

Analysis of Electricity Market Forecast

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Abstract. The power industry has owned the monopoly mode for a hundred years in widely using power generation, transmission, distribution, sales in one. In the past, it was generally believed that the power industry was an economy of scale. However, with the continuous development of power industry and continuous progress of society, the monopoly mode of operation in power system gradually displays the drawbacks. As the implementation of the power market reform introducing the concept of competition, from the economic point of view, power system that consists of power generation, transmission, and power supply is divided into power generation companies, power transmission companies and power supply companies, three relatively independent parts, which brings a lot of new problems. China's power system reform is also the same. This paper discusses the function and importance of market forecasting and analysis system, which is an important part of the electricity market operation system from the perspective of electricity market research.

Introduction

With the power market reform deepening in China, power industry is in the rapid development, but also encounters new difficulties at the same time. The power system is a unified whole previously, and the primary purpose is to ensure the safe and stable operation of the system, so the system security is put in the first place. In the new electricity market operating system, there should be a corresponding subsystem to achieve this part of function. Many foreign power markets have adopted such a subsystem, called the market forecasting and analysis system, or market adequacy analysis system. The corresponding function development is also more perfect. At present, there are scholars in the study of this issue and making certain summary for the functional composition of the system. But in general, the domestic market forecasting and analysis system in electricity market has not yet formed, so it's an important issue about how to develop a practical and effective market forecasting and analysis system for the power market reform.

Based on the development and improvement of market forecasting and analysis system, the research contents and main technical composition of electricity market is discussed firstly in this paper, and then the role and importance of market forecasting and analysis subsystem in the electric power market operation system is discussed further. Then the algorithm of market forecasting and analysis system is introduced, and finally the realization of two specific algorithms.

Technology Composition of Electricity Market

The research content of electricity market is extensive. As a new operation mode of power system, it includes all aspects from the operation of power system to the market economy, and is a typical interdisciplinary research field and the organic combination of social and natural sciences. The study of electricity market from the perspective of natural science is mainly based on microeconomics, combining with the power system expertise, to analyze the power market in the corporate behavior, market characteristics and solve the problem in the establishment of electricity market process. The study of electricity market from the perspective of social science is mainly to explore the legal, economic and social issues involved in the electricity market reform, research and compare the electricity market reform process, status quo, similarities and differences of countries, and put forward reform programs, organizational framework and so on.

The research of electricity market is inseparable from the expertise of power system, which is

resulted from the particularity of electricity production and circulation. Electricity is an invisible commodity, so the transport of electricity only follows the laws of physics, and usually does not tell the user the resource of the power. In order to ensure the safe and stable operation of power system and real-time balance of supply and demand, the market transaction on different time scale is required to coordinate in a system-wide manner. It can be said that if you cannot understand the physical characteristics of power system or the power flow calculation, transient stability, automatic power generation control, active power, reactive power and other power system professional basic concepts and terms, it is difficult to carry out substantial research on the electricity market. Many senior experts and scholars have pointed out that although the power system organization of production has changed, but the physical laws of system movement have not changed. Safe and stable operation of power system is still the core issue of power industry.

Compared with the traditional operation mode of electricity system, the electricity market operating environment formed by electricity market reform will be very different. Electricity market operating environment should not only ensure the safety of the entire system, high-quality operation, but also provide a fair competitive market environment as much as possible, so as to achieve the purpose of economic operation. It has high demand for power system expertise and economic knowledge. It is the power system expertise and the development of economic knowledge that makes the market reform of power system possible.

Market Forecasting and Analysis

As an integral part of the electricity market, the role of market forecasting and analysis system is to predict the market situation and publish corresponding information for the reference of the market members in order to achieve safe and smooth operation of market. The relationship between market forecasting and analysis system and other subsystems of electricity market operation system is shown in Fig. 1.

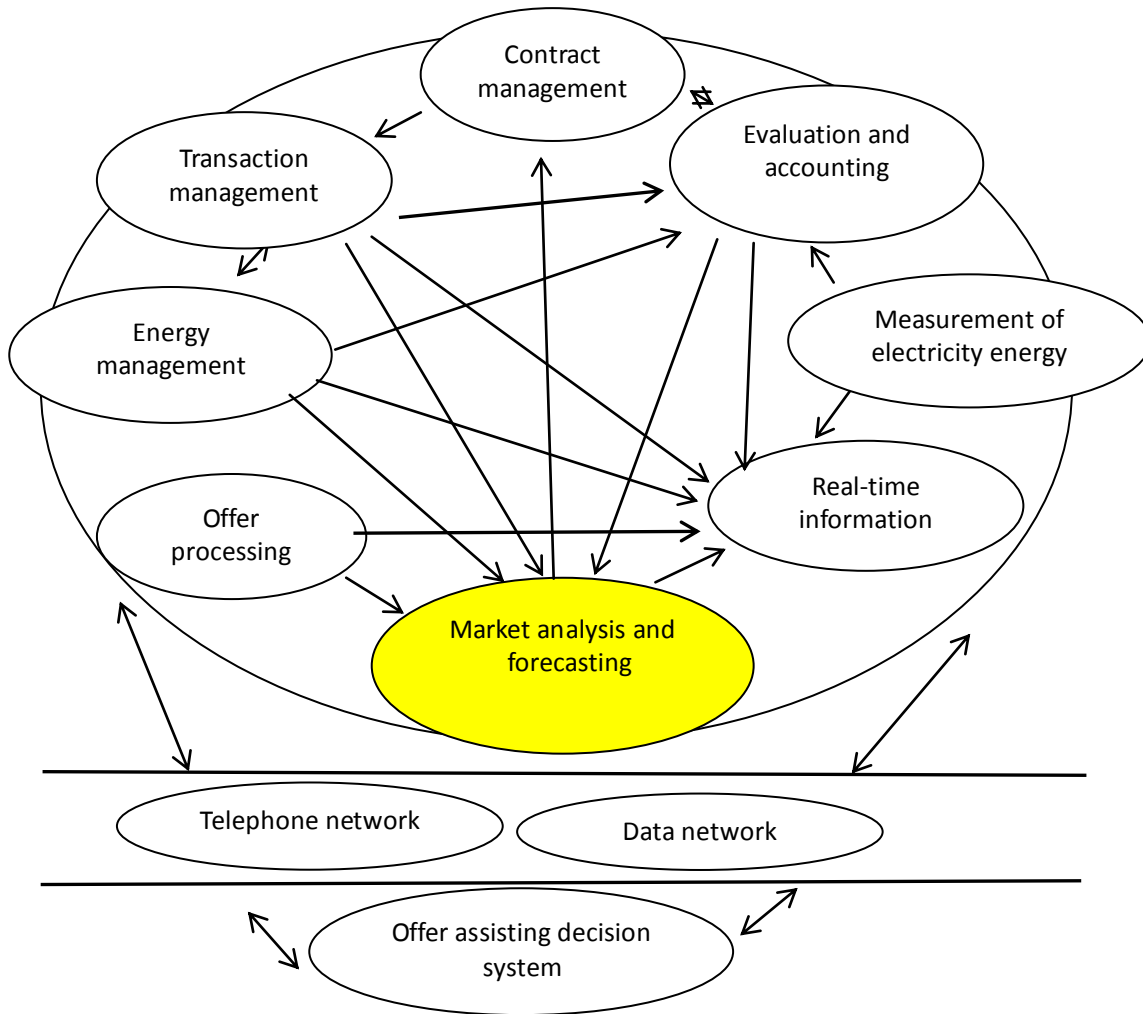


Figure 1. Logic relationship between market forecasting and analysis system and other system

This is the main function of market forecasting and analysis system in power market operation system. The detailed analysis is shown as below:

First of all, the power regulatory department should carry out the work of load forecasting, and predict the system maximum load and required backup, system power consumption and the sum of available capacity for each time period against short, medium and long different forecasting cycle respectively, combining with the relevant data of the units reported by power generation groups.

Secondly, the electricity regulatory authorities should make corresponding forecasting for the specific circumstances of market transactions in future period, give the marginal price of various trading hours and potential capacity shortage period in the future, as well as the description of the situation that may affect implementation of economic scheduling plan prepared by the power dispatch center due to network or equipment constraints based on the loading forecasting and repair plan and other information.

Finally, the electricity market supervision department should also ensure long-term reliable operation of electricity market. This goal can be achieved by adequately analyzing the entire system and calculating the reliability and issuing the corresponding sum of system and respective load nodes. And the power market supervision department can find the weak links that affect the security, stability, quality, economic operation of the entire system through the analysis of adequacy indicators and reliability indicators and make corresponding improvement, so as to improve the system operating conditions.

Electricity market forecasting and analysis system should reach the aim of guiding the power market security, stability, quality and economic operation for the above three aspects through the

release of relevant data.

Algorithm Composition of Market Forecasting and Analysis System

The main input and output data for market forecasting and analysis system is described above. In order to complete the function of market forecasting and analysis, some related algorithms should be organized as a component module of power market operation system. The module should predict the system network constraints, system load, and main decision of each market member, analyze the system transaction status and give the situation affecting economy. At the same time, system operation data should also be collected for timely analysis, and operation laws of the various markets members and the original units in power system should be summarized.

The important algorithms in this module include load forecasting algorithm, power plant quotation prediction algorithm, simulation transaction algorithm, system reliability calculation and so on. Load forecasting algorithm has been relatively mature. The simulation transaction algorithm mainly uses the resulting data of load forecasting algorithm and power plant forecast quotation prediction algorithm, combining the network condition in order to obtain the output situation of each power plant in each forecast period, so as to predict the transaction status in the forecast period, such as the marginal price of each period, the network links that may generate constraints for the transaction economics in a certain period, the logical relationship shown in Fig. 2. The reliability algorithm mainly analyzes the network reliability in the medium and long term, and the reliability of network is expressed by the probability index, which provides a basis for the network planning.

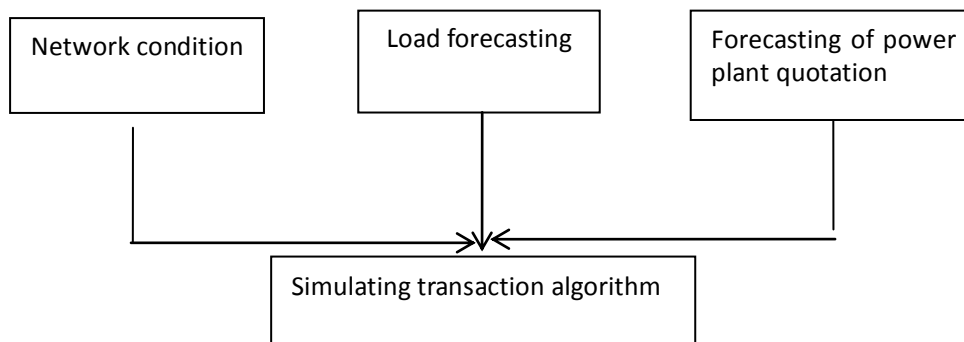


Figure 2. Algorithm logical relationship

Conclusion

This paper discusses the current situation of various electric price forecasting algorithms at home and abroad, and proposes a new power plant quotation forecasting algorithm based on fuzzy clustering analysis for the characteristics of market forecasting and analysis system. The algorithm has a good rapidity, not only considering the characteristics of power system operation, but also can better meet the requirement of market forecasting and analysis system for production simulation. At the same time, the algorithm and specific market rules are weak, so it is more suitable for the status quo that China's current power market reform is not fully mature. However, the analysis of predicted results and the original data indicates that the algorithm still has some problems. Firstly, the algorithm has a strong dependence on the historical data, and the reform of electricity market in China is not long and the accumulation of some operational data is not enough.

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