Research on the regulatory model of competitive electricity sales market

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Abstract. With the development of power market construction, in order to ensure the effective competition of the power market and the stable operation of the system, under the competitive electricity market mode, it has become an urgent problem to improve the power sales market supervision system. Firstly, the characteristics of the electricity sales market under the competitive electricity market mode is analyzed. Secondly, problems in the surveillance of the electricity sales market are pointed out. Finally, the countermeasures and suggestions for the surveillance of the electricity sales market under the competitive electricity market mode are put forward.

1. Introduction
The power market is the application and development of the economy in the power industry. The development of the electricity market can make the adjustment function of the supply and demand relationship in the market economy be fully utilized[1-3], which helps to establish a unified, open, standardized and orderly electricity market system and contribute to the development of the power industry[4-6]. In the 1980s, Western countries led by the United Kingdom first began to explore the marketization of the power industry, implemented reforms to separate power and grid electricity prices, improved service levels, and broke the inefficient mode of traditional management[7].

With the continuous reform of the power system, power market construction has become more complete and efficient than ever before[8-9]. The "Several Opinions on Further Deepening the Reform of the Electricity System" is promulgated by China on March 15, 2015, clarifying the principles, tasks and paths of the electricity sales market under the competitive mode. The past model of unified purchase and sales will be broken due to the deregulation of electricity sales, which gives users the right to choose the electricity sales[10-11]. However, in the practice of the electricity market, there are also continuous problems emerging. The government needs to take measures to solve these problems. Thus, the surveillance of the electricity sales market has become more and more important. The power system is effectively integrated into the market economy by optimizing the surveillance of the electricity market and improving the efficiency of the electricity market. Above all, the market surveillance method of the electricity sales market under the competitive mode still needs to be studied.
2. Analysis of Characteristics of Electricity Sales Market under Competitive Mode

2.1 Concept of Electricity Sale Market under Competitive Mode

The competitive power market on the sales side is based on the competition in the power generation side. In this mode, Users have the right to purchase power and can choose to purchase power from power retailers or power distribution companies. Besides, the distribution network is fair and open to all users. Different electricity sales companies often provide users with electric energy through a reasonable market. Users can choose or replace electricity sales companies independently according to their own needs and the degree of satisfaction of the services provided by the electricity sales company. This model requires a more complete power market and construction funds to support it. In the implementation process, lots of power metering, information transmission and data analysis devices are required, and the cost of the power transmission process is also borne by the users.

The characteristics of the electricity sales market under competitive mode are as follows:

- Users can choose to buy electricity directly from generators or independent power sales companies.
- Small and medium users can also freely choose electricity sales companies to provide power supply services.

The incremental power distribution network is liberalized, The grid is no longer the only option, social capital can enter and participate in the operation and have absolute controlling rights. Electricity sales companies that own a distribution network can participate in later electricity market transactions, and provide value-added services through the purchase and sale price difference or provide users with energy management.

Through the deregulation of the generation side and the sales side, effective competition between power generators, between power generators and power sellers, and between power sellers is realized. A "multi-buyers, multiple sellers" power market is formed.

2.2 Advantage of Electricity Sale Market under Competitive Mode

Before and after the deregulation of the power sales side, the changes of the electricity trading mechanism are shown in the table below.

| Type                  | Before the power sale side is released | After the power selling side is released                                                                 |
|-----------------------|----------------------------------------|---------------------------------------------------------------------------------------------------------|
| Transaction subject   | Power generation enterprises and power grid companies | Multiple trading entities, intelligent buildings, parks, power companies, small and medium-sized users |
| Transaction type      | Single                                  | Auxiliary services trading, green certificate trading, power generation right trading and carbon emission trading market are becoming more and more active |
| Transaction information | Opaque, Inadequate                      | Transparent, timely and paid                                                                         |
| Transaction management | Planned nature                         | Marketization                                                                                       |

Promote the consumption of renewable energy. In terms of transactions, policies are used to guide users to consider energy conservation and emission reduction when making decisions, so as to achieve low-carbon and environmental protection. In inter-regional and inter-provincial transactions, the proportion of clean energy exchanges between provinces is increased.

Multiple platforms of trading. At present, China has 30 power trading centers, 28 provincial-level trading centers, and 2 national-level trading centers. In addition, there are also various trading platforms based on Internet platforms, such as a hybrid cooperation platform of mobile phone applications and PPP models. In the future, trading organizations will become more diversified, and various trading platforms in the society will in competition.
Users have right to choose. An important feature of the electricity sales market under competitive mode is that users have the right to choose. With the construction of trading organization and information platform, the market participation of users can be increased. On the other hand, a variety of options also increase the enthusiasm of users for participating in the market.

3. Problems of the surveillance of Electricity Sales Market under Competitive Mode

3.1 Insufficient marketization of the electricity sales market
In the power industry, power products are provided by power plants, and power products are consumed by power users. Power transmission, distribution, and sale of power grids are all subordinate to the power grid company. The power grid company connects power plants and users. The separation of power plants and grids was realized due to the power reform in 2002. The power generation has been formed as a competitive market. Although the competition among power generation companies breaks the monopoly, due to the state-owned nature of most power plants, the "separation of government and enterprises" is not complete, and local governments are strongly dependent on basic industries, and competition between power plants is inevitable. There are still barriers between industries, which affect the market competition. The electricity price reform has not been realized due to complicated reasons, as a result, the electricity sales competition mechanism has not been established. The electricity price management is still controlled by the government, and the transaction between electricity products and users is limited.

3.2 Inefficient surveillance
Power industry is mainly concerned with the speed of development and scale expansion, the attention paid to the effective allocation of resources is not enough. On the one hand, there are still many small thermal power plants in China, which reduces the efficiency of resource allocation. Due to high energy consumption and high pollution of small thermal power plants, the overall resource allocation efficiency is low. At the same time, some clean resources have not been fully developed and utilized such as photovoltaic power generation and wind power generation, which also leads to low resource allocation efficiency. It can be seen that although the power supply has increased due to the power reform, the allocation of resources is not optimized, which lead to inefficient surveillance.

3.3 Unreasonable surveillance mechanism
There is no specialized agency responsible for power industry surveillance in China, which is difficult to effectively doing their duties. What is more, because there are many surveillance departments and complicated procedure, the surveillance is not effective.

4. Advice of the surveillance of Electricity Sales Market under Competitive Mode

4.1 Establish a surveillance mechanism for power market
The electricity market must be analyzed and monitored. In the construction of the electricity market, the participation of third-party professional surveillance agencies is absolutely needed. Relying on third-party professional agencies to analyze and evaluate market is a useful way to strengthen market management. Energy regulatory agencies and local government power management departments should establish power market surveillance mechanisms, and may entrust third-party surveillance agencies to carry out relevant surveillance and analysis. Energy regulatory agencies and local government power management departments make decisions on market violations in accordance with relevant laws and regulations, referring to the investigation conclusions of third-party surveillance agencies. Energy regulatory agencies, local government power management departments, power market management committees, and third-party surveillance agencies should have regular meetings to evaluate market surveillance.
4.2 **Strengthen the surveillance of electricity sales market**

Strengthen the surveillance of competitive electricity sales market. In order to ensure fair competition, relevant work standards such as office separation, financial independence, and information isolation should be formulated.

4.3 **Strengthen the credit surveillance of market members.**

Strengthening the construction of the credit system is an inevitable requirement for promoting the reform of the electricity market and the construction of the electricity market. The energy regulatory agency is responsible for establishing a credit evaluation system for market members. They should establish a credit evaluation index system for different types of market members, and establish the credit records of corporate legal persons and their responsible persons and employees. Establishing the blacklist system is needed. Serious untrustworthy behaviors will be recorded and publicized to the society. For serious untrustworthy behaviors and refusal to rectify and affect power safety, trading rights may be restricted and be recorded in the national joint disciplinary system.

5. **Conclusion**

At present, China is in a critical period of deepening the construction of the power market. The power market has become more and more perfect after the power system reform, but the surveillance method of the electricity sales market under the competitive mode still needs to be studied. Firstly, the characteristics of the electricity sales market under the competitive electricity market mode is analyzed. Secondly, problems in the surveillance of the electricity sales market are pointed out. Finally, the countermeasures and suggestions for the surveillance of the electricity sales market under the competitive electricity market mode are put forward.

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