Analysis and Research of the Electric Power Crisis and Causes in China

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Abstract

As a special product, the electric power has the character of the synchronization of generation, transmission, distribution, and use, and as the main carrier of the power transmission and distribution, the electric power network were continually impacted by the natural disasters, with different influences on various parts in the electric power system, the safety and stability of the electric power network are facing the challenge. By introducing the existing problems and the management meaning of the electric power network crisis management, the comprehensive causes are deeply researched in this article, and they are classified from the interior aspect and the exterior aspect, which could offer theoretical base to enhance the level of the electric power network crisis management in China.

Keywords: Crisis of electric power network, Interior causes, Exterior causes

1. Introduction

Different enterprise management backgrounds have different weak parts in the management process. The cause analysis of enterprise crisis could help to find the interior relation of crisis information, and by the crisis cause analysis, the generation and development of crisis could be avoided essentially and the risk could be avoided. There are many factors influence the security of the electric power network, with certain complex and long-term characters, and strong uncertainty. The generation of the electric power network crisis will not only influence the normal operation of the whole electric power system, but directly harm the social properties and human securities, and the influencing range is large and the diffusion speed is quick, and the loss is large. For example, in the August of 2009, the biggest hydropower station in Russia, the Sayano Shushenskaya Hydropower Station in Siberia exploded in the repair process, and the walls were damaged, and the machine plants were flooded, many employees died and were harmed in this accident. At the same time, the normal operation of the electric power network was seriously influenced. At Jan of 2010, this Station was attacked by the continual cold snaps, and many building were frozen, which impacted the operation of the electric power network again. Therefore, it is practical to systematically analyze various causes of the electric power network crisis. The causes of crisis are generally divided into interior causes and exterior causes. Based on the specialty of the electric power network, the natural disasters influencing the electric power network and the various interior parts in the electric power system are mainly studied in this article.

2. Existing problems and management meanings of the electric power network crisis management

The crisis management theory has been mature, and the electric power enterprises have further strengthened the crisis management consciousness, when they continually analyze the problems existing in their management. But following problems still exist, i.e. the base of the crisis management theory is deficient, the research method of

the crisis management theory is deficient, the crisis consciousness is weak, and the right cognition of the crisis warning management is deficient, and the crisis warning management ability is weak.

It is meaningful to further strengthen the research of the electric power network crisis management. It could exactly predict the generation of the crisis, strengthen the warning management consciousness of the whole electric power, enhance the ability to deal with problems arising from an accident after the electric power network crisis breaks out, which could not only enhance the ability to control the generation of crisis, but largely reduce the loss brought by the crisis.

3. Exterior causes of the electric power network crisis

According to the further analysis of the generation source of the electric power network crisis and the efficient identification of the electric power network crisis sources, the electric power network crisis sources are divided into the exterior natural environment, the social policies and laws, and the market resource environment.

3.1 Influence of the natural disasters on the electric power network

3.1.1 Thermal power plant

The thermal power generator is the main force of the electric power supply of China, and it assumes 70-80% equipped capacitor of the electric power production of China, so the influences of the natural disasters on the thermal power plant need to be more concerned. The natural disasters influencing the thermal power plant mainly include the flooding, the rainstorm, the typhoon, the storm, and the tide, so these natural disasters have the character of season and the instability of range to the thermal power plant.

Because of the El Nino phenomenon, the formation and landing times of the southeast coastal typhoon are more and more in recent years, which have seriously threatened the electric power production in many provinces such as Guangdong, Fujian, and Zhejiang. The ash dams in some thermal power plants were broken because of storms and floods, and the ash water submerged farmlands and villages, and polluted many rivers. Even some floods entered into the coal field, and the stored coals were dispersed, and the coal transportation systems were failed, which would largely influence the transfer of the electric power, and the abrupt power cut accident also occurred because above causes.

3.1.2 Hydraulic power plant

Comparing with the thermal power generator, the hydraulic power plant is cleaner as viewed from the environment protection, and the reservoirs of hydropower stations in the flood season of each year could block the floods, and weaken the flood peak, and reduce and avoid the flood disaster loss for the backward position, and realize large social benefits. But there are many natural disasters to harm the hydraulic power plants, such as the flood, the drought, the earthquake, the coast, the mud-rock flow, the mud sand, the frost, and the white ants, which will all bring large influences and damages to the hydraulic power plants.

Though the dam collapse accident has not occurred in the electric power system, the system has paid large costs for that. In addition, when the electric power station discharge the floods, the water fog will fill in the downstream, and the discharge switch will be short in intervals and the discharge floods will attack the rocks and smash the equipment of the switch station, and the power generator will be stopped. Because of lower flood control standards, part hydraulic power stations will seriously threaten the safety of the dam when encountering large floods, and induce large economic loss, and largely impact the regional electric power network planning.

The drought will also impact the hydraulic power station and the dam. In the initial term of 1990s, part regions in China had drought in successive years, and to fulfill the irrigation and water supply, the reservoirs of many hydraulic power stations had to reduce the water level below the dead water level, which seriously impacted the electric power generation benefits of the station. In addition, because the water level was too lower, the dam had been in the advantageous working condition of the high-temperature low water level and or the low-temperature low water level, and the concrete dam would often form cracks, and the dam structure would be damaged, and the safety hidden troubles would be accumulated in the long term.

The earthquake has large damage function to the reservoir and the dam. In March of 1962, the earthquake of 6.1 class happened in the new Fengjiang of Guangdong, and the epicentral intensity was Ⅷ, and the earthquake seriously harmed the dam structure, and a transfixion-level-crack of 82m occurred at the position of 108.5m height, which induced the leakage of the reservoir. In addition, the earthquake will also induce the cast of dam or the collapse of waters.

Because of the freeze thawing and the frost heaving function, the concretes of many dams such as Fengman Dam, Yunfeng Dam, and Shuifeng Dam in the north cold regions would aged and expanded, and the wear of these

dams will be impacted seriously. When the reservoir waters of the dam are frozen, large freezing pressure will act on the dams and strobes, and harm the buildings and strobes, and influence the open and close of the strobe of the dam.

3.1.3 Electric power network and power supply enterprises

The electric power network and the power supply enterprises are directly influenced by natural disasters such as rainstorm, typhoon, flood, hailstone, ice snow, and mountains. The electric pole bases in rivers, swamps, water and soil flow regions, spanning rivers are also eroded by the floods, and the routes are often be broken. The electric power transmission routes in the mountains also will be often impacted by the mud-rock flows. By analyzing of the influences of natural disasters on the different forms of the electric power system, the sorts of natural disaster harming the electric power network are numerous, and the disasters are distributed widely, and they often induce large economic losses, so the prevention consciousness of the natural disaster should be strengthened, and the monitor level of natural disaster should be enhanced, and the perfect emergency system should be established.

3.2 Influences of the change of the social policies and laws on the electric power network

As the support of the economic development of China, the safe running of the electric power will largely influence the social production and life, so various aspects such as the electric power management department, the electric power user, the supervision department, and the running department in the whole country can not form uniform development opinions. From the surplus of the electric power production to the situation of "not constructing thermal power plants, and the electric power shortage is continual", the profound influence of social policies and regulations on the running of the electric power network could be obviously reflected, and from the reform of the electric power department, the construction of the electric power group, to the marketization reform of the electric power market, the large impacts of the whole electric power system are very obvious. So the social policies and regulations are very important to maintain the normal running of the electric power network.

3.3 Influences of resources and social and economic environment on the electric power network

In recent years, the coal resource is deficient, and the coal price rises quickly, so the electric power plants lose largely, even the normal running of the electric power could not be achieved, and many plants could stop the running by various reasons, which will largely influence the electric power network transfer and the maintenance of the electric power network charge. At the same time, the occurrence of the economic crisis will influence the industries with large demand of electric power, and indirectly threaten the production and supply of the electric power.

4. Interior causes of the electric power network crisis

Except for large damages from natural disasters, the power generation, the power transmission, the power supply, and the power use in the electric power system are also influenced by some other factors in the long-term running and management, which will directly or indirectly threaten the electric power network.

4.1 Power plant

The electric power generation market has basically formed certain competitive situation with certain scale, and the electric power demand and the electric power generation cost are impacted by various factors which bring heavy burdens to the electric power plants. With the quick increase of once-energy price and the nervous supply of power coals, the power generation cost could not accord with the electric power price, and some power generators have to be stopped, so the normal management of the electric power plants are seriously influenced, and only in 2008, part power generation groups lost seriously, and the electric power network was also limited largely. In addition, the utilization rate of the infrastructure of the electric power is too high, and failures are very frequent, so too less adjustment surplus will seriously influence the transfer and running of the electric power network.

4.2 Transformer substation

As the hinge of the electric power supply, the transformer substation directly influences the normal running of the whole electric power network. Bad technical level and the wrong checking of title and number all will induce the large power cut, and the wrong operation sequence will induce the protection action, wrong switch, and illegal operation which will even harm human life. In addition, with the enhancement of the automatization level of the transformer substation establishment, the "self-service management" will be popularized, and the negligence of the security monitor will induce the crisis of the electric power network. Therefore, the security

management of the transformer substation should be strengthened to ensure the safe running of the electric power network.

4.3 Electric transmission network

For the running of the whole electric power network, the electric transmission network is the "transporter", and the electric transmission network technical level is advancing quickly, and in Jan of 2009, the 1000 KV high-voltage AC experiment demonstration project designed and constructed independently by China started normally, and it is the electric transmission and transformation project with the highest voltage class and the highest technical level in the world. For the important electric transmission routes, the checking and maintenance are important factors to threaten the running of the electric power network, and the reasonable planning of electric transmission routes is the important index to enhance the utilization efficiency of the electric power network. In addition, part regions in China are influenced by many factors such as geography, climate, and power charge, and the maintenance and the power supply of the electric power establishment are restricted seriously.

4.4 Clients

Clients are the terminal of the electric power production and consumption, and the loose management of important user information will influence the normal running of the electric power network. With the continual advancement of the social production, the electric power charge increases quickly, and the prepared capacity is deficient, and the electric power storage technology is not advanced, which largely exceeds the original charge prediction result, and the electric power limitation would bring large economic loss. At the same time, because the extreme peak charge is hard to predicted, and the system reserves is deficient and the peak transfer is difficult, with the repair of hydraulic plants and old electric power plants, the conflict between supply and demand is more and more obvious.

The safe running of the electric power network also will be influenced by some other social and economic factors. The occurrence of the economic crisis would largely challenge the prediction of the electric power demand, and the large change of relative industries such as coal and steel would largely impact the running of the electric power network. In addition, the public also will strictly require many indexes such as the environment protection and the investment benefit, which also will bring pressures to the production, investment, R&D of the electric power. The electric power law system of China is still being perfected, and the security management level of the electric power network should be further enhanced.

5. Conclusions

For the development of the society and economy, the electric industry must be in the front rank, and the stability of the electric power network is the premise of the big electric power management environment. The existence of the electric power network crisis has been widely concerned by the circle of the society, and to deeply strengthen the electric power crisis management must analyze the comprehensive causes, and grasp various factors of the crisis. To further systematically research the cause theory of the electric power network crisis will establish the base to enhance the crisis warning ability and the crisis management level.

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