Discussion on the Strategy of Improving the Reliability of 10Kv Distribution Network

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Abstract. With the rapid development of economy and society and the continuous improvement of people's living standard, the reliability of power system is more strictly required. 10KV distribution network is the main mode of power transmission, it brings great convenience to our life and work, but 10KV the transmission voltage of distribution network is relatively large, the requirement of transmission wire is strict in the process of power transmission. Therefore, improving the reliability of 10KV distribution network power supply is the first problem to be solved by related personnel.

Keywords: 10kV distribution network, reliability of power supply, strategy.

1. Introduction
Distribution network is a kind of power network device which distributes the voltage step by step to different demand users through transformer, spiral coil, control switch and so on between the generating area and the receiving area. It is mainly composed of copper core aluminum wire, optical fiber, transmission iron frame rod and some power control switches. It plays the role of distributing electric energy in power network. China's economy has started to develop rapidly in recent years, and the demand for electricity has risen sharply. The disadvantages of 10KV distribution system are small in capacitance, large in power loss, small in power cut-off area and need to occupy multiple transmission pipelines. Therefore, how to increase the transmission capacity of 10KV distribution network, reduce the transmission loss of 10KV distribution network and improve the reliability of 10kV distribution network need to be solved by relevant personnel.

2. Significance of Improving the Reliability KV 10 Distribution Networks
10KV Distribution network is the main mode of medium voltage power transmission in China, and its reliability is the key factor for the progress of science and technology and the improvement of people's living standard. Our country economy is in the new period of rapid development, the requirement of distribution network performance is more strict, the traditional 10KV distribution network is far from meeting the national demand because of its small current flux, large transmission heat and low power conversion efficiency. Compared with the developed countries such as the United States and Japan, there are still many technical problems in the 10KV distribution network in our country, such as uneven distribution of power points, unreasonable network structure of distribution network too fast...
load growth. Due to the restriction of technical conditions, there are many unstable factors in the power supply of 10kV distribution network in China, which make the line failure rate of transmission network on the high side, and the blackout events often occur. Hence, it is very important to improve the reliability of 10KV distribution network power supply through some technical and management means.

3. Factors Affecting the Reliability of 10 kV Distribution Network

3.1. Line design issues
Circuit design problem is the first problem to be solved in the power supply system of 10kV distribution network. Line is one of the components of power supply network. In order to transmit power for long distance, we must rely on transmission wire. The structure, shape, cross-sectional area, material and other factors directly affect the transmission efficiency and loss rate of current. From the current situation of 10kV distribution network operation, the effect of line design is not ideal. First of all, the ring network rate of 10kV distribution lines is low. When new transmission wires are added, the wires are intertwined with each other, which makes the wire lines extremely complex, which increases the length of transmission conductors and greatly increases the transmission cost. Secondly, when the transmission wire is exposed to high temperature and high humidity air for a long time, oxidation will occur, resulting in some of the wires exposed in the air. Due to the influence of rain, snow and other environments, some exposed conductors are prone to oxidation and fracture, which seriously affects the transmission capacity of transmission wires.

3.2. Man-made or natural disasters
In daily life, there are many incidents of distribution network safety accidents caused by man-made theft, intentional destruction and unintentional damage, which have brought huge economic losses to the country and great impact on the production and life of the people. In the process of wire network construction, some people deliberately steal transmission cables in order to obtain benefits, or deliberately cut corners in order to save costs, resulting in loopholes in power grid lines. Some people even use the power grid for a little profit, which seriously damages the transmission line and produces a lot of security risks. In terms of natural disasters, long periods of rain, snow, hail, fog and other natural disasters will lead to the breakage of transmission wires, resulting in leakage of transmission wires, resulting in huge economic losses and even casualties.

3.3. Power outages
Planned power outage is also an important factor affecting the reliability of power supply in 10kV distribution network. Due to the problem of energy shortage, some cities will have planned power outages. It is very important to ensure the normal operation of distribution network in the process of planned power outages and calls. When the newly connected current flows into the power grid instantly, the power outage problem is very important to the power supply reliability of distribution network because the resistance produces very high heat and damages the wire.

4. Enhancing the reliability of 10 kV distribution network power supply

4.1. Optimizing kV design of 10 power supply lines
First of all, we should optimize the structure of 10kV distribution network power supply lines, design reasonable transmission lines, determine the total length of transmission conductors according to the demand of electricity consumption in various regions according to local conditions, and realize that the power supply is consistent with the demand. Secondly, the demand of electricity consumption in various places should be accurately predicted to ensure that the demand of electricity consumption in cities in the season of peak electricity consumption is satisfied.
4.2. Live operation and condition maintenance
In the actual power transmission work, in order to reduce the occurrence of power outages caused by circuit damage, it is necessary to ensure the power supply reliability of distribution network to the greatest extent, live operation and condition maintenance. In order to ensure the normal operation of 10kV distribution network, the staff need to regularly overhaul the transmission line. The staff can check the working status of the circuit through universal meter, voltmeter and other instruments in the state of transmission wire passage to ensure its normal operation. When the transmission wire has problems, the electrician should check the fault area at the first time and repair the damaged area to ensure the normal power supply.

4.3. Enhanced inspection and maintenance of line equipment
In order to ensure the normal operation of 10kV distribution lines and equipment and improve the reliability of power supply point network, the state should strengthen the inspection and maintenance of line equipment. When there are some faults such as transformer short circuit, transformer fuse burning, pole collapse and so on in the transmission line, the relevant personnel should solve these problems immediately to ensure the normal transportation of electric power. In addition, the staff should do a good job of seasonal prevention work, whenever summer and winter natural disasters occur frequently, the relevant staff should increase the intensity of inspection, timely detection and repair of the source of wire failures, to ensure the normal operation of distribution lines and equipment.

4.4. Strengthening prevention of natural disasters
China has a vast territory and frequent seasonal natural disasters, which greatly affects the normal operation of 10kV distribution network. Therefore, it is necessary to strengthen the prevention of natural disasters, to strengthen the prediction and prevention of lightning weather in areas where lightning occurs frequently, and to install lightning protection devices next to transmission conductors to bring lightning underground in time to avoid great losses; For the southern area with more Rain Water, the pole should be strengthened and a layer of waterproof resin should be added to the outer layer of the transmission wire to prevent the short circuit of the wire.

4.5. Strengthening scientific scheduling
In recent years, the power consumption of our country has increased sharply, and the supply of the State Grid will sometimes appear local tension, so the power supply department should do a good job of accurate calculation of electricity consumption, through the means of scientific counting to accurately calculate the daily electricity consumption of each city, in order to ensure that the residents' daily electricity consumption, working electricity consumption, engineering electricity demand is met. Secondly, the relevant departments should actively guide the users to save electricity, formulate the principles of "cumulative increase" and "less use and reduction ", reward and punish the users to wake up the consciousness of saving electricity and reduce the waste of electric energy.

4.6. Enhanced blackout management of distribution networks
Power enterprises should strengthen the management of power outage in distribution network through power grid.

5. Concluding remarks
To sum up, the relevant personnel should improve the stability of distribution network power supply in 10kV of our country through some technical means and management methods, meet the increasing demand of residents, and ensure the rapid development of our economy.

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