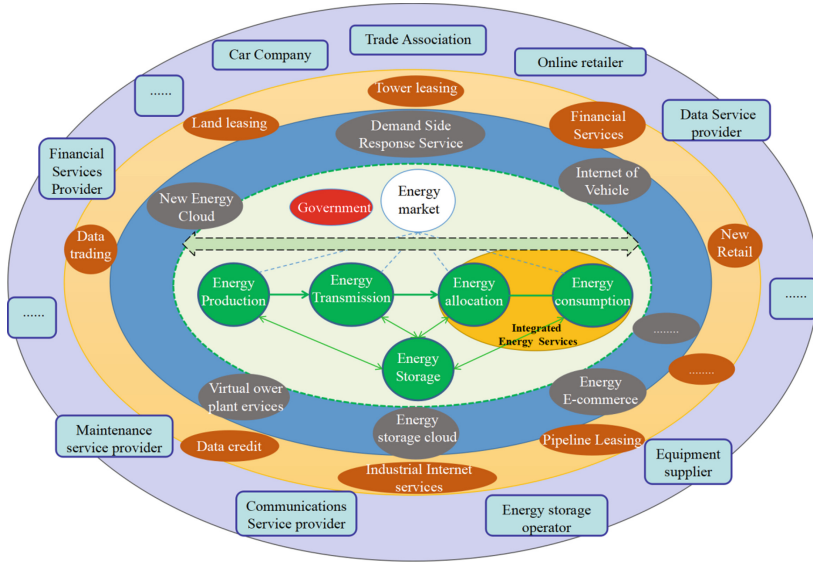


Fig. 1. Energy Internet business system

quality of energy data products in specific scenarios. The mode of “construction while operation” is applicable to the scenario of large demand for construction funds, continuous improvement of product model and gradual maturity of external demand, which is conducive to flexible organization and continuous upgrading. The mode of “construction before operation” is applicable to situations where the demand for construction funds is small, the product model is relatively mature and the external demand is relatively clear, which is conducive to large-scale development and play a leading role [4].

Different construction modes put forward different requirements for construction fund arrangement, self-supporting capacity, infrastructure and system security. From the perspective of fully realizing the collection of national data resources and driving the development of industrial enterprise-level energy big data center, the Power Grid enterprises’ big data center can decide the adoption of develop mode, with the solution of large-scale fund-raising, overall implementation of infrastructure, formation of product system and so on [5] (Fig. 1).

2 Typical Mode of Big Data Center Construction and Operation

Big data operation service aims to promote the buyer and the seller to exchange the original or processed data and data services. It is the release means and process of data value and dividend [6]. According to the cases at home and abroad, there are four main types of big data center construction and operation modes, as shown in Figs. 2 and 3.

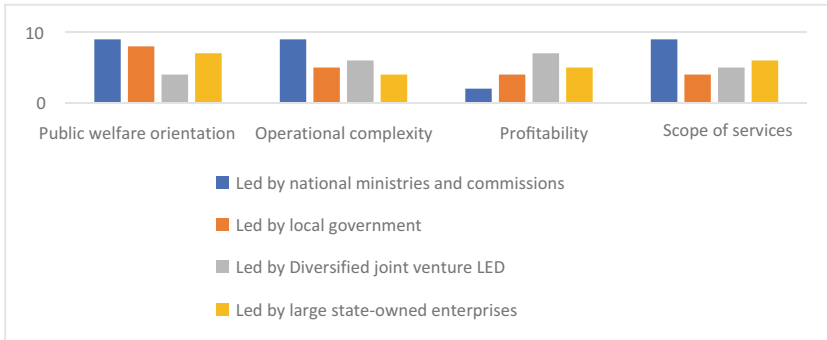


Fig. 2. Evaluation scores of four modes of big data centers (10-level scale)

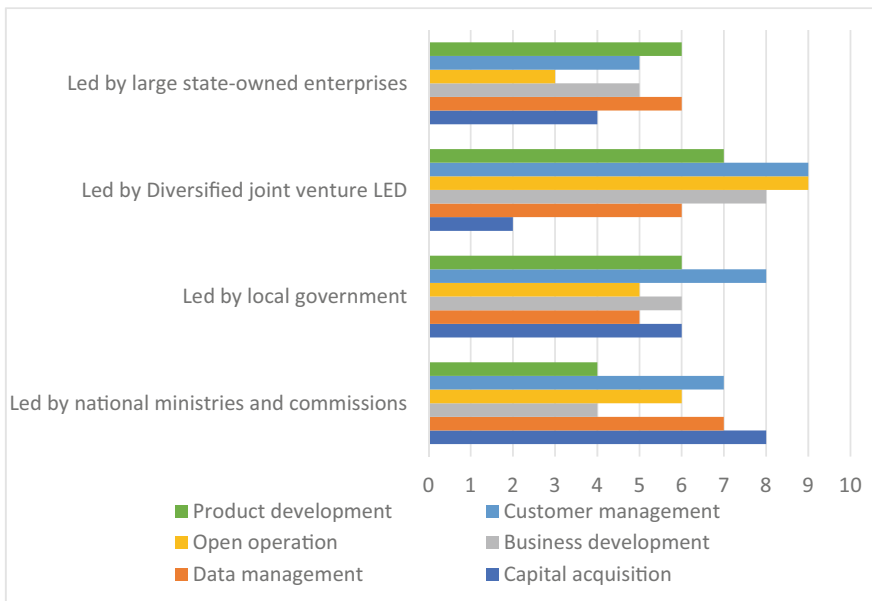


Fig. 3. Technological advantage of four modes of big data centers (10-level scale)

2.1 Led by National Ministries and Commissions

Industrial big data centers led by national ministries and commissions, such as American energy big data center, Singapore financial big data center, national health care big data center, national industrial Internet big data center, transportation big data center, etc. The construction of such big data centers—not aim at profit, goes through the application of new technologies such as big data, cloud computing, artificial intelligence and mobile Internet, and a variety of ecological cooperation modes of “government, industry, learning, research and application” to collect and gather data resources in the industry in line with the legal framework and standard system, which forms open data

services or visual data analysis tools after processing, to realize the integration, opening and sharing of data resources in the industry, promote the expansion and strength of the industry, and cultivate new formats and models of industrial development.

2.2 Led by Local Government

Taking Chongqing energy big data center, Tianjin energy big data center, Hebei Energy big data center and other provincial energy big data centers as examples, most of them adopt administrative means to promote the construction of regional (provincial, municipal, county or a regional) energy big data centers. Through the opening of government data, enterprise data sharing and personal dynamic data extraction, The construction of big data centers realize the interconnection and sharing of data in the region, gathering a large number of data assets, and cultivating and driving the agglomeration of a series of big data core industries. Under this mode, enterprises are still the main body of big data marketization, while the government acts as an active promoter of big data marketization, which fully releases the vitality of market subjects, maintains the normal order of the market, and creates a loose and fair environment for enterprises. This model is conducive to actively cultivate the big data industry, promote the market-oriented circulation of data assets, improve the trading mechanism of the big data market, give play to the regulatory role of the market mechanism, cultivate the big data trading market, and promote the social circulation of enterprises' and industries' internal data.

2.3 Led by Led by Diversified Joint Venture LED

It is common in the construction and operation mode of local big data exchanges (centers), typical representatives include Guiyang big data exchange and big data trading platforms successively established in various places. For the purpose of profit, such big data centers obtain certain benefits by matching the legal and compliant transactions of data property rights between both parties, promoting the realization of the value of data assets, and serving enterprises or research institutions that need relevant data. This kind of mode mainly presents the following two characteristics: first, adhere to the principle of "state-owned holding, government guidance, enterprise participation and market operation" in operation; Second, adopts the mixed ownership model of state-owned assets holding, management shareholding and participation of main data providers in equity model. This model not only ensures the authority of data, but also stimulates the enthusiasm of different transaction subjects and expands the scope of participants, so as to promoting the realization of data transactions from "commercialization" to "socialization", from "decentralization" to "platform", and from "disorder" to "standardization", Collecting the data resources scattered in the hands of different subjects in various industries into a unified platform, and realizing data sharing, docking and exchange between different regions and industries through a unified and standardized standard system.

2.4 Led by Large State-Owned Enterprises

For energy, finance, e-commerce and other fields with urgent needs and good data infrastructure conditions, industry leaders or leading enterprises organize relevant ecological enterprises and institutions to focus on the development of big data industry. Based on the big data platform dominated by industry leaders or leading enterprises, typical representatives include Guodian investment big data center, Sinopec big data center, etc. The purpose of this kind of big data center construction model is not to make profits, but to promote the common ecological development of enterprises, share and open relevant data resources to ecological enterprises in various ways, cultivate new business forms and models for enterprise development, and create a harmonious and win-win industrial ecosystem, so as to drive the development of relevant business clusters. On the one hand, due to the small scope of data transactions based on industry, it is easier to formulate strict data quality and value evaluation system standards; On the other hand, based on the industry data standards, it is easier to realize the unified collection, unified evaluation, unified management and unified transaction of trade data in the industry, which makes the data value easier to realize and do good for the data transaction be getting less difficult and more operable.

3 Conclusion and Enlightenment

3.1 Conclusion

The energy big data center of Power Grid enterprise is an important force for China to deeply grasp and lead the global digital transformation and development, the main promoter of China's construction of energy digital ecosystem, and the "advance team" driving the high-quality development of energy digital enabled economy in China. At present, there is no mature experience in the construction and operation of energy big data center of Power Grid enterprise, so it is necessary to solve the potential problems faced by the construction and operation of energy big data center to provide guidance for the construction of energy big data center. From the construction of big data centers in different countries and industries, the following enlightenment can be got:

3.2 Enlightenment

First, the combination of government's influence and enterprise resource advantages is a convenient way for the construction of energy big data center at the current stage. Government leadership can give play to the administrative advantages of the government in policy-making and stakeholder coordination; Enterprises' participation can give play to the resource advantages of enterprises in capital, data, equipment and facilities, technology and talents. The combination of advantages, sharing of rights and responsibilities and benefit sharing between the two sides can achieve the effect of "1 + 1 > 2", which is conducive to promoting the rapid construction and efficient development of energy big data center.

Second, the public welfare of big data centers under the leadership of the government is more prominent, emphasizing the driving role of social industries. The government-led construction of the big data center is mainly concentrated in the fields of energy,

transportation, manufacturing, medical treatment and so on, which has a fairly obvious attribute of public utilities with the construction goal of coordinating data resources and bring providing services to the society.

Third, treating the application scenario as the link, exploring the commercialization model of energy big data for mutual benefit is the focus of construction. The application scenario of mutual benefit and win-win is the endogenous driving force for the orderly development of big energy data. The construction of energy data center should be market-oriented, demand-driven, and application scenario-design. We should make full use of Internet+, big data and other information technology to create co-construction, co-governance of the win-win environment for data development.

Fourth, enterprise-level big data center is the key path for energy enterprises to move towards digital development. From the digital transformation experience of State Power Investment Corporation and Sinopec Group, the construction of enterprise-level big data center is the focus of its digital development strategy. As an important starting point for gathering data resources and carrying out digital innovation, enterprise-level big data center provides an important foundation for energy enterprises to grasp the opportunities of digital transformation and build a model of digital development.

Fifth, security compliance is the basic guarantee for the construction of energy big data center. Ensuring data security is the premise for the construction of energy big data center. Relevant leading practices attach great importance to the bottom line of data security, strengthening the construction of data security compliance management and control system, strengthening the R&D and application of data security technology, promoting the deep integration and application of data business development and security compliance, and guarantee for data and information security.

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