Environmental Protection Requirements of Power Transmission and Transformation Project Construction Based on Internet of Things Technology and Its Change Trend Analysis

Zhai Xiaomeng¹, Cheng Xi²
¹State Grid Jiangsu Electric Power Design & Consulting Co., Ltd., Nanjing, China
²Economic and Technological Research Institute, State Grid Jiangsu Electric Power Co., Ltd., Nanjing, China

Abstract. Due to the in-depth development of the Internet of Things, various industries have to attach importance to its construction. Based on the advantages of the Internet of Things that can realize intelligent identification and management, the Internet of Things has become another breakthrough after computers, the Internet and mobile communication networks. Based on a comprehensive analysis of the current situation of environmental protection management at home and abroad, the main environmental impact factors in the construction process are analyzed, and a monitoring method of environmental protection measures in the construction process of power transmission and transformation projects based on Internet of Things technology is proposed. The monitoring system of environmental protection measures shall be constructed in full connection with environmental assessment and completion acceptance, so as to improve the level of environmental protection supervision during the construction of power transmission and transformation projects. On the basis of implementing the scientific development concept, accelerating the adjustment of energy structure and accelerating the optimization of power structure, it will become the focus and direction of scientific development of power transmission and transformation systems to adhere to the sustainable development strategy, build a harmonious society, and strengthen environmental protection while developing power engineering construction.

1. Introduction
The Internet of Things is an important component of the development of China's strategic emerging industries as a deep expansion and application of information technology. It has important strategic meaning for promoting industrial structure adjustment, optimization and upgrading, and enhancing industrial competitiveness. Environmental protection Internet of Things, supported by Internet of Things technology, under the constraints of the protocol, analyzes and processes the collected massive data and information by means of intelligent computing technologies such as cloud computing, thus realizing environmental protection [1]. Compared with other construction projects, power transmission and transformation projects have their own characteristics, such as combination of points and lines, long distance, inconvenient transportation, large number, short construction period, etc., and the environmental impact scope of power transmission and transformation projects is banded. A large amount of land is occupied in power transmission and transformation projects, mineral resources are covered, construction pollution, equipment pollution and other problems occur, and the environmental
protection problems of power transmission and transformation projects are increasingly prominent [2]. Environmental protection supervision during the construction phase is affected by such factors as the wide scope of construction projects, complex environment, few supervisors, and lack of standardized management methods, resulting in the objective lack of supervision in the whole construction process [3]. Therefore, we propose environmental protection measures in the process of power transmission and transformation project construction based on Internet of Things technology, so as to protect our environment, promote economic development and protect the harmonious unity of the environment.

2. Basic Concepts of Internet of Things Technology

The Internet of Things, as a new set of technology applications, effectively integrates various advanced technologies such as computer network communication technology, sensing technology, micro-processing and intelligent control technology, software technology and so on. It is one of the fundamental ways to realize the sustainable development of human beings to manage the natural environment and society on a fine scale in time and space [4]. Through cloud computing and other intelligent computing technologies, massive perceptual data and information are analyzed and processed to realize intelligent identification, location, tracking, monitoring and decision management of environmental quality, pollution sources and risk sources. At present, people's cognition of the Internet of Things has accumulated with the passage of time. Under such circumstances, the concept of the Internet of Things has gradually become clear, which conforms to the concept of people's cognition of the Internet of Things as follows. The Internet of Things is a network that can intelligently identify, locate, track, monitor and manage [5]. In the entire integrated network, there are super-powerful processors or central computer groups that can manage and control the personnel, machines, equipment and infrastructure in real time. It mainly realizes this project through the application of radio frequency identification, sensors, global positioning system, laser scanner and other information sensing equipment [6]. During this period, it is bound by the agreed agreement. The so-called “Internet of Things” is formed by a plurality of sensors with more thorough perception ability. Any person can be connected to the Internet at any time and at any place, so that the sensors can self-organize a set of network system, and then through intelligent information processing and data calculation, data information can be transmitted to each other and finally resources can be shared. Finally, a comprehensive intelligent network is built to connect the buildings.

3. Research Status At Home and Abroad

3.1 Foreign Development

Developed countries attach great importance to environmental protection, and all projects should follow the principle of giving priority to environmental protection. As far as power transmission and transformation projects are concerned, in the planning stage, there are already factors that affect the environmental evaluation of the project, such as ecological environment, electromagnetic environment, noise, etc. In the construction phase, various protection management and supervision measures are implemented through environmental supervision, and ecological restoration and environmental treatment are carried out after completion and acceptance. As for Canada, where environmental protection is developing rapidly, in order to better supervise the environmental protection problems of various projects, government environmental supervision personnel directly shoulder the environmental protection work in different links of the project. This mode helps to minimize the impact of the project on the environment. In Canada, in order to effectively supervise the environmental protection of various projects, government environmental supervision officials are directly responsible for inspecting the environmental protection work at all stages, which can minimize the damage to the environment [7]. As far as the United States is concerned, there are already sound environmental protection laws and regulations, and environmental protection management standards are formulated for different stages of the project [8]. In Japan, all levels of government have relatively complete environmental protection agencies, equipped with specialized environmental full-time management
personnel to supervise environmental protection issues in the project.

3.2 Foreign Development

In our country, although the environmental protection management of construction projects started late, some achievements have been made by absorbing and drawing on the experience of foreign related work. At present, the environmental protection work of engineering projects includes two key projects: approval and completion acceptance. This management mode has good effect on environmental protection supervision of industrial pollution projects, but the effect that can be obtained for infrastructure construction projects is not obvious. In the construction of power transmission and transformation projects, the project construction unit and the competent department should put the environmental work in a prominent position and carry out it simultaneously with other preliminary work. Transmission and transformation projects include design, project establishment, construction, trial operation and other links, and each of these links involves environmental protection issues [9]. At present, environmental management of construction projects has two focuses: environmental approval and completion acceptance. This management mode is more effective for environmental supervision of industrial pollution projects, but it is relatively weak for infrastructure construction, such as roads, power transmission and transformation systems, water conservancy, etc. As far as power transmission and transformation project construction is concerned, some lines span natural scenic spots or scenic spots and historic sites and other complex areas. Although specific protection methods have been designed for environmental impact assessment, reasonable management is lacking for the construction process.

4. Environmental Impact Factors in Construction Process of Power Transmission and Transformation Project

The construction of power transmission and transformation projects can be planned as two major parts: overhead transmission lines and substation construction, which are characterized by cross-region, long distance, complex environment, etc., and may also cross sensitive environmental areas such as residential areas and nature reserves [10]. The impact on the environment during the construction phase is short-term and controllable. If it is not properly managed at this time, it will easily cause serious impact on the environment. The main environmental impact factors in the process of power transmission and transformation project construction are shown in Figure 1.

![Figure 1 Environmental Factors](image)

Impact of ecological environment. The impact specifically refers to the impact on vegetation and plant resources, the impact on cherishing and protecting animals, and the impact on the protected landscape. In particular, it involves the impact on sensitive protection targets, including natural ecological protection targets such as rare and endangered animals, rare ancient and famous trees, living resources such as drinking water sources, and natural and cultural protection targets such as world cultural heritage.

Impact on water environment. During the construction of power transmission and transformation projects, there are a large amount of waste soil and domestic garbage that may be directly discarded into the water, or still directly beside the nearby streets, which will seriously affect the quality of surface water. Abandoned muck and domestic wastes during construction are directly thrown into the
water, which will directly affect the quality of surface water. Domestic sewage, construction mud water, equipment washing waste water, etc. will also have a certain impact on the water environment of the construction site, thus damaging human health, ecological environment and agricultural crop growth.

Atmospheric environmental impact. During the construction of power transmission and transformation, excavation of earth and rock, backfill and other construction links will cause certain dust. Excavation and back filling of earthwork during construction will produce certain dust, which is easy to cause in windy and dry weather. At the same time, vehicles and mechanical equipment will produce a small amount of tail gas, which will affect the atmospheric environment.

Impact of soil erosion. During the whole construction period of the project, it is unavoidable that it may affect the soil structure, topography and geomorphology of the construction area, and may also damage the water and soil conservation facilities, which will lead to water and soil loss in heavy rainfall weather. Such as substation site area, line tower foundation area, etc.

Impact of acoustic environment. The acoustic environmental impact during substation construction mainly includes construction machinery operation, operation of construction vehicles and noise of substation main equipment, while the line construction noise is mainly generated by tower foundation construction and mechanical equipment such as tension unit and hoist during tension unreeling. The combined noise of these equipment or vehicles will seriously affect the normal life of the surrounding residents and staff.

5. Monitoring Method of Environmental Protection Measures in the Construction Process of Power Transmission and Transformation Project Based on Internet of Things Technology

5.1 Implementation Process
In the process of power transmission and transformation project construction, environmental monitoring is the key and difficult point of the whole project construction. In order to respond to the environmental protection measures given in the process of environmental assessment and dynamically monitor the environmental impact factors, it is necessary to make a complete monitoring plan for environmental protection measures. Through wired, wireless, satellite and other networks, through video, infrared, remote sensing and "3S" and other technical means, the collected environmental protection data information is quickly and accurately transmitted to various environmental protection application subsystems. On this basis, pollution sources and risk sources are monitored and analyzed to facilitate data transmission. The transport layer is responsible for collecting and transmitting data for easy application. The application layer is responsible for processing the data and information received in each environmental protection application subsystem so as to carry out environmental protection integrated intelligent management. Through the coordination between the mobile intelligent terminal and the server website, it will further promote the realization of systematization, definiteness and standardization of task formulation, and adjust the management mode of relatively scattered information in the traditional construction process, which is helpful to promote the reform of environmental protection monitoring means. In terms of type selection, tower type selection should consider the rationality and feasibility of adopting the same tower with double return towers and compact towers. The double circuit of the same tower replaces the two single circuits, and the corridor width can be reduced by half, thus greatly saving the scarce land resources of the country. However, the operation reliability of the line is slightly worse than that of the single circuit line, and there is certain operation risk.
Follow up the implementation of environmental protection measures on the construction site. According to the matching environmental protection measures in each link of the construction stage, the implementation of environmental protection measures on site can be tracked by relying on the environmental protection monitoring system, and the engineering environmental protection monitoring report can be formed. If there is no requirement for the use of the traction yard and temporary access road of the transmission line after the construction, the original ecological environment shall be restored as soon as possible. Through high-performance computing, massive data mining, intelligent analysis and other technologies, the data are effectively processed and play a role in each corresponding subsystem to realize integrated intelligent management of environmental protection, thus effectively improving the level of environmental management. From the perspective of Internet of Things technology, the purpose of building environmental protection capability is to supervise environmental quality, pollution sources and risk sources throughout the process. In the process of material transportation, reasonable selection should be made for construction transportation roads and human transportation roads to avoid road construction work in sections with intact trees and vegetation. At the same time, in the construction period to do a good job of publicity and education of construction personnel, prohibit the killing of wild animals; Make pictures of possible national key protected animals and plants within the scope of the proposed project route evaluation. The tasks that pass the examination can be downloaded to the intelligent terminal of the person in charge of on-site supervision, and the intelligent terminal is used as the carrier to perform the tasks on the site. finally, the collected on-site information is uploaded to the server, thus realizing intelligent and process management of the information, as shown in Figure 2.

5.2 Mobile Environmental Monitoring System
When collecting data using traditional monitoring methods of environmental protection measures, the staff must be equipped with cameras, video cameras or tape recorders and other auxiliary equipment to record. When collecting data using traditional monitoring methods of environmental protection measures, the staff must be equipped with cameras, video cameras or tape recorders and other auxiliary equipment to record. Intelligent networking is realized by tracking key pollution sources, for example, monitoring the concentration and emission of major pollutants, monitoring the production process, monitoring the working conditions of pollution control facilities, and video monitoring are implemented for pollutant-discharging enterprises. On this basis, a real-time dynamic total emission control system is established. In terms of construction management, we clearly require the construction team to pay attention to the protection of the original vegetation, adopt advanced construction technology and avoid the random disposal of construction waste. Photograph, sound recording and video recording shall be carried out on the placement of construction solid wastes and dust treatment. Noise monitoring instrument shall be used to test and automatically record the impact on acoustic environment. A daily record report on the implementation of on-site environmental protection measures on the day shall be formed. During substation construction, attention should be paid to the centralized recovery of wastes to avoid environmental pollution caused by oil and gas leakage of equipment.
When the environmental protection measures of the bid reach the standard, a report on the implementation of the environmental protection measures of the bid will be formed and summarized to the report on the implementation of the environmental protection measures of the project. In the selection of power transmission and transformation engineering equipment, in addition to comprehensive consideration of the equipment performance, durability, price, after-sales service and other factors, attention should be paid to the environmental protection performance of the equipment, and the transformer with high cost performance and low noise should be selected to reduce the noise pollution of the transformer. In the transportation project of iron tower materials, the tower materials transported to the tower site shall be stacked at appropriate positions to reduce the occupation of the site. After the erection of the iron tower is completed, the anchor pit of the construction site shall be backfilled in time to facilitate vegetation restoration. The high-span route shall be adopted for the sections with better forest land in the protected area. Airships or other advanced methods shall be adopted for the routing. Vegetation restoration shall be carried out immediately after the construction. At the stage of feasibility study and initial design, the design will be continuously optimized to minimize the impact on the areas of social concern. If the basic farmland protection area is occupied, relevant land use procedures should be handled. In terms of cloud computing technology and concept, the annual total and peak value prediction of environmental protection Internet of Things data, data storage space calculation, network topology architecture design, server configuration selection, disaster recovery backup system design and optimization of data service release mode are mainly solved.

6. Conclusion

Research on the implementation method of environmental protection measures for power transmission and transformation projects has realized the effective recording and preservation of environmental protection measures for power transmission and transformation projects, integrating environmental management into the whole construction process. We should attach importance to and strengthen the publicity work of environmental protection for power transmission and transformation projects, rely on advanced science and technology at home and abroad, strengthen communication with news media, and conduct correct public opinion guidance. In this way, enterprises can not only complete the task of power construction, reap good economic and social benefits, and contribute to China's modernization, but also protect the environment while developing, so that people and nature can live in harmony. Internet of Things technology can assist in environmental monitoring and data management. At the same time, it can also provide technical support for office, management, emergency command and other needs, which provides new means and ways to achieve the strategic objectives of environmental planning.

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