



Research on Provincial Policy System Framework and Implementation Path to Adapt to the Large Scale Development of Distributed Power Sources

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Abstract. With the rapid development of distributed power generation, provincial power grid enterprises urgently need to adjust and optimize policy system, organizational system, and business system to adapt to the power grid business of distributed power generation, and make precise efforts to better adapt to and promote the scientific, orderly, coordinated, and economic development of distributed power generation. Basing on the main issues of Hebei Company's adaptation to the large-scale development of distributed power generation, this study proposes policy system framework covering the entire life-cycle of distributed power sources from project reserve, approval, project initiation, construction, operation and maintenance. It is recommended that Hebei Company promote the improvement of the top-level design and policy system of distributed power generation through three paths: top-down, bottom-up, and horizontal reference.

Keywords: Distributed Power Sources Policy System Provincial power grid enterprise

1 Introduction

The large-scale and systematic development of distributed power generation in China is becoming the main trend for the high-quality development of energy and electricity, especially the proposal and construction of new power systems, which poses higher requirements for provincial power grid enterprises to deeply optimize active distribution network business. Firstly, the proportion of distributed power sources in future

power sources will significantly increase, and traditional power systems will accelerate the upgrade to new power systems. Secondly, distributed power generation will continue to be dominated by distributed power sources, supplemented by gas multi generation, and wind and photovoltaic power generation will become the main driving forces for global energy transformation. Thirdly, the development of distributed power generation is shifting from a single energy source to diversified integrated system. Through the application of technologies such as information communication and energy management, the operation mode of distributed power generation systems is optimized. Fourthly, distributed power is no longer simple power role, but is deeply integrated and mutually promoting with market-oriented reform.

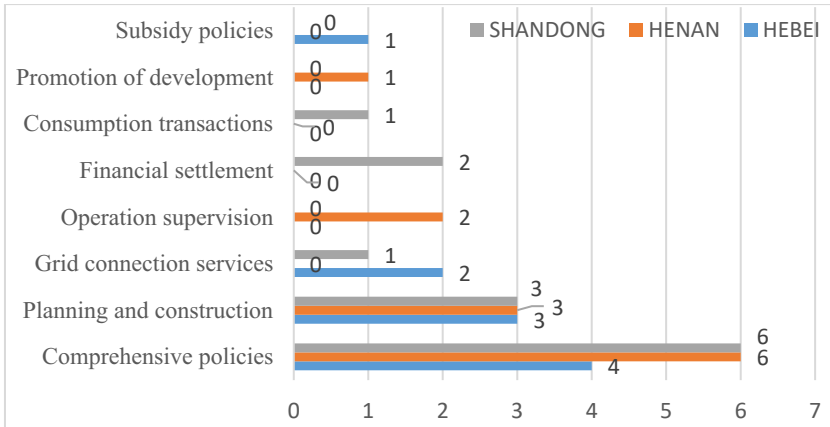
From the perspectives of organizational theory and strategic theory^[1], in uncertain environments, the core competitiveness of enterprises needs to break organizational boundaries^[2], seek to maximize the development and utilization of scarce resources that are both strategic and legitimate^[3]. With the rapid development of distributed power generation, provincial power grid enterprises urgently need to adjust and optimize policy system, organizational system, and business system to adapt to the power grid business of distributed power generation^[4], and make precise efforts to better adapt to and promote the scientific, orderly, coordinated, and economic development of distributed power generation^[5].

2 The Current Situation and trends of the Policy System in Hebei Province

2.1 The Current Situation

Since 2011, in order to support the development of distributed power generation, multiple ministries and commissions at the national level have introduced relevant policies to support the development of distributed power generation and participate in market transactions. In terms of photovoltaic, multiple national and provincial policies have been introduced, including planning and construction, grid connection services, operation supervision, financial settlement, consumption transactions, promotion of development, and subsidy policies. From the perspective of the national energy strategy, we will continue to vigorously promote the development of distributed power sources to promote the increase in the proportion of non fossil fuels. From the perspective of electricity price subsidy policy, there is a significant gap in renewable energy subsidies, encouraging the rapid development of non subsidy project types. From the perspective of scale layout control policies, scale layout is jointly influenced by subsidy funds, grid acceptance capacity, and market demand. (shown as Table 1)

Table 1. Policy Situation of Distributed Energy Development in Three Provinces



Overall, Hebei, Henan, and Shandong provinces have experienced the impact of large-scale development of distributed power generation, and policy systems have continued to improve, and the focus of policy formulation has gradually refined from comprehensive policies to specialized policies. Compared to Henan and Shandong provinces, Hebei province mainly focuses on Grid connection services and subsidy policies, Operation supervision, Financial settlement, Consumption Transactions, Promotion of Development, no special policies have been formulated yet.

2.2 New trends

(1) Development of Distributed Power Sources

Overall, after experiencing the explosive growth of distributed photovoltaics from 2020 to 2022, the accessible capacity of each county of Hebei Company has gradually bottomed out, and the source network load storage pattern faced by the active distribution network is gradually taking shape. The problems faced by the management of the active distribution network business are concentrated, and the establishment and improvement of the active distribution network organizational model and management mechanism by Hebei Company has essentially ushered in an important "window period".

(2) Development of Distributed Power Sources policies

Companies in various cities throughout the province actively strive for policy support to further standardize the development of distributed photovoltaic.

① at the provincial level

Hebei Company supports and cooperates with local governments and photovoltaic development enterprises to conduct resource surveys, prepare distributed photovoltaic planning and county wide development pilot plans;

Hebei Company supports the provincial energy bureau in preparing the "Roof Distributed Photovoltaic Construction Specification";

Hebei Company takes the lead in releasing the enterprise standard of "Principles for Distributed Photovoltaic Grid Connection Technology on Roofs in the Whole County" in the company's system;

Hebei Company supports the drafting of the "Notice of the Development and Reform Commission of Hebei Province on Further Promoting the High Quality Development of Distributed Photovoltaics" by the Provincial Energy Bureau.

② At the city and county level

Xingtai City Company urges the Xingtai Development and Reform Commission to issue the "Notice on Doing a Good Job in Grid Connection Operation of Distributed Photovoltaic Power Generation Projects";

Seven counties (districts) in Shijiazhuang and six counties (districts) in Baoding have successfully urged the government to introduce relevant policy documents on distributed photovoltaic construction management;

Baoding Yixian Company urges the Yixian government to release the "Yixian Distributed Photovoltaic Openable Capacity Information Disclosure Measures (Trial)".

3 Main Problems of the Policy System in Hebei Province

The large-scale integration of distributed power sources brings more uncertainty and randomness to the distribution system, and the system operation mode is more complex. With the rapid development of distributed energy in Hebei, problems continue to emerge, and Hebei has also introduced a series of policies, gradually shifting the policy direction from encouraging support to regulating and tightening.

From the current perspective, the challenges faced by the development of Hebei Company's active distribution network mainly come from the spatiotemporal mismatch between the power and consumption sides driven by policies. It is urgent to solve the contradictions such as the mismatch between the government policy system and distributed development needs, in order to create space for deep response to external demands and promote the upgrading of distribution network business. (shown as Figure 1)

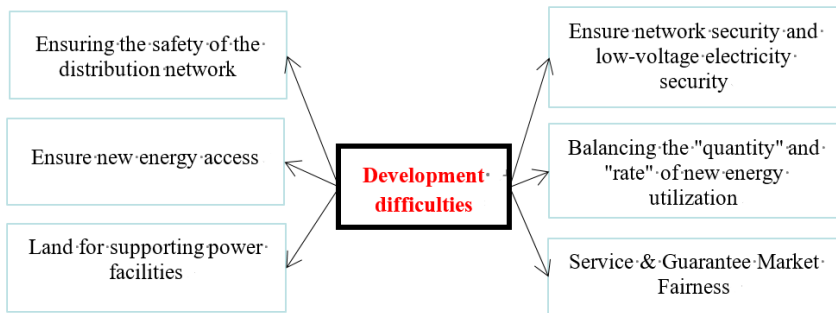


Fig. 1. Main Problems of Distributed Energy Development in Three Provinces

Based on actual development needs, firstly, the requirements for installation access have been constantly changing and there are many sources of enforcement basis. Policy standards are intertwined and overlapped, and grassroots understanding and enforcement are clearly differentiated. Secondly, rural rooftops, park photovoltaics, and building photovoltaics will usher in another "golden period", but the foresight and coherence of relevant policies are clearly insufficient. Thirdly, the policy system framework for the entire life-cycle of distributed power generation projects, including reserve, approval, project initiation, construction, and operation and maintenance, is incomplete.

Based on the project development cycle, in the early stages of the project, there are still shortcomings in data statistics and long-term planning of ongoing projects, and there is a lack of guiding documents. In the mid-term of the project, there are still many ambiguous provisions regarding the participation of distributed power sources in peak shaving. Issues such as grid monitoring and regulation, peak shaving and device cost allocation, transaction prices, cost allocation and compensation have not been resolved yet. In the later stage of the project, there is a lack of guidance documents on the recycling and utilization system of new waste such as photovoltaic module wind turbine blades and related dispute resolution issues.

4 The Basic Elements of Modern Governance System

4.1 Policy system framework

Based on the current demand for the development of distributed power generation in Hebei Province and the scientific and efficient promotion of high-quality development of active power distribution in Hebei, it is suggested that Hebei Province should form distributed energy policy system that covers the entire life cycle, including project reserve, approval, project approval, construction, operation and maintenance, and other aspects of distributed power sources.

4.2 Policy constructing path

Path1: From top to bottom. Based on national policy requirements and in combination with the trend and key tasks of large-scale development of distributed power generation in Hebei Province, we will strengthen the collaborative planning of source network load storage, coordinate the key needs of distributed power generation manufacturers, investment and development enterprises, and end users, establish a comprehensive full life cycle policy framework, and form development layout planning and guidance documents.

Path2: From bottom to top. Focusing on planning and construction, grid connection services, operation and maintenance services, trading systems, and technical standards, all parties' demands and concentrated issues, timely joint research, argumentation, and plan formulation by power grid and other enterprises to gather consensus, form professional regulations and operational standards.

Path3: Horizontal reference. Based on national policy requirements and development points, draw on the policy systems of provinces such as Shandong and Henan to identify and fill in policy gaps. Actively learn from the policy systems of regions with relatively complete trading systems in the distributed power generation market, and proactively build a distributed power generation business operation mode and mechanism.

5 Conclusion and Enlightenment

Under the new situation, Hebei Province urgently needs to take the initiative to address the impact of the centralized grid connection of distributed power generation once again, establish policy system framework covering the entire life-cycle of distributed power sources from project reserve, approval, project approval, construction, operation and maintenance, and support the coordinated promotion of energy transformation by power grid enterprises and power generation entities.

Firstly, based on the trend and key tasks of the large-scale development of distributed power generation in Hebei Province, we will promote the government to establish a comprehensive life-cycle policy system framework, and form a development layout plan and guidance document.

Secondly, power grid enterprises focus on planning and construction, grid connection services, operation and maintenance services, trading systems and technical standards, etc., to gather consensus, form professional regulations and operational standards.

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References

1. Ansoff, H. I. Corporate Management [M], McGraw-Hill, New York, 1965.
2. Morck R., Yeung B. Y. Never waste a good crisis: An historical perspective on comparative corporate governance[J]. Annual Review of Financial Economics,2009, 1(1):145-79.
3. Scott. Institutions and Organizations [M], Thousand Oaks, Calif.: Sage, 1995.
4. Wood E. Determinants of innovation in SME's [J]. See Michie and Smith. 1998: 119-145.
5. Mengweixuan, Chengjiayu, Liu jin. Research on Operation Mechanism optimization framework of Power Grid Business Organization under the new circumstances[J]. Journal of Physics: Conference Series (JPCS),2021.

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