

# Research on the Service Evaluation System Adapted to Provincial Medium and Long-Term Power Trading

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**Abstract:** With the deepening of power market reform, various trading subjects in the market have put forward diversified trading demands for participation in the power market according to their own power generation and consumption characteristics, changes in the market environment and other internal and external factors, which has put forward higher requirements for market operation and supervision, and the original power market evaluation system based on medium- and long-term trading is increasing lb b by unable to adapt to the development pace of the current power market. To this end, this paper proposes a general framework for inter-provincial and intra-provincial market monitoring and evaluation system design with general market operation monitoring and a general index system for medium and long-term electricity market operation monitoring including nine dimensions of market environment, market construction, market structure, market subjects, market operation, market efficiency, market price, market settlement and grid security.

## 1 INTRODUCTION

Recently, the national development and reform commission has held two meetings related to electricity market reform, issued relevant documents, required to promote the electricity in the long-term contract "six sign" work, for the current problems faced in the construction of the electricity in the long-term market, establish and improve the medium and long-term power contract signed supporting security mechanisms, to further strengthen the foundation, play the power medium and long-term market "ballast" role. At the same time, the state grid company held a power trading work conference, issued relevant documents required to improve the market adjustment mechanism of medium and long-term contracts, gradually shorten the trading cycle, increase the frequency of transactions, rich trading varieties, and gradually realize the medium and long-term trading continuous market, so as to better play the decisive role of the market in the allocation of resources. With the continuous advancement of the power market construction process, the power market also constantly faces the test of new environment, the traditional service evaluation system can no longer

meet the needs of the provincial power market, and there is an urgent need to establish a transaction service and evaluation index system that is compatible with the medium and long-term continuous operation.

However, the current methods and focus on the establishment of the evaluation system in various countries are not the same, and have not yet formed a recognized evaluation system. Foreign electricity market has developed earlier and established a relatively perfect market evaluation system. Jiang Da analyzed the evaluation methods of the electricity market in the United States and the United Kingdom, and proposed the principles for the construction of the market index system; Wang Peng introduced the meaning of each index of the evaluation of the electricity market in the United States, and proposed the inspiration for the evaluation of the electricity market in China. Most of the domestic research results focus on the evaluation of electricity market structure, for market structure, Mao Jibing pointed out that many foreign electricity market regulators use Lerner index, HHI and supply-demand ratio to evaluate the market structure; Guo Lei proposed to use the residual supply rate to reflect the market position, competitive strength and the ability to influence the

price of power generation enterprises; Qin Wang et al. proposed the use of indicators such as upper and lower offer limits and scarcity price frequency to evaluate the market operation; The remaining aspects are relatively less researched, for the whole evaluation system, Chen Fei et al. combined with international electricity market evaluation standards and tried to build an evaluation system that meets China's national conditions; Wang Gangcan et al. took the liquidity, stability, economy and development coordination , constructed an evaluation index system for the electricity market trading mechanism.

In order to promote the stable development of medium and long-term continuous operation of provincial electricity market and ensure the stability of the electricity market, this paper proposes a service evaluation system adapted to medium and long-term electricity trading, and constructs a general framework of market operation monitoring with commonality for inter-provincial and intra-provincial market monitoring and evaluation system design as well as a general index system of provincial medium and long-term electricity market operation monitoring including nine dimensions of market environment, market construction, market structure, market subjects, market operation, market efficiency, market price, market settlement and grid security.

## 2 OVERALL PROGRESS OF CHINA'S ELECTRICITY MARKET CONSTRUCTION

The power market is an important part of China's unified and open modern market system with orderly competition. The construction of China's electricity market continued to advance in depth and achieved remarkable results. The industry pattern of "controlling the middle and letting go of both ends" has basically taken shape; The electricity market trading system is basically established; The openness and activity of the market increased significantly; The decisive role of the market in allocating resources is gradually emerging; The market mechanism helps to continuously improve the level of clean energy consumption; The open and transparent market environment is healthy.

## 3 ELECTRICITY MARKET OPERATION EVALUATION SYSTEM CONSTRUCTION IDEAS

With the rapid advancement of the trial operation of the spot pilot continuous settlement, the power market reform has fully entered the deep water, and the pattern of diversified interests is more complex. The current power market construction is at a key node, the power market operation evaluation analysis as an important part of the power market construction work, need to firmly grasp the direction and boundary of the market advancement, to combine the new situation facing the power market, to "ensure security supply" as the basic premise; to "promote clean transformation " as the key goal; adhere to the "two levels of operation" to start; in line with the actual, according to local conditions.

## 4 GENERAL FRAMEWORK OF MEDIUM AND LONG-TERM MARKET OPERATION EVALUATION INDEX SYSTEM

The general framework of the provincial electricity medium and long-term market operation evaluation index system is shown in the following table.

Table 1: Framework of evaluation index system.

Evaluation dimension	Evaluation cycle	Evaluation type
market environment	annual	qualitative evaluation
market structution	monthly	quantitative evaluation
remarket construction	monthly	combination of quantitative and qualitative evaluation
market subject	daily	quantitative evaluation
market operation	daily	quantitative evaluation
Market Benefits	monthly	Combination of quantitative and qualitative evaluation
market price	daily	quantitative evaluation
Market settlement	by Settlement Cycle	Combination of quantitative and

		qualitative evaluation
Grid Security	daily	quantitative evaluation

Referring to the common indicators for monitoring and analyzing the operation of foreign electricity markets and combining with the current situation of the construction and operation of medium and long-term electricity markets, the provincial medium and long-term electricity market operation monitoring and evaluation index system mainly monitors and evaluates the medium and long-term electricity market comprehensively from the nine dimensions shown in the table above.

### 4.1 Market Environment

The market environment is mainly used to describe the basic situation of the power market and the construction environment. Generally, the provincial medium and long-term market is monitored and evaluated every year. Among the operation monitoring indicators of the market environment, the first level evaluation indicators include the basic

situation of power supply (including the total amount, type and proportion of installed power supply); Basic load information (including electricity consumption, peak load, user side release, registration of power selling companies, overall market participation, etc.); Basic information of the power grid (including the structure of the power grid in the province and the main interconnection lines outside the province).

### 4.2 Market Structure

The market construction dimension is mainly used to reflect the soundness of the medium and long-term market mechanism and the operational efficiency of the medium and long-term market organization. Generally, the provincial medium and long-term market is monitored and evaluated on a monthly basis. The operation monitoring indicators of market construction include the first level evaluation indicators: market rule system, market supervision mechanism, information disclosure mechanism, technical support system, and staffing.

Table 2: Market Structure Dimension Operational Monitoring Indicator Setup.

First level evaluation	Secondary evaluation index	Index content and description
Market supply and demand	Medium and long term market bidding space	It refers to the power generation space in the market where the load under unified regulation will participate in the market bidding after deducting the preferential power generation and external power generation.
	Medium and long-term market supply and demand ratio	It refers to the ratio of generating capacity to bidding space. The statistics can be divided into two periods: peak and trough.
Market Concentration	HHI Index; TOP-4 share; Remaining supply rateRSI	The sum of the market share of all power generation enterprises in the medium and long term market; The sum of the market shares of the four largest power generation enterprises; It refers to the sum of market shares of other power generation enterprises except a power generation enterprise in a certain period of time in the medium and long term electricity market.

### 4.3 Market Construction

The market construction dimension is mainly used to reflect the soundness of the medium - and long-term market mechanism and the operational efficiency of the medium - and long-term market organization. Generally, the provincial medium - and long-term market is monitored and evaluated on a monthly basis. The operation monitoring indicators of market construction include the first level evaluation indicators: market rule system, market supervision

mechanism, information disclosure mechanism, technical support system, and staffing.

### 4.4 Market Players

The dimension of market subject is mainly used to evaluate the degree, declaration and trading behavior of market subject's participation in the medium and long-term market, and reflect the active degree of medium and long-term market transactions. As market entities participate in medium - and

long-term market operations every day, the dimension of market entities should be monitored and analyzed on a daily basis.

#### 4.5 Market Operation

The market operation dimension is mainly used to comprehensively reflect the overall operation of the provincial medium and long-term market, medium and long-term market and auxiliary service market. Consistent with the dimensions of market entities, the market operation dimension is generally monitored and analyzed on a daily basis.

#### 4.6 Market Benefits

The market efficiency dimension mainly reflects the benefits of the market in terms of releasing the reform dividend and promoting the consumption of clean energy, which are reflected by indicators such as market main body benefits, social welfare and clean energy consumption. According to the settlement cycle of the medium and long-term market, the market efficiency dimension is generally monitored and evaluated on a monthly basis.

#### 4.7 Market Price

The market price dimension is an important embodiment of the market operation state, and also relates to the interests of all market subjects. The overall price level, price fluctuation, price reasonableness and other indicators are used to reflect the market operation status and competition efficiency, thus providing reference for the improvement and optimization of medium and long-term market rules and mechanisms. Due to the drastic changes in market prices in the medium and long term, the market price dimension is generally monitored and analyzed on a daily basis, and some key indicators need to be monitored on an hourly or even shorter cycle.

#### 4.8 Market Settlement

The market settlement dimension is mainly used to evaluate the efficiency of market settlement, the amount of settlement funds, and the scale of unbalanced funds, reflecting the overall market cost. The evaluation cycle of the market settlement dimension is generally consistent with the settlement cycle of the medium and long term market, which can be monitored and analyzed monthly.

#### 4.9 Grid Security

The power grid security dimension is mainly used to reflect the power grid security operation in the medium and long-term market environment. Power grid security is the premise of medium and long-term market operation, so the power grid security dimension is generally monitored and analyzed on a daily basis.

### 5 CONCLUSIONS

This paper puts forward a general market operation monitoring framework for the design of inter provincial and intra provincial market monitoring and evaluation systems, including the overall index system of Gansu electric power medium and long-term market operation monitoring in 9 dimensions of market environment, market construction, market structure, market subject, market operation, market efficiency, market price, market settlement, and power grid security. The medium and long-term market evaluation index system in the province can be designed in detail based on the overall framework.

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