Research on Risk Assessment and Guarantee Mechanism of Distributed Transactions in China

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Abstract: Distributed energy can reach many goals such as achieving sustainable development of energy utilization, mitigating environmental pressure, and promoting economic development. It has become an important direction of energy development. However, distributed transactions in China are at the initial stage of development, and there are still some risks. Based on the current situation of distributed transactions in China, this paper analyzes the existing risks of distributed transactions in China from five aspects. Aiming at the risk factors of distributed transactions, the corresponding guarantee mechanism and related suggestions are proposed to provide reference for the development of the corresponding supporting mechanism of distributed transactions in China.

1. Introduction

With the rapid development of the global economy, the demand for electricity has been growing at a high speed. Problems like environmental pollution, climate change and shortage of energy resources are becoming more and more prominent. All world countries are considering the development of their own resources and economic development goals, and actively promote the development and utilization of renewable energy such as wind, solar and hydropower [1]. China's energy consumption structure has long been single dominated by traditional fossil fuels, which limits the sustainable development of China's society and economy. The sustainable development of energy planning and utilization, the development of distributed renewable energy, and the promotion of social and economic sustainable development have become major strategic tasks in China now[2]. With the large-scale construction of distributed energy, distributed energy power generation trading market has gradually formed in China, gradually liberalizing the market system to promote the development of distributed energy power generation.

However, risk management is urgently needed because so many risk factors are in the power market. Experts and scholars have done a lot of research on risk management in the power market. Literature [5-6] explores the risks existing in the electricity market from different angles, and summarizes the methods of risk measurement and risk control in the electricity market environment. Literature [7] analyzes the new energy policy and its risks to electricity market transactions, and proposes risk aversion measures. Literature [8] introduces some of the risk management techniques widely used in the financial sector and their applications in the power market. Literature [9] puts forward the risk management methods of the electricity market, which are mainly divided into seven
types of risk assessment, electricity price forecasting, bidding decision, power supply planning, hedging method, market analysis and market operation.

At present, China is gradually implementing distributed energy power generation transactions, and there is still a series of risks. The existing literature systematically analyzed the risks and risk prevention and control management methods of power marketization transactions, but did not analyze the risks distributed transactions. In the early stage of the development of distributed transactions, China should summarize the risks in distributed transactions at the current stage and clarify its prevention and control measures. This paper analyzes the above problems on the basis of summarizing the current situation of distributed transactions in China.

2. Overview of distributed transactions
Distributed power generation refers to small and medium-sized power generation facilities that are connected to the distribution network and have nearly the same amount of power generation. The so-called distributed power generation market-oriented transaction, that is, a form of transaction in which distributed power such as photovoltaics and wind power is nearly completed. Compared with centralized power supply, distributed generation has the advantages of flexible power supply and near consumption, which can save power transmission and distribution costs to the greatest extent.

The mechanism of distributed power generation market trading is that the distributed power generation project unit and the nearest power users in the distribution network conduct power transactions; the power grid enterprises undertake the power transmission of distributed power generation and cooperate with the relevant power trading institutions to organize distributed power generation market transactions, according to The government-approved standard collects “over-network fees”.

3. Status of distributed transactions in China

3.1. Policy
In 2017, the National Development and Reform Commission and the National Energy Administration jointly issued the “Notice on Launching a Pilot Program for Distributed Power Generation Marketization”. The notice indicates that distributed energy projects can choose to sell electricity at a nearby 110kv voltage level. The pilot program of distributed power generation market trading started this. In January 2018, the National Energy Administration issued the Supplementary Notice on Piloting the Marketization of Distributed Power Generation Markets, further clarifying the issues related to the preparation of the pilot program for distributed power marketization transactions, and the requirements for the pilot organization and division of labor and pilot programs. Supplementary notice was given for the submission of the pilot program. A series of distributed energy generation policies and market-based trading policies for distributed energy generation provide feasibility for distributed energy to directly participate in market transactions.

3.2. Practice
From a practical perspective, in 2010, the Inner Mongolia Power Multilateral Trading Market opened, with grid companies, large users, power generation companies, and power users participating together, allowing power users to enter the market as the mainstay of power purchases, breaking the monopoly power purchase status of power grid companies. In addition, the price formation mechanism of negotiated transactions in the market has broken through the original "government-guided price" pricing method, and the price of electricity generated by the purchase and sale of electricity is negotiated. The issuance of a supplementary notice means that China's distributed transactions will be piloted and popularized on a large scale, and the pilot construction of distributed transactions provides empirical feasibility for conducting distributed energy transactions.
3.3. Necessity
(1) Alleviate energy shortages in China and ensure the implementation of sustainable development strategies

The problems of excessive exploitation of traditional fossil energy have challenged China's energy security. Energy security is an important part of China's economic security and is directly related to China's national security, social stability and sustainable development. Accelerating the promotion of cogeneration technology, improving distributed photovoltaic and wind power generation technologies, vigorously developing distributed energy, promoting distributed energy trading, and alleviating energy shortages in China have become important energy strategies in China.

(2) Important measures to promote wind power consumption

Due to the problem of the power transmission channel capacity of the power grid, the unreasonable power supply structure, the insufficient wind power consumption capacity, the lack of incentives for the transaction price mechanism, and the difficulty of peak shaving, the winds in the northern region are seriously abandoned, and similar phenomena occur in other regions. According to the statistics of the National Energy Administration, the data show that the national average wind curtailment rate in 2015 and 2016 is at a high level of 15.2% and 17% respectively. Although the wind abandonment has eased, the situation is still grim. Therefore, the wind energy is transported out, and this requires the deployment of distributed energy transactions, using market mechanisms to guide and improve the level of wind power consumption.

4. China's distributed transaction risk assessment

4.1. Trading Policy Risk

Distributed energy trading policy and regulatory risk refers to the possibility that the government's laws, policies, regulations and their changes have adverse effects on distributed energy and cause risks. As one of the effective ways to solve the energy crisis, distributed energy has always been highly concerned by governments around the world. It has generally adopted tax incentives and various subsidies such as electricity price subsidies and construction subsidies to ensure and promote its rapid development. Nowadays, China has already stipulated that the distributed power generation pilot project will be automatically included in the scope of subsidies for the renewable energy development fund after completion, and the subsidy for electricity will be given according to the total power generation. However, if the subsidy policy changes, the rate of return and market participation of the pilot project cannot be guaranteed, and the promotion of distributed transactions may also face severe challenges.

4.2. Trading market risk

Market risk refers to the shrinking of the distributed energy trading market due to the uncertainty of the market and related external environment, the decline in trading volume, and may even affect the survival and development of distributed energy. The evaluation and prediction of market risk of distributed energy trading is an important part of risk analysis. Market risk is the focus of distributed energy development investment. Market risk analysis mainly focuses on the appropriate time for the transaction subject to determine the exit, market capacity and market competition. In actual work, market risks are difficult to calculate accurately, so it is necessary to rely on the judgment and evaluation of experts and managers.

4.3. Trading Information Risk

Information risk mainly refers to the risk caused by the uncertainty of various information in the trading market. Under market conditions, the planning and operation of power systems requires consideration of a wealth of information. Due to source and statistical deviations, the reliability and readiness of information is low, which will cause damage to the electricity market. For example, load forecasting is affected by information such as socioeconomic conditions, user behavior habits, weather,
and other force majeure. The forecasting method used has limitations, and the information is not necessarily accurate, resulting in load forecasting bias, and the forecasting result exists with the actual load. A certain gap causes losses in the power grid or power generation enterprises. If the two parties in the market purchase, sell or sell based on inaccurate forecast results, they may bring corresponding losses to both buyers and sellers. This risk is an information risk.

4.4. Trading Credit Risk
Credit risk refers to the risk of economic losses caused by the failure of the parties to perform the obligations in the contract. In power commodity transactions, the credit risk of participating entities is usually one of the main sources of trading risk. In the operation of the distributed energy trading market, there may be an obligation for distributed energy power generation companies or suppliers to fail to fulfill the power purchase contract, and large users fail to pay on time. Constructing a credit rating system for the trading market can effectively reduce the level of credit risk.

5. Suggestions on the mechanism of distributed transaction risk prevention and control
There are various risks in the distributed energy trading market. In order to reduce the risk of political, market, information, operation, credit, technical equipment and other risks, improve the distributed energy trading model, and determine the smooth promotion of the distributed energy trading market, it is necessary to establish a guarantee mechanism for the prevention and control of distributed energy trading risks. This section will construct a distributed energy transaction guarantee mechanism in terms of policies and regulations, market, information transparency, management guarantee, and credit guarantee for the risks identified above.

5.1. Policy
In order to promote the entry of distributed energy into the trading market and ensure its healthy and orderly development, the government departments need to formulate and improve relevant policies and laws. In terms of legal protection, it is recommended that government departments supplement the laws on electricity law, renewable energy law, energy conservation and emission reduction, and determine the status and development strategy of distributed energy. At the same time, the systemic barriers to the removal of the external environment for distributed energy have enabled the smooth integration of the distributed energy and commercial development. In terms of policy protection, it continues to provide preferential policies such as tax subsidies for distributed energy investment owners or power producers. In addition, encourage distributed energy generation and grid-connected technology innovation, and improve industry planning.

5.2. Market
In terms of the internal market environment, it is necessary to improve the market guarantee mechanism from the following aspects: (1) It is necessary to formulate corresponding trading market specifications, and clarify the distributed energy trading process, the obligations and duties of the trading entity. (2) In order to avoid the risks caused by the intermittent and random nature of distributed energy generation, and to maintain a stable operation of the market, it is necessary to open an auxiliary market to assist distributed energy transactions. (3) Relevant government departments and power regulatory agencies supervise the transaction negotiation, bidding and supervision of contracts, and minimize risks.

5.3. Information transparency
With the reform of the electricity market and the construction of a distributed energy trading market, reliable and transparent information is increasingly important for the distributed energy trading market. The asymmetry of information will cause market failure, and the less reliable information will cause the trading entity to make wrong trading decisions. Therefore, the information disclosure system for distributed energy and power grid enterprises should be improved. Leading the establishment of a
good functional department information supervision system by the power trading center is also an important guarantee for the standardization and informationization development of the distributed energy trading market.

5.4. Credit guarantee
With the promotion of China's distributed energy trading, "credit" will gradually become a concern in the trading market. In terms of credit guarantee mechanism, establish the principle of market access for distributed energy trading, establish a rating system for distributed energy enterprises, and exclude enterprises with unqualified ratings from the trading market. Implement credit disclosure and early warning mechanisms for distributed energy companies, increase the intangible assets of market transactions through credit disclosure, and thereby obtain more business opportunities. At the same time, disclosure of corporate default information can have a disciplinary effect on the company. The implementation of the disciplinary mechanism for corporate dishonesty will impose certain sanctions on those who fail to complete the contract on time and in volume, and collect default fines from the defaulters. If the circumstances are serious, they will be forced to withdraw from the trading market.

6. Conclusion
Based on the current status of energy development and existing problems, the paper evaluates the risk of distributed transactions, and studies the distributed transaction risk air defense mechanism, and has achieved the following research results:

(1) This paper analyzes the development status of distributed transactions in China, summarizes the development policies and practices of distributed transactions in China, and proposes the necessity of developing distributed transactions.

(2) On this basis, this paper puts forward the problems in the development of distributed energy in China. The above research provides a research basis for the design of distributed energy trading risk prevention and control guarantee mechanism.

(3) According to the risk of distributed transactions in China, this paper proposes corresponding risk prevention and control guarantee mechanism, and proposes to improve relevant laws and policies, establish an orderly and healthy internal and external market environment, ensure transparency of transaction information, strengthen transaction operation management and establish. The credit evaluation mechanism of the transaction subject guarantees the sustainable and healthy development of distributed transactions in China.

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