

# Research and application of power marketing operation safety control technology

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**Abstract:** In order to improve the safety and efficiency of power marketing operation, the power marketing operation safety control technology is studied and applied. Through in-depth analysis of the connotation of power marketing and power marketing operation safety management and control technology, combined with advanced technology methods, the design strategy of security management and control system platform is put forward. It is hoped that this study can provide strong technical support and solutions for the operation security control of the power market.

## 1. Preface

The research and application of power marketing safety management and control technology focuses on establishing an efficient and intelligent safety management system. Through comprehensive monitoring and data analysis of the site, accurate work plan management, electronic work card process, safety disclosure, real-time identification and prevention of dangerous points are realized. At the same time, 5G technology is combined to improve the efficiency of data collection and transmission, optimize personnel and equipment management, establish a security knowledge base, and achieve a comprehensive evaluation and continuous improvement of operational safety. These researches and applications can effectively improve the safety and efficiency of power market operation.

## 2. Connotation of electric power marketing

To put it simply, power marketing is to provide power products and services to consumers through a series of marketing activities in order to achieve the company's profit target. The core of power marketing is to understand and meet the power needs of users, which puts forward higher requirements for the power supply of power enterprises, that is, to ensure the reliability of power supply, but also pay attention to people's electricity habits, electricity demand changes and market competition. Through market research, data analysis and other methods, to develop more targeted marketing strategies, such as optimizing electricity pricing policies, providing personalized services, in order to attract and retain customers. In the process of power marketing, it is also

necessary to strengthen the communication with consumers, establish a good corporate image, and establish a brand image<sup>[1]</sup>. At the same time, with the progress of science and technology, power enterprises should also actively use new technologies and new methods such as smart grid and big data to improve marketing efficiency and improve service quality. In short, power marketing is a series of marketing activities carried out by power companies under the conditions of market economy to meet the needs of consumers and achieve the purpose of profit.

## 3. Power marketing operation safety control technology content

### 3.1. Safety monitoring technology

Safety monitoring technology is an important link in the process of power marketing to ensure production safety. First of all, high-precision sensing technology is used to lay a variety of sensors at key locations of the power supply equipment. The sensor can collect the operating parameters of the equipment in real time, such as temperature, pressure, current, voltage, etc., and transmit the data to the central control center. Through continuous data collection, the working condition and performance of the equipment can be comprehensively understood. Secondly, the use of high-efficiency monitoring system, real-time monitoring of users' electricity consumption behavior and the entire power grid. The system can receive the data collected by each sensor in real time, and analyze and process it to find potential safety hazards and abnormal conditions. Regardless of equipment failure, overload operation or illegal operation, the alarm can be reported at the first time, and the relevant information can be conveyed to the relevant personnel in a timely manner.

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On this basis, with the help of advanced data analysis technology, the monitoring data is deeply mined and analyzed. Using data visualization tools, we can intuitively understand the changing trend of equipment running status and the characteristics of users' power consumption behavior. In this way, security risks can be discovered in time and corresponding measures can be taken to prevent them.

### **3.2. Safety training technology**

In the power marketing work, safety training is an important part of enhancing the safety awareness and business level of operators. In order to enhance the training effect and enhance the interest of training, we actively use multimedia, virtual reality and other advanced technologies in the training process. Using multimedia technology, complex safety procedures and accident cases can be visually presented to employees, so that the training content is intuitive and vivid. This teaching method is simple and easy to understand, and can effectively attract people's attention and enhance the training effect. At the same time, virtual reality technology is used to simulate the real working environment and working environment, so that operators can carry out operation training in the virtual environment. By simulating various possible safety accidents and emergencies, operators can carry out practical work in a safe and controllable environment and improve their response ability. This training method can not only improve the operation skills of operators, but also enable them to have a deeper understanding of safety risks, and then pay more attention to safety in daily work.

### **3.3. Security management technology**

In the process of power market operation, safety management is the key to ensure the safe and efficient operation of production. First of all, to establish a sound safety management system, clear responsibilities, clear work flow. The system not only stipulates the code of conduct of employees, but also stipulates emergency measures and accident reporting procedures, which provides a reliable system guarantee for safe production. At the same time, information technology is actively used to build a security information management platform to realize the sharing and management of security information<sup>[2]</sup>. The platform is used to collect, organize and analyze security data in real time, and discover and eliminate security risks in time. By means of information technology, the rapid transmission and sharing of safety information can be realized, and the efficiency and accuracy of safety management can be improved.

### **3.4. Safety equipment technology**

In the power marketing work, the use of safety equipment technology is an important guarantee to ensure the safety of production site. In order to ensure the stability and safety of the equipment, high-quality power supply and protection equipment should be selected, and regular inspection and maintenance of the equipment, including

cleaning, tightening, oiling, adjustment, etc., to ensure the normal operation of the equipment and extend its service life. Focus on monitoring the key parts of the device. If an exception or potential safety risk is found, take immediate measures to prevent accidents. The use of safety device technology can not only ensure the stability and safety of the equipment, but also provide a safe working environment for workers. This can greatly reduce the safety risk in the operation process, improve the work efficiency and quality, and provide a strong guarantee for the smooth operation of the power market.

## **4. Application of power marketing operation safety control technology**

### **4.1. Overall Design**

Establishing a set of efficient, stable and industry standard safety management system is the core of power marketing site operation safety management. Based on the big data platform, this paper will design a security management system carrying massive operation data and security information. The platform not only has a strong data processing ability, but also has the ability to analyze and mine the value of data in real time, and carry out accurate safety guidance for field operations. The application support layer provides a series of standardized and modular service interfaces to ensure the flexibility and extensibility of system functions. The business application layer is directly user-oriented, with friendly interface and convenient operation mode, which facilitates real-time monitoring and efficient management of on-site operations. The whole technical architecture is designed in strict accordance with relevant industry standards and specifications to ensure the stability, security and reliability of the system.

### **4.2. Function Design**

#### **4.2.1. Function of marketing safety operation platform**

The system includes operation plan management, work ticket (card) management, pre-shift meeting management, risk point identification and control, real-time supervision and inspection, personnel deployment, equipment maintenance records, security knowledge base update and other contents, combining all functions together to form an efficient and intelligent on-site operation safety management system to ensure the smooth operation of power grid marketing.

#### **4.2.2. micro-application functions for marketing security operations**

5G micro application function has been more and more applied in the power industry, it has six kinds of functions, which not only improves the work efficiency, but also ensures the safety and reliability of power supply.

a) Industry expansion

5G technology makes business acceptance more convenient, and field investigation more accurate and faster. Adopt HD video transmission intermediate inspection, completion acceptance and other links to achieve remote monitoring and real-time feedback. Expansion of power outage, distributed grid connection acceptance, local power plant grid connection acceptance, will greatly improve the user experience.

b) Market management

5G technology provides real-time data transmission and video surveillance for key customer verification, anti-theft investigation, electricity inspection and other businesses, ensuring the timeliness and accuracy of the verification work[3]. At the same time, 5G technology also provides remote monitoring and intelligent management functions for the installation, commissioning, operation, energy consumption monitoring, and multi-energy services of integrated energy systems.

c) Field measurement

The application of 5G technology makes field measurement more accurate and more effective. Installation and disassembly of equipment, on-site inspection of energy meters, on-site inspection of transformers, etc., can be completed in a very short time, but also through real-time data transmission, remote monitoring can be achieved. In addition, 5G technology also provides users with on-site shutdown and power recovery, user relationship judgment, line loss anomaly investigation and other functions, improving work efficiency and accuracy.

d) Smart electricity

5G technology provides a strong support for smart electricity, including charging service, charging station inspection, detection, maintenance, etc. Using high-speed data transmission technology, the operating status and fault information of the charging station can be transmitted to the monitoring center in real time to achieve rapid response and timely maintenance.

e) Collection operation

The application of 5G technology makes collection and maintenance more convenient and effective. Through real-time data transmission, the monitoring center can find data acquisition anomalies and metering equipment failures in time, and can quickly deal with them. As a result, tasks such as misalignment also become faster and more accurate.

f) Measuring room calibration:

5G technology provides effective data transmission and remote monitoring means for measuring room calibration. The performance test of the metering device, the separation of the smart meter room sorting, automatic calibration and indoor calibration can be carried out by remote control, which can improve the efficiency and accuracy of the work.

### 4.3. System architecture design

#### 4.3.1. Physical Architecture

a) Intranet.

The application program and database of the power marketing work platform are configured to the information Intranet, and the customer demand and data exchange are realized through the marketing management access service and commercial application system, so as to provide support for the field mobile operation terminal.

b) 5 G extranet

In the 5G external network, the application of the marketing work platform is deployed to realize the separation of the internal network and the external network, and support the smart phone access of the external network.

c) Mobile private network

The 5G marketing work APP is embedded into the mobile phone operating terminal, and VPN is used to access the business program of the internal network market operating platform to exchange data with the main users<sup>[4]</sup>.

d) Internet

Install the power marketing application on the smart phone and access the external power marketing work platform through the 5G network wireless public network to provide services for key staff and external employees.

#### 4.3.2. Security Architecture

The security design of the system needs to be carried out according to the overall information security strategy of the enterprise, and its security protection should be planned according to the system security requirements of level two of the protection requirements. In this process, emphasis should be placed on operational safety to prevent operational safety problems. The security of network is analyzed from the aspects of network protection, user identity authentication and permission management, data storage management, computer room environment management and management system.

a) Network security

The system is based on the enterprise internal network, through a unified security protection mechanism and means to protect the enterprise security.

b) Data security

In order to ensure the security, integrity and effectiveness of service data in transmission, processing, storage and other aspects, to ensure the accuracy and reliability of service data. Important sensitive data login authentication, strict authorization, transmission encryption; Strict rights management measures to prevent unauthorized users from modifying data and programs; Where not necessary, the data should be safely deleted, destroyed or disposed of, and should not be disposed of arbitrarily because the data is outdated; The integrity of business data can be detected, whether it has been damaged during processing, transmission and storage.

c) System security

Including operating system security, middleware

security and database security. In the process of use, to choose a more secure operating system, middleware and database, as well as not allowed to use the default password and weak password, so as to effectively protect the system files from tampering, tampering; Install the antivirus software on the Intranet server, install the antivirus software on the single machine, and update the virus database regularly [5].

c) Physical security

The actual working environment required by the system, including application server and load balancer, is generally carried out according to the construction specifications of the computer laboratory of the State Grid Power Company.

#### 4.3.3. Technical Framework

a) Intranet (information internet)

In the internal information system, establish the internal network system of marketing field operation management, including marketing field operation management WEB application, Nginx, API gateway, permission authentication service, database, message service, etc. In a wireless private network, the relevant WEB requests are sent to Nginx through a secure access platform or internal informational network, and then Nginx is load-balanced before Nginx is sent to the API gateway. The API gateway applies for authorization verification service. After the verification is successful, the API gateway can apply for the corresponding network task management APP or WEB microservice from the corresponding client. After the query, the micro-service can send the data to the corresponding client. This interface interconnects service data with other business systems through Webservice or Restful requests. Install the client of the secure access platform on the mobile operating terminal of the mobile phone, then set up a VPN channel on the mobile phone, and log in through the business APP.

b) External network (information internet)

When the external network enters the internal information system, a security isolation device is used to filter illegal Restful requests and database requests. On the 5G Intranet, set up and configure the marketing field job management extranet, including Nginx, database, scheduling service, Redis and message service. On the Internet, the APP sends a request to Nginx of the marketing control network through the mobile interactive platform, and carries out load balance on Nginx, and then sends Nginx to the API. The API gateway applies for authorization verification service, and applies to the corresponding market management APP after the verification is successful. The service uses secure isolation devices to access the internal network database and feed data back. The Redis service in the information Intranet stores some APP registration data and other data, and the information service is used to send a kind of notification to the APP.

c) Internet

Through the analysis of the network domain name, the name of the network can be connected to the external

network, so that the requirements of the market management application can be provided to the external network from the Internet.

## 5. Conclusion

In short, with the deepening of the power marketization process and the continuous improvement of the technical level, the safety control technology in the power marketing operation will continue to evolve and improve. This research and application is of great significance to improve operation safety and efficiency, but it also faces new challenges and opportunities. It is hoped that people can further deepen technology research and development, innovate application models, form a more comprehensive, more efficient and more intelligent power marketing safety control scheme, and promote the continuous development and application of power market operation safety control technology.

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