



ARTICLE

Research on Distribution Network Automation and Distribution Network Planning Mode

Xuan Chen*

Changchun University of Technology, Changchun, Jilin, 130012, China

ARTICLE INFO

Article history

Received: 21 December 2018

Revised: 29 March 2019

Accepted: 8 April 2019

Published Online: 16 April 2019

Keywords:

Distribution network automation

Distribution network planning

Mode research

ABSTRACT

Based on the research of distribution network automation and distribution network planning mode, the analysis of the significance of urban distribution network automation must be performed at the first place. Combined with the problems existing in China's current distribution network, it is concluded that, establish effective hardware support system, data sharing and feeder automation to ensure automation safety; strengthen power distribution and power line material testing to improve distribution automation system and distribution network planning; research methods of improving the professional skills and comprehensive quality of professionals.

1. Introduction

The development of social economy has gradually improved people's living standards. To a certain extent, people have put forward higher requirements for their living environment and quality of life. The urban process is accelerating, and electricity consumption is constantly occurring. As an important energy source in people's living environment, electric energy is constantly increasing in demand for electric energy. Therefore, in order to ensure the quality of the use of electric energy, it should ensure that the grid can be effectively operated, and relevant personnel should do a good job in grid planning. However, in the process of actual work, it will be affected by many factors, which will further affect people's life and work. To improve the operation efficiency of the distribution network, it is necessary to apply the automation system in the urban distribution network environment

and implement real-time monitoring of the distribution network application, so as to ensure the normal operation of the urban distribution network.

2. The Analysis of the Significance of Urban Distribution Network Automation

Power enterprises should ensure the stability of power supply and the quality of power distribution. Therefore, innovation and development of automation technology and computer technology are needed. The application of distribution network automation can save a lot of manpower and material resources and avoid cost waste. At the same time, it can also avoid the failure of power supply, improve the quality of urban power supply, and play an important role in the power supply system. Therefore, the application of distribution network automation systems plays an important role in power enterprises. The main

*Corresponding Author:

Xuan Chen,

Changchun University of Technology, No. 2055 Yan'an Avenue, Changchun, Jilin, 130012, China;

E-mail: 1205844669@qq.com

role of urban distribution network automation is mainly for the main operation of the power system, and it is convenient to dispatch automation power. Distribution network automation technology is formed using a variety of technologies, which is a new science and technology, not only with remote operation, but also control of the power system, which guarantees the stable operation of the power system on a certain basis and effectively maximizes the economic benefits of the enterprise.

At present, in the process of urban distribution network operation in China, it is necessary to ensure the stability of power supply. Distribution line wiring can be affected by many factors, because the power supply line is affected by the external environment and will be affected for a long time. But now there are many power supply units that gradually bury the electrical lines underground. At present, there are many urban distribution network lines using cables, which improved the power supply effect to a certain extent, making the application of urban distribution network automation more convenient and promoting the rapid development of the city.^[1]

3. Existing Problems in China's Distribution Network at the Present Stage

3.1 Problems with Power Supply Layout

At this stage, during the operation of the distribution network, there are generally some problems, and the power loss is relatively high. There are many areas in China that have established grid systems very early. Therefore, the actual distribution of the power point is not combined with the actual situation, and the distribution is unreasonable. However, the power supply radius is relatively long in some areas, and there is also a phenomenon of line damage. Such problems seriously lead to serious problems in the process of power transmission. In the process of power system operation, the quality of materials used is relatively poor, which will seriously affect the future development of power enterprises.

3.2 The Overall Structure Is Not Reasonable Enough

At present, there are many problems in the design of power grid structure in China, and to a certain extent, affect the supply of electricity, which will be limited by many factors, and people will be affected by electricity consumption in their daily lives.

3.3 Transportation Channel of the Distribution Network

In the process of urban distribution network planning, it is

usually necessary to build cables and overhead lines, so as to keep up with the network operation of the distribution network. However, such construction costs are relatively high, and in the process of concrete construction, it will be affected by many factors.

3.4 The Degree of Distribution Network Automation Construction Is Relatively Backward

The construction of China's distribution network is relatively late. Therefore, in the process of construction, it is relatively low and cannot meet the development needs of social power. In fact, the scope of distribution network automation needs to be extensive. In the process of automation of distribution network, it often costs a lot of money. At present, in the process of building automation network for distribution network, China has certain requirements for equipment selection and technologies, and it needs to be strengthened in the management mode. These factors directly affect the normal operation of the entire distribution network system.

4. Research on the Methods of Urban Distribution Network Automation

At present, many countries use distribution network automation systems and have achieved certain results. However, relevant staff should also be aware that the actual situation is more complicated. At present, some regions have no strength and cost investment, and there are no corresponding problem-solving measures, which will hinder the future development of power enterprises to a certain extent. At the same time, there are still many problems in the power supply enterprises, such as mechanical equipment and management, which limits the development of urban distribution network automation technology. In this paper, the urban distribution network automation is studied from four aspects: distribution network frame equipment, Informatization system, automation system, and automation communication.

4.1 Establish an Effective Hardware Support System

Forecast the hardware in the market, collect the data in a scientific way, and combine the data for detailed analysis, which can accurately predict the demand for electricity, and there is a more powerful function that predicts the distribution of future electricity use. The use of electricity management repair system, power management is mainly through the network information system for management and supervision, if there is any abnormal situation of electricity, alarm, reduce safety is the occurrence of accidents,

which fundamentally guarantees the people's life safety and significantly improves the practical level of distribution automation engineering, making the distribution network automation system improve the reliability of power supply and effectively promoting the engineering quality and social and economic benefits.

4.2 Data Sharing

In fact, the automation technology of the power system has high requirements, effectively promoting the sharing of data within the system. In the process of data sharing, relevant departments of the enterprise should establish an independent management organization to strictly manage the power system. Analyze in the context of the entity, and define and improve the standardization, for the area covered by the power system, and also need to have data information of physical attributes, and then standard expression. The dependence of people's life on the power system, the distribution network has become an important part of life, so the government and relevant departments should pay attention to the power system. Therefore, it is necessary to analyze the actual situation, make overall plans for the operation of the system, adjust the parts locally, and effectively realize the automation of the power system, thereby improving economic benefits.

4.3 Feeder Automation

In the process of grid system operation, an effective control plan should be formulated, which is an advantage for on-site control, which mainly achieves the purpose through the functions of the recloser and the segmenter, and establishes a monitoring mode platform, and the information collected by the feeder terminal is transmitted back to the main station. If there is a fault, effective measures should be taken, mainly to collect information for judgment and analysis, and remote control. In combination with the actual situation, a detailed plan for power restoration can be made under the cooperation of intelligent switch and short circuit, which can cut off the faulty circuit accurately and timely, and effectively control the fault area.

4.4 Ensure Automation Safety

Power system automation technology should have certain flexibility to ensure the normal operation of the power system. The power system automation technology can effectively adjust the power, which can ensure the workload and work risk of the staff. Power enterprises should formulate relevant policies and timely maintenance of the power system, because automation technology is very

important for data recording and updating, and can effectively reduce the cost budget in daily operations. But for the staff, the most basic thing is to ensure the safety of the employees. Power system automation technology has certain monitoring capabilities, and what abnormal problems occur in actual work, especially when a safety accident occurs, the automation system can promptly remind and take effective measures.

4.5 Strengthen the Detection of Power Distribution and Power Line Materials

In daily construction, leaders should pay attention to the detection of power transmission and distribution and power line materials. Before the work is carried out, the manufacturers of circuit materials should be selected. It is not necessary to purchase some materials that are not up to standard in order to reduce the cost of the enterprise. Therefore, strict inspection and testing are carried out before the safe operation of the transmission and distribution and power engineering lines, so that problems such as tripping during the use of the line can be effectively avoided. In the application of line materials in engineering, attention should be paid to the accuracy of line installation to ensure safe and reliable operation of the line.

4.6 Distribution Automation System

(1) In the process of urban distribution network automation construction, the adoption of information technology is a necessary condition. Building a complete distribution automation system requires unified integration and planning of distribution network data, user data and grid structure, and geographic graphics, which can effectively help monitor, protect and control the operation of the distribution network.

(2) At this stage, the urban distribution network automation system mainly uses GIS power distribution technology. In the process of computer integrated system operation, the geographic information system and production operation management technology are used for unified control of the distribution network planning. Specifically, it is the application of the GIS system, which can effectively maintain data parameters, network protocols, and the like. In the automatic generation of relevant data parameters, it should be combined with wiring diagrams, ring diagrams and one-line diagrams. But at the same time, when the power companies are using, they should strengthen production management, master the detailed information of customers, and comprehensively design the entire plan and plan, thereby improving the practicability of the system, effectively solving the problems of the data

graph and improving the work efficiency.

(3) In the process of power system operation, to facilitate the access of data and communication interfaces, relevant staff should master the distribution of the structure and the application of the system, which will improve power quality and service to facilitate sharing data with other systems.

(4) The distribution network mainly monitors the remote area. The data acquisition and monitoring control system is mainly applied in the distribution network. At the same time, the terminal equipment and the communication system are accepted to understand the real-time status control. Among them, the real-time status usually refers to the data of the 10kV line column switch, ring network cabinet, distribution transformer and opening and closing station, protection action information and operation data.

(5) In order to ensure the expansion of the functions and scale of the distribution network automation system, the power system has the possibility of linear and seamless expansion. In the construction of distribution network automation system, adequate preparation should be made, mainly to determine the scale of the system, the size of the memory, the processing speed, etc., to effectively realize the realistic needs of the vision of distribution network automation.

4.7 Research on the Distribution Network Planning

In order to build a distribution network automation system quickly and efficiently, the distribution network planning should be done in advance. In the process of planning, the source of funds and system management should be considered comprehensively to ensure the normal operation of the distribution network automation system. In the process of construction, attention should be paid to the equipment itself and the problems of overweight and power supply capacity of the load. Moreover, in the work, the principle of ductility should be adhered to, and the current and substation should be comprehensively controlled. Relevant staff should make overall planning according to the actual development of local city distribution network automation, and must meet the actual requirements of automatic operation of distribution network. In the process of transforming the distribution network frame, distributed

contribution should be carried out.

4.8 Improve the Professional Skills and Comprehensive Quality of Professionals

Power companies should pay attention to the training of dispatching staff. In the dispatching work, the professional skills and safety awareness of operators should be strengthened. Enterprises must implement safety management work. As a staff of power dispatching, they should be aware of the importance of power dispatching work, constantly absorb new working concepts in their work, and strictly abide by the relevant systems of power dispatching. In the actual work, the responsibility system for dispatching posts should be effectively implemented. The dispatching agency is an important department to ensure the safety, quality and economic operation of the power grid. With the development of society and the continuous improvement of people's living standards, society has a strong dependence on electricity, and the dispatching responsibilities of power grid workers are getting heavier and heavier. To this end, the grid dispatching system must have a high-quality cadre team and technical team.

5. Conclusion

In summary, in the continuous development of the social economy, we must strengthen the planning and design of the distribution network automation system. In this process, it is necessary to comprehensively analyze and comprehensively consider the automation system and characteristics of the distribution network in combination with actual needs and current conditions, under the support of modern science and technology, it can timely and effectively identify faults in distribution network operation, realize real-time control of distribution network operation, ensure the safe operation of distribution network, and promote the continuous development of China's electric power industry.

References

- [1] Yu Du. Discussion on distribution network automation and distribution network planning mode[J]. Technology and Market, 2018, 25(09):148-149. (in Chinese) DOI:10.3969/j.issn.1006-8554.2018.09.069