Analysis on Ubiquitous Power Internet of Things Based on Environmental Protection

Huawei Jin*, Xianjun Liu, Weiwei Liu, Jing Xu, Weiping Li, Hao Zhang, Jie Zhou, Yuheng Zhou
Yichang Power Supply Company of State Grid, 443000, Yichang, Hubei, China

*Corresponding author e-mail: jinhuawei@qq.com

Abstract. With the comprehensive acceleration of the construction of ubiquitous power Internet of Things based on environmental protection, the construction of power Internet of Things can improve the depth and breadth of information monitoring in all aspects of the power system, monitor and control the operating parameters of important equipment in all aspects, and improve the power system. The monitoring, analysis and prevention capabilities; sensors are the most critical link to the in-depth mastery of information in all aspects of the power of the Internet of Things. As one of the important components of the country, the power company plays a fundamental role in supporting the development of the entire national economy. As power companies continue to develop, they also bring a series of environmental problems. The use of sensor monitoring terminals has become a key issue restricting the development of power Internet of Things. How to build an environment-friendly environment based on environmental protection. The power Internet of Things can improve the safe operation level of the power grid and achieve good economic and social benefits.

1. Introduction

The development of smart grids has made power equipment more intelligent and modern, which has led to the convergence of smart grids and the Internet of Things. The so-called power Internet of Things is a network system that meets the requirements for grid infrastructure, personnel and environment identification, interconnection, sensing and control. The sensor is the most basic facility in the implementation of power Internet of Things. The monitoring of the operation and transformation of power transmission and transformation equipment and the changes of the environment around the substation and transmission line need to rely on a large number of environmental monitoring sensors to form a wireless sensor network, real-time monitoring and control of all links. Operating parameters of important equipment [1].

1.1. The basic concept of ubiquitous power internet of things

Ubiquitous refers to the connection and interaction of information between anytime, anywhere, anyone, or anything. The ubiquitous power Internet of Things is the specific manifestation and application of the Internet of Things in the power industry; it is not only the change of technology, but also the improvement of management thinking and the innovation of management concepts. The internal focus is on quality improvement, and the external focus is financing development. The ubiquitous power...
Internet of Things connects power users and their equipment, grid companies and their equipment [2], power generation companies and their equipment, suppliers and their equipment, as well as people and things, to generate shared data for users, power grids, power generation, and suppliers. And government social services; with the power grid as a hub, play a platform and share role, create greater opportunities for the development of the whole industry and more market entities, and provide value services.

![Diagram of power Internet of ubiquitous Things](image)

**Figure 1.** The composition of the power Internet of ubiquitous Things

1.2. Based on the concept of environmentally friendly
Enterprises are the foundation of environmentally friendly society and the premise of environmental protection construction. "Environmentally friendly" is a concept that adopts a production mode that is conducive to environmental protection. "Environmentally friendly" is a process of positive interaction and mutual promotion between the enterprise and the surrounding environment. It is achieved by the company through continuous improvement of its own behavior. Harmony with society. The work of creating an "environmentally friendly power company" integrates the concept of "environmentally friendly" into the production, operation, management and development of power companies, and encourages power companies to take the initiative to assume more environmental protection responsibilities [3]. Management trends, with conceptual innovation, institutional innovation, and management innovation as breakthroughs, are important supplements to the current mandatory measures for environmental protection prevention and control. By encouraging power companies to further assume social responsibilities on the basis of achieving environmental compliance and compliance, and continuously improve the level of pollution prevention and control, and at the same time promote more enterprises to carry out cleaner production, deepen industrial pollution prevention, take a new road to industrialization, and achieve sustainable industrial development [4].

1.3. Analysis of the current status of environmental protection in power companies
The rapid development of new energy, represented by wind power and photovoltaic power generation, has played an important role in the development of green transformation and optimization of energy structure. Under the general trend of energy structure transformation and low-carbon development, the development of new technologies such as the Internet of Things and big data and the deep integration with the new energy industry will break the long-standing structure of the traditional energy system
and the new integrated energy service provider. Will be generated as the protagonist of the market. From the current situation, the efficient consumption of new energy has become an important factor restricting the high-quality development of China's new energy [5]. At present, wind power and photovoltaic account for the total installed capacity of electric power. However, due to the low utilization hours, the proportion of power generation is less than 8%. There is still a gap between China's 2020 non-fossil energy ratio of 20%. In the process of rapid growth of new energy installations, the problem of abandoning wind and abandoning light has become increasingly prominent. With the widespread penetration and deep integration of IoT technology in the new energy industry, IoT technology is expected to solve the problem of new energy consumption. One of the important functions of the ubiquitous power Internet of Things is to promote clean energy consumption and optimize dispatch to achieve cross-regional coordinated control [6].

![Figure 2. Contact with environmental protection in the power Internet of Things](image)

2. Analysis of the construction of IoT based on environmentally friendly power companies

2.1. Characteristics and Application Environment Analysis of Power Internet of Things
The fundamental characteristics of the power Internet of Things are comprehensive sensing, reliable delivery and intelligent processing. Comprehensive perception, that is, using sensors, two-dimensional codes and other technologies to realize real-time perception, measurement and capture of object information. Reliable delivery, by interconnecting things with communication networks, relying on various communication technologies to effectively share and interact data in real time. Intelligently process various intelligent information processing technologies, analyze and process a large amount of power data, and realize intelligent monitoring and management. Compared with the traditional Internet of Things, the power Internet of Things is generally used in the fields of power transmission and transformation equipment monitoring, substation inspection, etc. The power Internet of Things has a high demand for communication, and requires reliable and long-term operation of each sensor node deployed in the power system.

2.2. Power System Environmental Protection Plan
Building an environment-friendly power company requires a strong driving force. Building an environment-friendly enterprise is a systematic project, a long-term construction and continuous improvement process, and requires a strong driving force. Seriously compare the national standards, industry standards and advanced enterprise standards to formulate work plans, assessment standards and accountability mechanisms, and truly quantify the positions and responsibilities to individuals. Secondly, we should increase investment in science and technology, create work around
environmentally friendly enterprises, vigorously develop relevant high-tech, and actively establish green technology systems such as waste recycling and clean production.

2.3. Planning for the development of green energy

2.3.1. Strengthening environmental protection work related to biomass energy. Accelerate the development of technologies for the development and utilization of renewable energy such as biomass energy conversion technology and geothermal energy. Biomass energy refers to the energy produced by biomass as a carrier. It is directly or indirectly derived from the photosynthesis of plants. It is the form of energy stored in the form of chemical energy by solar energy. Biogas utilization and crop straw power generation use biomass. An important aspect of energy. Further strengthen the research and development of biomass energy technologies, such as key technologies for biomass direct combustion or gasification power generation, agriculture and forestry waste, key technologies for biomass molding industrialization, and municipal solid waste energy utilization technologies, waste incineration Fossil energy substitutes and production equipment such as pyrolysis treatment technology, biomass fuel ethanol and biodiesel, mobile straw drying food technology and complete sets of equipment, assembled biogas fermentation equipment and supporting equipment and process technology, biomass cogeneration technology And the comprehensive development and utilization model, as well as the cultivation of high-yield oil crops to produce biodiesel technology, and the low-cost large-scale biological hydrogen production technology based on green algae.

Figure 3. Hierarchical structure of power internet of things

2.3.2. Strengthen the development and utilization of renewable energy such as solar energy and geothermal energy. Strengthen research and demonstration of renewable energy development and utilization technologies such as solar energy and geothermal energy, and significantly reduce dependence on non-renewable energy sources. The development and utilization technology of geothermal resources in our province is still immature. We should strengthen the development and application of geothermal technology in power generation, hot air drying and processing of agricultural and sideline products, hot spring bathing, etc., which will alleviate energy shortages in the province, promote economic and social development and improve the ecological environment. Has
great significance. In terms of comprehensive solar energy utilization technology, we will focus on
technologies such as solar water heaters, solar cookers, solar houses, and solar greenhouses.

2.3.3. **Strengthen environmental protection work for environmental protection hydropower projects such as hydropower stations and nuclear power plants.** With the development of the national environmental protection policy, it has been gradually established and improved. From the early stage of project management, bidding, construction, and inspection, it has formed a relatively complete environmental protection management system. According to the characteristics of hydropower projects, the environmental protection work in the planning stage was carried out and measures were taken to reduce the impact of hydropower construction on the ecological environment and prevent soil erosion. Through special nuclear power construction environmental protection requirements, the power department always regards the safety and environmental protection of nuclear power plants as one of the prerequisites for selecting and reviewing the site according to the regulations, regulations and standards promulgated by the state on nuclear power plant safety and environmental protection, so that nuclear power construction Meet environmental requirements.

3. **Systematic construction of power Internet of Things sensors**

3.1. **Establishment of wireless sensor network terminal in substation**

In the substation, the sensor node terminal substation inspection includes various types of instrument data collection, isolation switch knife gate state monitoring, transformer, generator and other equipment status monitoring. The terminal can be efficiently utilized and managed by performing terminal on the monitoring sensor nodes of each device. The completion of the terminal is realized on the basis of the following assumptions: all the nodes in the monitored substation are known for their position information; the orientation information of all the nodes in the monitored substation is known. By analyzing the orientation of each node in the monitored substation and its communication reachable range, the monitoring sensor node of the equipment in the substation can be divided into several terminals, and the sensor nodes in each terminal are determined according to the rules to be mentioned below. The terminal header is responsible for concentrating the device status data collected by the nodes included in the terminal, and transmitting it directly after the fusion processing or relaying to other nodes in the monitoring range. In the node monitoring range, the sensor nodes in each area constitute a virtual terminal, and the nodes in the virtual terminal are responsible for collecting device state data and transmitting it to the terminal header in the terminal, in order to ensure that any one of the nodes can The collected environmental data is transmitted to the terminal head node to ensure stable collection and processing of real-time monitoring information in the substation, so that the energy of the sensor network node is relatively balanced, and it is necessary to find the sensor node with the highest stability in the terminal as the terminal head. This establishes an efficient monitoring network that can completely monitor the parameters in the substation.

3.2. **Establish an environmental monitoring network system**

Environmental pollution is a problem that must be solved in the process of economic construction. In view of the current common environmental pollution problems, in the development of power systems, environmental monitoring must be strengthened, environmental monitoring and management systems must be continuously improved, and environmental monitoring levels should be improved. In the specific implementation process, we can start from the aspects:

(1) Establish a unified management mechanism. In the process of environmental monitoring, in order to prevent the phenomenon of multi-management in monitoring work, in the specific work, we should actively strengthen the improvement of the environmental protection supervision and management system, form a unified management mode among various regulatory departments, and set up a special The management team effectively monitors the environmental pollution problems arising
from the production of power systems and the use of electrical energy, and continuously improves the
quality of environmental monitoring.

(2) Establish a sharing platform for environmental monitoring management data. In the monitoring
of data feedback in the power Internet of Things environment, different departments monitor the
environment from different perspectives to obtain more comprehensive monitoring information. In
order to improve the level of environmental monitoring, it is necessary to strengthen the construction
of an environmental monitoring and management data sharing platform. All participating
environmental monitoring departments should transmit the monitored data to the platform, help to
share environmental information, and develop environmental protection for each department. The
program provides sufficient data support.

Figure 4. Environmental Monitoring Network System of Power Internet of Things

3.3. Develop a scientific and rational power system environmental protection plan
In the production process of power systems, environmental protection work must be incorporated into
the power production process, and long-term planning plans should be formulated to deal with various
environmental pollution problems in the power production process. It is necessary to determine the
scope of planning for environmental protection, including the time of planning, the geographical scope
of planning, and the objectives of planning. For example, it is necessary to supervise the discharge of
waste water, waste gas and solid waste in the electric power production process, and require the
electric power enterprises to control the quantity of these wastes within a certain range in the
production process, thereby realizing the protection of the environment. It is necessary to keep track of
various relevant situations within the scope of the defined environmental protection plan of the power
industry, such as the status quo after the start of implementation of the plan, future developments, and
record the crew structure, technical characteristics, pollution control and emissions of the power
system. And develop scientific and feasible environmental protection measures based on the data
provided by the power companies, develop more clean energy, select fuels in the power production
process, apply more new technologies and new equipment in the power production process, and
reduce electricity. The harm and impact of production.
4. Conclusion

The power Internet of Things has emerged with the continuous development of the smart grid, and the sensor is the foundation of the construction of the power of the Internet of Things. The complex working environment of the power equipment makes the construction of massive sensors in the network an important issue. This paper first analyzes the working environment and characteristics of the power Internet of Things, summarizes the various aspects of the power Internet of things construction, and then selects appropriate monitoring methods for the power system environmental monitoring system to maximize the stable operation and monitoring of the wireless sensor network. The validity of the data. It guarantees the safe and stable operation of the wireless sensor network, and is of great significance to the development of the power Internet of Things. It can effectively realize the accuracy of environmental protection monitoring in the substation, and not only meet the requirements of sustainable development of environmental protection and energy conservation, but also it can also push the grid structure level to a higher level.

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