

The Market Regulation System in China Under the New Political Context

Qiuyang Ma¹, Gao Zhang¹, Menghua Fan¹, Li Ma¹

¹ Corporate and Strategy Research Centre of State Grid Energy Research Institute; Beijing, China

¹ qiuyangma22@sina.com

ABSTRACT

The power system in China faces three new changes. The first one is the “Carbon Peak and Carbon Neutrality” national strategy; the second one is to establish the new generation energy system where the green and clean generation will be used to support most of the demand. And the third change is a new document “Notice on Further Deepening the Market Reform of Feed-in Tariff for Coal-fired Power Generation” (No. 1439 Document). Under the new context of the energy system, this paper concutes four recommendations for the future regulation system establishment for Chinese energy market by learning and summarizing the regulation and monitoring for foreign countries.

Keywords: Regulation; Carbon Peak and Carbon Neutrality; U.S. regulation system; European market regulation system;

1. INTRODUCTION

Since 2015, the publishing of the “Several Opinions of the CPC (Communist Party of China) Central Committee and the State Council on Further Deepening the Reform of the Electric Power System” (also called No. 9 Document) marked the beginning of a new round of power sector reform of China. The objectives of this round of power sector reform focused on establishing and improving market mechanisms, building a unified and open, competitive market, emphasizing the commodity attributes of electricity, and fully optimizing the resource allocation through the market. With the 6 years energy market reform and efforts, the two-tier bidding and two-tier clearing market model has already been established with the inter-provincial and provincial market in China.

However, at the same time, from the political perspective, the power system in China faces three new changes. The first one is the “Carbon Peak and Carbon Neutrality” national strategy, which will guide China’s energy transition in a long period. The second one is the target to building the new generation energy system where the green and clean generation will be used to support most of the demand. And the third change is a new document “Notice on Further Deepening the Market Reform of Feed-in Tariff for Coal-fired Power Generation” (No. 1439 Document) issued by the

National Development and Reform Commission on October 11th 2021. The No.1439 Document requires to gradually cancel the feed-in tariffs of all coal-fired power generation, expand the limitation of the market price caps, and facilitate all commercial and industrial users to join the energy market. Only in this way, the energy price signals can further release to the demand-side users.

Under the new context of the energy system, to ensure the fair and orderly operation of the power market and the safe operation of the power system, it is necessary to simultaneously promote the power regulatory system. Scheduling supervision is an important part of China’s power regulation. In the context of gradually deepening power system reform, China’s power grid dispatching operation will face more complex regulatory situation and stricter regulatory environment, and the regulatory content and mode will gradually mature and diversify. The dispatching department of the grid needs to clarify the new regulatory requirements and contents of dispatching under the new situation, establish a more complete adaptive regulatory system, and continuously improve the ability of dispatching service supervision.

In this paper, the dispatch regulation and the practical experience in foreign typical electricity market countries will be analyzed and summarized firstly. Then,

the state quo of Chinese dispatch regulation will be introduced. Finally, by analyzing the new situation and new requirements the dispatching department of the grid faced on, the suggestions of Chinese dispatch regulation will be given.

The rest of this paper is organized as follow: the regulation and market monitoring systems in foreign countries will be summarized in Section II. The latest situation of the Chinese electricity market regulation objectives will be introduced in Section III. And the final suggestions of Chinese dispatch regulation under the new political context will be analyzed and given in Section IV.

2. THE REGULATION SYSTEMS IN FOREIGN COUNTRIES

In this section, the regulation and market monitoring systems of two typical energy electricity markets will be chosen as examples, which are the electricity market of United States and the Internal European Market (IEM) [1].

2.1. The Key Governance Organizations in IEM

In European countries, the grid dispatching agencies are generally set up in grid companies, called Transmission System Operators (TSOs), and usually independent from the electricity market operators.

As the world's largest economic association, the EU has been promoting the integration of the electricity and gas sectors since the late 1980s to facilitate the opening and integration of energy markets among member states. To this end, in recent years, the EU has been strengthening the integration and coordination of existing rules on grid operation, market operation and regulation among member states, and accordingly established three key governance organizations in the European United internal coupling energy market: □

● ENTSO-E (European Network of Transmission System Operators for Electricity):

ENTSO-E is the European association for the cooperation of TSOs, representing 42 TSOs from 35 countries [2-4]. ENTSO-E and its members, as the European TSO community, fulfil a common mission: Ensuring the security of the interconnected power system in all time frames at pan-European level and the optimal functioning and development of the European interconnected electricity markets, while enabling the integration of electricity generated from renewable energy sources and of emerging technologies. To carry out its legally mandated tasks, ENTSO-E's key responsibilities include the following:

- Development and implementation of standards, network codes, platforms, and tools to ensure secure system and market operation as well as integration of renewable energy.
- Assessment of the adequacy of the system in different timeframes.
- Coordination of the planning and development of infrastructures at the European level (Ten-Year Network Development Plans, TYNDPs).
- Coordination of research, development, and innovation activities of TSOs.
- Development of platforms to enable the transparent sharing of data with market participants. ENTSO-E supports its members in the implementation and monitoring of the agreed common rules.

● ACER (European Union Agency for the Cooperation of Energy regulators):

ACER was established in March 2011 by the Third Energy Package legislation as an independent body to promote the integration and completion of the IEM. By fostering cooperation among National Regulatory Authorities, ACER ensures that the integration of national energy markets and the implementation of legislation in the Member States are met according to the EU's energy policy objectives and regulatory frameworks. As an EU Agency, it supports the cooperation between the European Union and national governments by pooling technical and specialist expertise. This agency promotes:

- A more competitive, integrated market, offering consumers more choice.
- An efficient energy infrastructure and networks, enabling energy to move freely across borders, the integration of renewable sources, and therefore ensuring a higher degree of security of supply.
- A monitored and transparent energy market guaranteeing consumers fair prices and a limitation of market abusive behaviors.

● All NEMO (Nominated Electricity Market Operator) Committee:

This organization facilitates the cooperation among NEMOs for all common European tasks necessary for the efficient and secure design, implementation, and operation of single day-ahead and intraday coupling.

The All NEMO Committee is formed by the appointed representatives of each NEMO. The All NEMO Committee also ensures compliance with the CACM Regulation, the MCO Plan (plan that sets out how to jointly set up and perform the Market Coupling

Operator functions) and related contracts and relevant methodologies[5]. It does this by organizing periodic meetings, where discussions and decisions on these topics. It may create working groups or task forces dedicated to managing specific topics. It also represents officially the NEMOs positions in several coordination groups and meetings with TSOs and Institutions (European Commission, ACER and NRAs).

The EU dispatching regulatory system includes both EU and member state levels, with the overall framework shown in the figure 1 below.

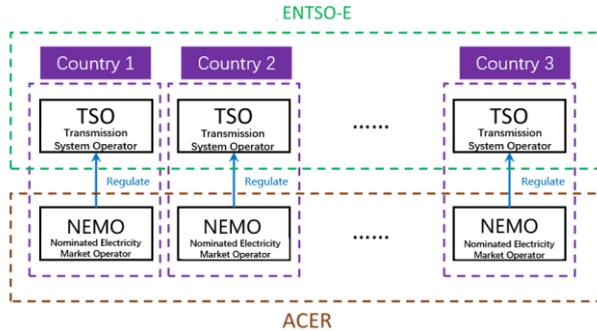


Fig.1 Relationship and structure of the IEM regulation system

2.2. The Independent Monitoring and Regulation in the U.S. Electricity Market

● Structure of the regulation system of the U.S. electricity market:

Regulatory Agency	ISO/RTO	Independent Market Monitor	
		Internal	External
FERC	MISO		Potomac Economics
	ISO-NE	Yes	Potomac Economics
	NYISO		Potomac Economics
	PJM		Monitoring Analytics
	SPP	Yes	
	CAISO	Yes	
Texas PUC	ERCOT		Potomac Economics

Fig.2 Relationship and structure of the U.S. regulation system

● Operation of the regulation system of the U.S. electricity market:

All of the decisions made by FERC are considered by the U.S. Federal Courts, rather than by the President and Congress of the United States. As required by FERC, each regional electricity market has established a third-party agency dedicated to providing market monitoring services, namely the Independent Market Monitor (IMM), which assists FERC in regulating the scheduling and trading agencies and markets. IMM's Principals have a high degree of professional integrity and have no conflicts of interest in undertaking to provide the Services under this Agreement. Currently,

In the U.S. electricity market, the dispatching department and the energy exchange trading department are integrated in a same organization, which called the Independent System Operators (ISOS) or Regional Transmission Organization (RTO), and independent from the grid companies. There are seven existing power dispatch and trading organizations in the U.S., namely, New England ISO (ISO-NE), New York ISO (NYISO), PJM's RTO, Southwest RTO (SPP), California ISO (CAISO) and Midwest ISO (MISO), and Texas RTO (ERCOT). Of these, five ISOs have cross-state coverage, and the California ISO (CAISO) and Texas RTO (ERCOT) have in-state coverage only [6].

The U.S. has a two-tier regulatory system for electricity regulation, the federal- level and the state-level. At the federal level, the Federal Energy Regulatory Commission (FERC) is responsible for the overall regulation of the ISO/RTO, but the North American Electric Reliability Council (NERC) is authorized to regulate the safety and reliability of electricity. Reliability Council (NERC) to regulate, so FERC currently regulates the operation of the ISO/RTO's electricity market. For the state level, the state regulator, the Public Utilities Commission (PUC) of each state, regulates the ISO/RTOs within the state. The structure of the regulation of U.S. electricity market is illustrated as figure 2 shows.

market monitoring services are provided by Potomac Economics and Monitoring Analytics, with the exception of CAISO and SPP, which are monitored by their own internal independent market monitoring departments.

The IMM agency assists FERC in regulating the ISO/RTO by collecting and analyzing data and issuing reports and reports directly to FERC and the ISO/RTO Board of Directors. Its main functions include:

- To Monitor market rules, market members' trading behavior and ISO/RTO performance to identify actual or potential market design flaws.

- To Monitor market structure issues to improve the competitiveness of the electricity market and market efficiency.
- To Monitor weather the market manipulation happened or not.

The independent market monitor has access to the full range of ISO/RTO information. The independent market monitor provides an objective evaluation of the competitive performance and operational efficiency of the market by issuing periodic reports (typically 1 year). The flowchart of the operation between ISO/RTO, IMM and FERC has displayed as Figure 3 shows below.

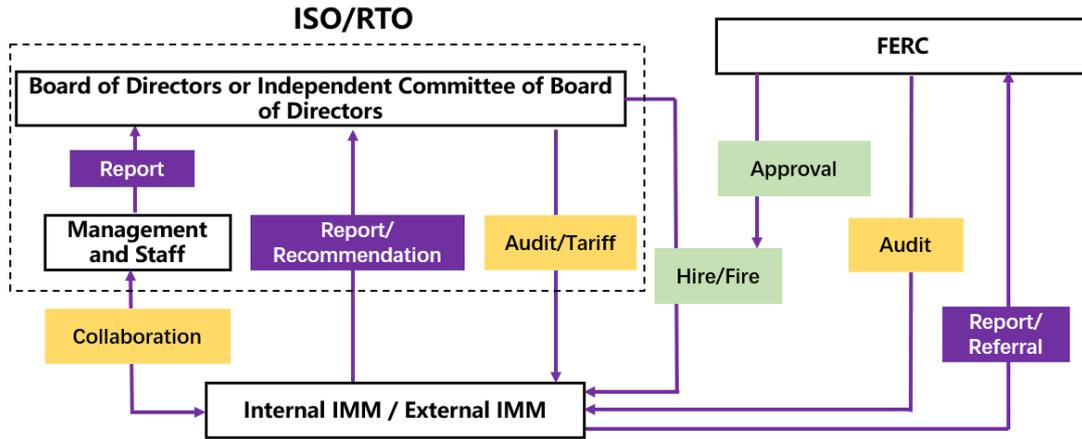


Fig.3 The flowchart of the operation between ISO/RTO, IMM and FERC

3. RECOMMENDATIONS FOR THE IMPROVEMENT OF THE MARKET REGULATION IN CHINA

With the goal of "double carbon" and the construction of a new generation power system, the development of China's power system will undergo a fundamental reform, which will have a greater impact on the focus, content, and methods of regulation of the power market and power dispatch, mainly in the following aspects.

● **To establish the credit-based intelligent regulatory mechanism**

The new changes in the power system and the new development situation provide an opportunity to carry out the transformation and upgrading of credit-based power regulation. As an important part of the construction of social credit system, the new credit-based regulatory mechanism aims to achieve the orderly and effective operation of credit management system through the establishment of credit commitment, information collection, classification, and cooperative regulatory system. Its role is mainly manifested as follows: to play a fundamental role of credit in the innovation of regulatory mechanisms, improve regulatory capacity and service levels, stimulate the vitality of market players, at the same time, it is conducive to the formation of a larger regulatory synergy, improve regulatory efficiency, is an inevitable choice to promote the national governance system and governance capacity and modernization.

● **Strengthen the regulation of rules and policy implementation**

In the face of the upcoming multiplication of wind and solar power, if the unified planning and monitoring is not in place, the development of the new generation power system will have significant difficulties. If the development and construction of the capacity of the renewable resources is too fast, the system cannot absorb all of the renewable generation. If the construction lag which will cause the shortage of power supply, not only directly affecting the security of the system operation, but also affecting the overall economic and social development.

Therefore, it needs to coordinate different regions, different industries, combined with the actual development of industrial policy, especially to do national and local planning convergence, power grid planning convergence, power grid management convergence, to prevent the disconnect between the construction of network sources, improve the grid's ability to accept, to provide a strong guarantee for the construction of new generation power systems.

● **Strengthen the regulation of prices and costs**

Electricity price reform is the core of power system reform and the key to building a new type of power system, and electricity prices are also linked to other energy prices, which are crucial to economic development and social stability. To strengthen price and cost regulation, in the process of building a new electricity system with new energy as the main body, we must consider the market and people's livelihood, efficiency and fairness, and actively build a market-

based price formation mechanism for electricity adapted to China's national conditions.

● **Strengthen the regulation and supervision of grid operation security**

China's energy and power industry will change from fossil energy to renewable energy, the power system shows a high proportion of renewable energy, a high proportion of power electronic equipment (called "double high") characteristics, the power system operating characteristics becomes more complex. Meanwhile, the system rotational inertia continues to decline which will cause the frequency regulation, voltage regulation capacity is insufficient. At the same time, as extreme weather more frequent and intense, the intermittent generation characteristics of the renewable resources will be amplifier, the difficulty of real-time power balance has been further increased. Under the guidance of the new energy security strategy of "four revolutions and one cooperation", the supervision of the safe operation of the power grid will be more stringent.

4. CONCLUSION

This paper introduces the regulation system in the U.S. electricity market and the Integrated European electricity Market and illustrate the new changes in political perspective and energy system development target. Under the new context of the power system, the suggestions for the regulation for Chinese power market can be concluded into four aspects:

- (1) To establish the credit-based intelligent regulatory mechanism
- (2) Strengthen the regulation of rules and policy implementation.
- (3) Strengthen the regulation of prices and costs.
- (4) Strengthen the regulation and supervision of grid operation security.

ACKNOWLEDGMENTS

This work was financially supported by the Science and Technology Project of State Grid Corporation of China (Research on Key Technologies of Power Market Design Serving the Construction of New Power System, 5100-202157292A-0-0-00).

REFERENCES

- [1] CAO Yijia, LI Qiang, TAN Yi, et al. A comprehensive review of Energy Internet: basic concept, operation and planning methods, and research prospects[J]. *Journal of Modern Power Systems and Clean Energy*, 2018, 6(3): 399-411.
- [2] ENTSO-E, information on SDAC, [Online].

Available:

https://www.entsoe.eu/network_codes/cacm/implementation/sdac/. [Accessed 16 June 2021].

- [3] ENTSO-E, information on SIDC, [Online]. Available: https://www.entsoe.eu/network_codes/cacm/implementation/sidc/. [Accessed 16 June 2021]. K. Elissa, "Title of paper if known," unpublished.
- [4] OMIE, "Electricity markets," [Online]. Available: <https://www.omie.es/en/mercado-deelectricidad>. [Accessed 26 June 2021].
- [5] Western EIM. WESTERN EIM BENEFITS REPORT Fourth Quarter 2019. <https://www.westerneim.com/Documents/ISO-EIMBenefitsReportQ4-2019.pdf>.
- [6] Monitoring Analytics. PJM State of the Market - 2019. http://www.monitoringanalytics.com/reports/PJM_State_of_the_Market/2019.shtml