Research on the Development of Electricity Market under the Background of New Electricity Reform

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Abstract: The reform of the power-sales side is another strengthening and deepening of the supply-side reform. It aims to comprehensively break the traditional power purchase and sales model of the power grid, effectively reduce the cost and pressure of power companies, stimulate the market and promote vitality. This paper draws on the advanced experience of opening up the power selling side and demand response abroad, discusses the development direction of the existing power market, provides help and suggestions for the development of the power market opening up the power selling side in China, and better carries out business renewal and expansion services.

1. Introduction

In late March 2015, the Central Committee of the Communist Party of China and the State Council issued "Several Opinions on Further Deepening the Reform of Electricity System", which called for steadily advancing the reform of electricity selling side and cultivating market players through multiple channels. They also issued specific implementation opinions on promoting the reform of electricity selling side. The liberalization of electricity selling side market has become one of the key tasks of deepening the reform of electricity system.

The liberalization of the electricity market on the electricity market provides a channel for demand-side resources to participate in the electricity market, and promotes the enthusiasm of demand-side resources to participate in the electricity market. At the same time, the release of the power-selling side broke the previous model of unified purchase and marketing, and gradually introduced the user's choice by introducing competitive power-selling entities, giving users the freedom to choose the power-selling subject.

2. Foreign Experience in Electricity Sales Side Reform

Generally speaking, the reform of the power selling side is to liberalize the electricity selling business in the power market, which means introducing competition in the power selling link and giving users free choice. There are two basic connotations in the opening of the electricity-selling side market: one is to break the monopoly of electricity-selling, to construct multiple electricity-selling bodies, and to form a pattern of multiple electricity-selling enterprises; the other is gradually liberalizing the customer's free choice of electricity, allowing users to freely choose and replace sales company. The former is the way of reform, and the latter is the core of reform.

The reform of foreign electricity sales side mainly analyzes from the market operation mechanism, and combines the main body of the electricity sales market with the effectiveness of electricity sales to determine the direction and method of reform. We mainly analyze the specific practices of the power
sales side reform.

2.1 Gradually release the power selling side
Strictly review the qualifications of independent sales entities, first open large factories, then medium-sized factories, and finally small factories. Voltage is also in the field of ultra-high voltage to high voltage to medium voltage and finally to low voltage. Most of them are examined and approved by the regulatory committee. They have certain requirements for the financial credit risk prevention capability, industry experience, technical level and economic scale of the main body of electricity sales, and re-examine the qualifications for power purchase access on a regular basis, mostly for 2-3 years. To ensure the reliability of the main body of electricity sales.

2.2 Give users the option
According to the process of liberalizing the user's right of choice in different countries, most of them are divided into 3-4 stages, and some of the faster countries are divided into 1-2 stages. The length of liberalization varies, some countries have implemented the policy of liberalization in 5-7 years, and some countries have been liberalizing for 15 years. The number of users who choose to let go of the users is different. European countries like France and the United Kingdom choose to liberalize all of them. The United States has liberalized 1/3 of the states according to their regions, and Russia has liberalized all non-resident users according to their types of users. According to the voltage level and power capacity, users are gradually given the option in stages.

2.3 Improving Price Control in Electricity Sale Market
The terminal sale price in foreign countries is usually composed of electricity price from power grid (power generation price), transmission and distribution price and related taxes and fees. But when the price of electricity on the grid fluctuates substantially, the government has the right to set the upper limit of the price of electricity on the grid.

At the beginning of the opening up of the power selling side, electricity price was the biggest feature that the power selling company attracted users. Each electricity sales introduced the methods of offering different preferential rates for reserved electricity charges to attract users. With the intensification of competition, some power companies offer customized packages to attract customers. However, the overall competition is within the control of the government, which ensures the healthy competition of the electricity market by using the upper limit of the price of electricity on the Internet, and promotes the steady and rapid development of the electricity market.

2.4 Establish a guaranteed power supply system
The guaranteed power supply service provider can be summarized as follows: When the user who has released the option has given up the option, the original sales company terminates the operation or cannot find the power supply of the seller for various reasons, the power supply company should bear the final power supply responsibility. This power supplier is known as the bottom power supplier. Most of them are undertaken by the original power suppliers. While ensuring full competition in the power market, foreign governments have established a guaranteed power supply system to ensure the smooth development of the power industry. Most countries designate the original power suppliers to undertake the obligation of guaranteed power suppliers, and clearly stipulate the starting conditions, service scope, standard process and charging price of guaranteed power supply services.

3. Enlightenment of China's Electricity Sales Side Reform
At present, China's electricity market belongs to a single mode. Although power generation enterprises are separated from power grid companies, electricity prices are unified by the government, and electricity price competition has never been implemented. Except for a few large industrial enterprises that purchase electricity directly from power generation companies and enjoy direct purchase prices, most users buy electricity from grid companies.
However, in 2015, the central government decided to further promote power reform and open up the power sales side. After the opening of the power selling side, a multi-buyer-multi-seller electricity purchasing mode will gradually be formed. The main body of electricity selling will be added to the power selling side, and users will be given the right of choice in the open electricity selling market. The power supply service will certainly develop towards personalized service, market-oriented service and customized service. Electricity sellers and users are both participants in the electricity market. Both parties can freely choose the service and the object to be served, especially the users. The passive mode of purchasing electricity in the past has been changed, and the mode of purchasing electricity and high-quality power supply services has been changed. The power selling companies will also be transformed into the mode of providing high-quality power supply services to the market.

When the sales side is open and the competition pattern in the power market changes, measures need to be taken to ensure the smooth operation of the electricity market. According to China's power situation, combined with foreign power reform experience, it has the following implications for China's power reform.

Legislation is in force. On the basis of the opening of the electricity sales side, there is a law to ensure the stable operation of the electricity market. Based on this, the power reform is gradually implemented. Determine the near-term goals and long-term direction of the reform of the power-sales side, revise the power-related laws, and improve the supporting laws and regulations for power reform.

Train the market-oriented concept of the main body of electricity sales. In the process of opening up the sales side, the market will be used to guide the sales of power to provide quality services. The government should implement subsidy-related policies to compensate for the loss of public electricity and green power losses of the main body of electricity sales, and ensure that the electricity sales company can better perform its social duties. Encourage the introduction of electricity purchase packages that meet the needs of users, and encourage sales entities to provide customized and personalized services to meet the needs of users.

Take advantage of existing power grids. International cross-regional power centers have become the development trend of the power market. China needs to expand the scope of transactions, enhance market vitality and enhance market competitiveness based on the existing Guangzhou and Beijing power trading centers.

4. Demand response
Demand response (DR) refers to the time and level at which users adjust their own power demand according to price signals or induced load reduction compensation when power price rises or system reliability is threatened under different market conditions, thus ensuring the safe, reliable and stable operation of power grid management.

4.1 Status of China's demand response
Demand response is an important means of demand-side resource scheduling and an important reform method for advancing the electricity market. At present, there is a need to study the response to demand. Some scholars have proposed to use virtual power plants to adjust the demand response; some scholars have pointed out that users are classified, and the demand response is targeted according to the user type, or Bayesian dispersion is adopted. The probability distribution function deals with the randomness of user selection to formulate the price implementation plan. Some scholars also study the demand response market and its capacity, and establish models to meet the uncertainty of market demand to meet user needs. It can be seen from these existing studies that the direction of demand response is to provide users with accurate service packages, which fully benefit the demand side resources, so that the demand side resources can participate freely in the electricity market.

Our country has carried out the pilot work of demand response in Beijing, Jiangsu, Foshan and Shanghai, and has achieved some results. Jiangsu Province has carried out a series of flexible regulation and control, built an interactive and friendly platform, which can promote the normalization
of China's demand response. Shanghai allocates demand response to day, week and month, forming a time system. However, with the completion of the pilot work and effective financial support, it is difficult for demand response work to achieve better development, and it is difficult to continue without policy support and guarantee.

4.2 Development Direction of Demand Response

The development of PJM power market in the United States is relatively mature. China can learn from the experience of PJM development to clarify the development direction of demand response in the power market.

Demand-side resources can participate in the spot market. Foreign demand response is mainly through service providers aggregating demand-side resources to participate in spot market transactions. Spot transactions account for about 80% of the total transaction volume, which can not be underestimated. China should integrate demand side resources through demand response, and then participate in the spot market, allow the main body of electricity to aggregate the demand side resources, and then guide the incentive users to use energy behavior, and finally allow the demand side resources to participate freely in the spot market.

Demand response participates in market support services. In the PJM market, the real-time call capacity only accounts for a small proportion of the registered capacity, while the auxiliary service accounts for about 30% of the total demand, and the auxiliary service occupies a larger market capacity. Auxiliary services require higher accuracy and stability than the spot market. Electricity sellers can control demand response accurately through intelligent contracts.

5. Conclusion

Compared with the traditional electricity market, the power-sales side is released and the demand response makes the power trading market-oriented. Users are free to choose the main body of electricity sales, and the transaction is liberalized. Various management models have emerged. In the face of new power reforms, the state should protect the large conditions for the sale of electricity on the side of the power supply, conduct price control, establish a bottom-sole supplier; develop and utilize demand-side resources, give certain policy support, promote demand-side development, and set up pilots to adopt advanced management model, fully draw on foreign experience, give full play to the advantages of low cost and good efficiency in China's electricity market.

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