Discussion on Distribution Network Management of Electric Power Enterprises

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Abstract
Reliability of the distribution network which reflects the ability and quality of electric power enterprises, is the manifestation of management level. With the continuous development of urbanization and the increasing of people's living standard, the dependence of the society on electric power enterprises is increasing, and the requirement of the reliability of the power supply becomes higher and higher. Distribution network is the most direct link between the power system enterprises and the user. The reliability of the distribution network directly reflects the overall level of the whole power industry. But the status of distribution network in our country can't meet the requirements of the development of the national economy. Thus, accelerating the construction of the power distribution network and improving the management of distribution network have become one of the focuses of the electric power enterprise management. This paper describes the measures taken by the power enterprises in our country in order to improve the management level and the reliability of power supply.
Key words: *electric power enterprise; distribution network; management; reliability; distribution network automation*

1 Introduction

With the improvement of people's living standards and the continuous deepening of the urbanization process, the degree of dependence on the power of the community continues to deepen, the user's demand for power enterprises is also getting higher and higher. As an important part of power enterprises, the distribution network is more and more concerned. The distribution network is located at the end of the power system. It is a bridge between the power system and the power users. It plays an important role in the supply and distribution of electric energy and is an important part of the power system[1]. Once the distribution network equipment failure or maintenance, it will cause the system to the user's power supply interruption.

According to incomplete statistics, more than 80% of the user power failure is caused by the failure of the distribution network in the power enterprise. That is to say, the power distribution network has the greatest influence on the reliability of the power supply, and the distribution network also has a very important position in the whole electric power enterprise.

Since 1990s, there have been many power outages in the home and abroad, which have caused serious losses.Although some of this is due to natural causes such as weather, catastrophic accidents caused by, but there are management, equipment quality and other aspects of the problem.Therefore, it is urgent to take effective measures to improve the

reliability of distribution network, reduce the power loss, and improve the service quality and customer satisfaction.

2 Distribution network management in electric power enterprises

2.1 Status of distribution network in electric power enterprises

Electric power enterprise includes three major systems, including power generation, transmission and distribution. Distribution network is in power system at the end of the power system or power transmission system and user facility to connect and allocated to the user electric energy and an important part of electric power supply, including substation, high and low voltage power distribution lines and the family line, the entire distribution network and its equipment.The reliability of distribution network is an important factor which is related to the level of power supply, as well as the level of power supply. Therefore, the reliability management of distribution network is very important, which is also an important part of the performance evaluation and evaluation of power enterprises.

2.2 *The main work of distribution network management*

2.2.1 Reliability special lifting project

Equipment aging, over load, user fault is the main reason that affects the quality of distribution network power supply, accounting for more than 90% of the total number of failures. In order to improve the power supply reliability level of the user, the power enterprises start power supply reliability of special upgrade project, replacing the old drop type fuse, wire clamp, knife switch, intelligent switch, boundary demarcation for recloser and distribution facilities on-line temperature measurement terminal, fault detection instrument, closed type analysis the system switch equipment overheating fault detection system, partial discharge detection system, bypass charged operation system, distribution network fault analysis and defect management system, static reliability, transform generator, electric operation vehicle maintenance, in order to improve the distribution network equipment and management level, which lays a solid foundation for the company to strengthen the management of distribution network.

2.2.2 Live working

Live working is an important way to improve the reliability of power supply system. In recent years, the live line work has become the power enterprises in transmission, transformation, distribution and other aspects of a popular mode of operation, improve the reliability of power supply, to provide customers with quality service and other aspects in play an irreplaceable role. In order to reduce the number of power outages, electric power company guide around the city power company actively carry out live working, and strengthen the province's distribution of live working technology and communication efforts, further expand the new projects of the live line work, to improve the level of charged operations, strongly promote the live working to carry out a comprehensive, and improve the power supply reliability level.

2.2.3 The distribution of load measurement

To ensure that the summer load during the peak of the safe operation of the distribution network and reliability of electric power supply, improve ability of summer peak load of distribution network to deal with, electric power enterprises carried out distribution network load CBT and special management, on public transformer in distribution network and special transformer load growth for the comprehensive combing and statistics, to avoid and reduce distribution network accidents, ensure that the summer load during the height of the safe operation of the distribution network and reliability of electric power supply.

2.2.4 Distribution network automation pilot project

Distribution network automation system to improve the power supply reliability of the role, mainly reflected in the failure of the rapid restoration of power supply. The main function of distribution network automation to improve the reliability of power supply is to shorten the outage time and reduce the loss of users by reasonable investment.

According to the experience of Japan's Kyushu Electric Power Company in 2000 to introduce, in 1986 began the implementation of distribution automation, regardless of the substation fault or on a fault line can further shorten the fault average interruption duration[2,3]. Fig. 1 and Fig. 2 are the effect of distribution network automation to shorten the outage time and the number of power outages.

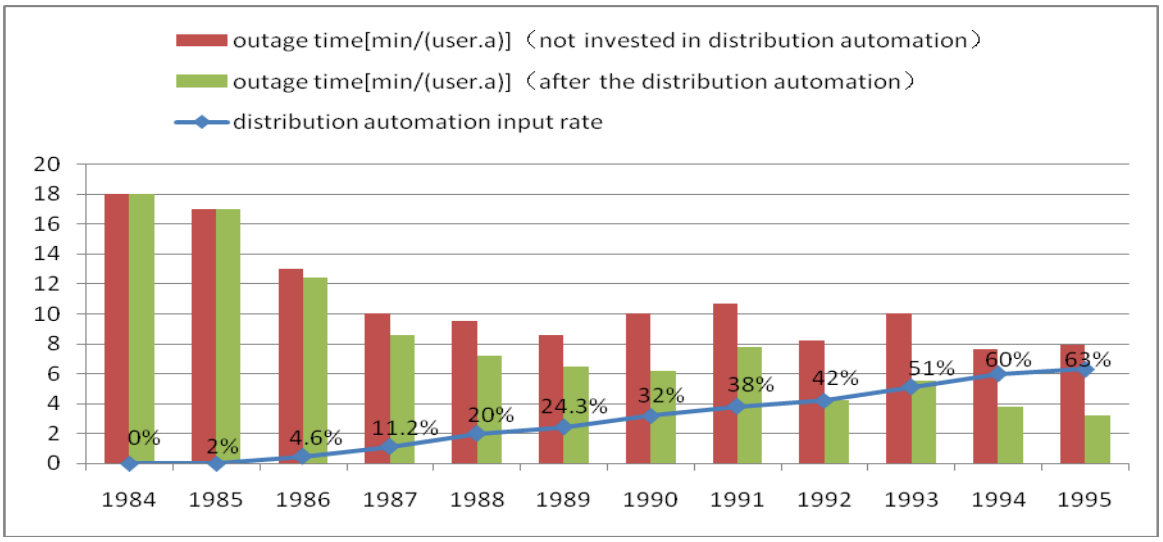

Fig. 1 The effect of power distribution automation on reducing the outage time

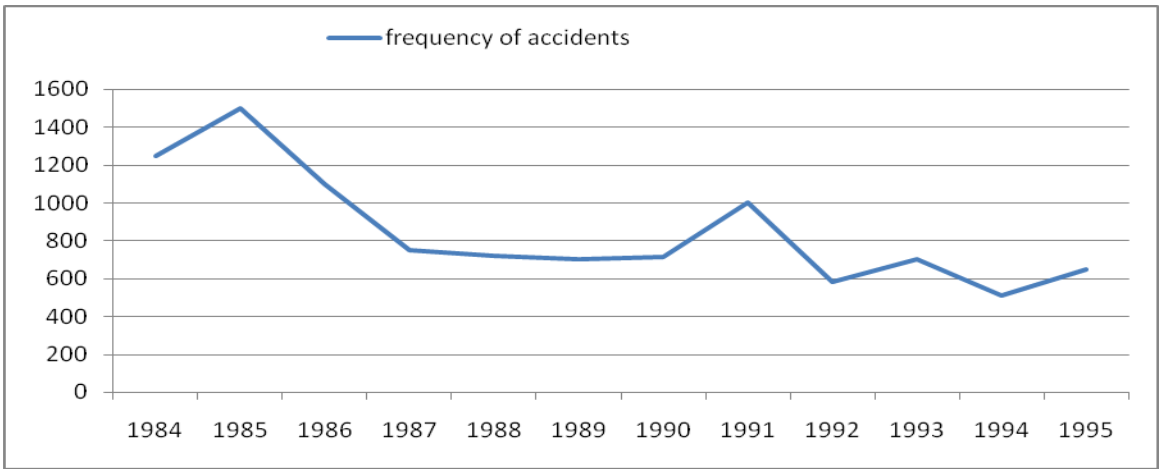

Fig. 2 The effect of power distribution network automation on reducing the frequency of accidents

Compared with Fig. 1 and Fig. 2, after the beginning of the distribution network automation, the number of power distribution network accident and the average user outage time is shortened. With the increase of the investment rate of the distribution network automation, the effect of reducing the number of accidents and reducing the time of power outage is becoming more and more obvious.

The electric power enterprises in the national Power Grid Corp to create a "strong unified smart grid" policy guidance, and actively carry out the integration of distribution automation and control pilot construction work.In accordance with the principle of national network of unified planning, unified construction, unified standards, from the aspects of the distribution network of perfect grid structure, distribution automation construction, information system integration, distributed power supply work comprehensively promote the construction of the pilot project[4]. Along with the progress of the project, the power supply reliability and management level of power distribution network will be further promoted.

3 Measures to improve the management level of distribution network

3.1 Optimization of distribution network structure

Due to the irrational distribution network structure and weak structure, parts of will power "card neck" phenomenon, mainly manifested in the load branch is not installed design load switch, once appear, will lead to failure of the entire main feeder power; power supply radius is too large, wire section is too small, resulting in line of the end of the voltage unqualified; some public transformer not installed compensation capacitor, resulting in high line loss rate; distribution transformer loss, lack of capacity meet peak load requirements. Therefore, it is an urgent task to optimize the distribution network structure, to change the distribution network equipment obsolete, and the low power supply reliability is an urgent task.

In order to improve the power supply capacity of distribution network and the safe and economical operation level of the power distribution network in China, the theoretical research and field practice are combined together to make the measures to optimize the network structure[5]. One is increasing line section, reduce the line average number of users; second is to increase the line contact, the network operation mode more flexible; the third is the control circuit load rate, reduce the burden on the line; four is to increase the network ring network and mutual supply ability, realize interconnection lines for each other, and ultimately

improve the goal of distribution network power supply ability and safe and economic operation level.

3.2 Increasing the ratio of the distribution to the variable capacity

The transformer substation number and capacity directly affects the reliability of power supply. The transformer capacity and number according to the load size and growth trend of rational choice. The capacity load ratio is one of the technical and economic indicators to reflect the power supply capacity of distribution network[6]. If the capacity of the distribution transformer is too large, the power grid construction investment is higher in the early stage. The capacity load ratio of the distribution transformer should be considered from two aspects of safety and reliability.

With the development of economy, the requirement of reliability of power supply becomes more and more high. Therefore, to change the way in which the single transformer power supply, especially high-rise construction should set more than two sets of distribution transformer power supply, increase the substation distribution point, improve transfer capability, a reasonable choice with variable capacity load ratio, thus greatly improving the reliability of power supply distribution network.

3.3 Strengthen the user equipment management, avoid tripping

One is the promotion of intelligent demarcation switch and user fault isolation and reduce user factors lead to failure; the second is strengthening business expansion management, in particular, to strengthen on customer access point, the selection of equipment and the user equipment operation and maintenance management, to prevent unqualified equipment into the network; third, regular testing for the user equipment, calibration, and strengthen monitoring the changes of user load; fourth is to strengthen customer electrical inspection, on the safe operation of the impact of customer equipment promptly issued a rectification notice, urging customers to rectification.

4 Conclusion

The management level of distribution network is the comprehensive reflection of a power supply enterprise technology and equipment level and management level, distribution network reliability level not only directly related to the economic benefit of power supply enterprise, on behalf of the service level of the electric power enterprise. Therefore, to improve the reliability level of distribution network, to meet the demand for electricity, reduce the loss caused by power outages, has become the urgent task of the current power enterprises.

Electric power reliability management is to improve power system reliability level, to ensure the safe and stable operation of the power system of effective management model, is to further strengthen management of electric power enterprises, the internal need to enhance the core competitiveness of enterprises, but also to enhance the needs of enterprises in the electricity market service level, to maximize the economic benefits of electric power enterprises and to lay a solid foundation. Reliability management quality is directly related to the timeliness and accuracy of data reliability, related to and the reliability of the research

results have been applied to power system planning, construction and production in the field of how to rationally and scientifically.

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