

Application Analysis of Environmental-friendly Protection and Energy-saving Control Technology in Modern Building Electrical Field

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Abstract: With the continuous evolution of the social economy, various industries in China are now moving towards energy conservation and environmental protection, striving to achieve energy-saving control through environmental-friendly protection technologies, reduce enterprise production pollution, and protect the ecological environment. In the field of modern building electrical engineering, environmental-friendly protection and energy-saving control technologies can maximize energy, water, and material conservation, ensuring stable ecological environment while achieving efficient industry development.

Based on this, this article mainly discusses green environmental protection and energy-saving control technology, focusing on the role of green environmental protection technology and energy-saving control technology, analyzing the specific application of this technology in the field of modern building electrical engineering, and aiming to promote the long-term development of energy-saving work in China through the researches.

Keywords: Green and Environmental Protection; Energy Saving Control; Modern Architecture; Electric

The original intention of green environmental protection and energy-saving control technology is to replace the traditional working modes with low pollution production modes, thereby achieving the goal of reducing pollution emissions. Green building advocates that the design construction processes and techniques should be conducted based on environmental protection concepts throughout the building process, laying emphasis on energy-saving and sustainable development.

Low carbon environmental protection technology, energy-saving control technology, and intelligent information technology are applied to buildings to solve problems such as ecological environment, construction quality, and environmental comfort. Green environmental protection and energy-saving control technologies are both pursuing the harmonious unity of nature, architecture, and human beings. This paper takes the electrical industry as an example to explore the practical application strategies of green environmental protection and energy-saving technologies.

1. The Impact of Green Environmental Protection and Energy-Saving Control Technology on Modern Building Electrical Fields

The influence of green environmental protection and energy-saving control technology on the modern building electrical field is reflected in multiple aspects, among which the implementation of green energy-saving concepts does matter. The enhancement of environmental awareness has made green energy-saving an important development direction for building electrical design. The modern building electrical field can optimize energy utilization structure, reduce energy consumption, decrease carbon emissions, and achieve SDG.

The application of green environmental protection technology makes building electrical systems more energy-efficient, reduces energy consumption, and lowers the operating costs of buildings. Many companies have reduced their dependence on fossil fuels in building electrical systems by adopting energy-saving technologies, thereby reducing greenhouse gas emissions and having a positive impact on environmental protection.

From the perspective of market economy value, green and energy-saving buildings are more

popular due to their environmental characteristics, which can enhance the market value and competitiveness of buildings. From a technical perspective, green environmental requirements have driven the research and application of new technologies, such as smart grid technology, LED lighting, solar photovoltaic systems, etc.

In addition, the government has also established new standards for environmental protection technology and related construction industries, and the building electrical design must obey higher energy-saving and environmental protection standards, which actively promotes innovation and development of related technologies.

As for the construction costs, the application of energy-saving technology reduces the long-term operating costs of buildings. The only problem is that this technology may require higher investment costs in the early stages, which will have a certain impact on the economic decisions of building owners and investors. For users, with the popularization of energy-saving technologies, their usage patterns and habits of buildings will be also changed, for instance, paying more attention to energy-saving and environmentally friendly lifestyles. Therefore, it can be seen that the impact of green environmental protection and energy-saving control technology on the modern building electrical field covers multiple levels such as economy, technology, regulations, market, and society, highlighting the importance of green environmental protection and energy-saving control technology.

2. Application of Environmental Protection and Energy-Saving Control Technology in Modern Building Electrical Field

2.1 Energy-Saving in Power Supply and Distribution

In the field of modern building electrical engineering, it is challenging to achieve energy efficiency in power supply and distribution with the purpose of realizing green environmental protection and energy-saving control.

The staff need to set up the substation in the load center to reduce the power supply distance, minimize line losses, reduce the number of transformers, and reasonably set up dedicated transformers for power supply to reduce losses.

At the same time, reactive power compensation should be centrally installed on the high and low voltage sides to improve the power factor to 0.9 or above, and harmonic control should be carried out on nonlinear loads to reduce harmonic losses.

The energy-saving transformers should be used in design of transformers, such as high-quality cold-rolled grain oriented silicon steel sheets with high magnetic flux density and energy-saving transformers made of amorphous alloy materials, to reduce active power loss. In the process of power supply and distribution, designers need to minimize line transmission losses as much as possible. Generally, copper cores are chosen as conductors, or copper aluminum composite busbars are used as vertical main busbar. Or reduce the length of wiring, design straight power supply wiring, and control the power supply radius of low-voltage lines. Modern buildings can also use renewable energy sources such as solar photovoltaic and wind power to replace traditional electricity supply methods, achieving energy conservation and emission reduction. In terms of building equipment design, designers can choose high-voltage power supply methods based on the capacity of large electrical equipment, such as electric motors, to reduce the losses of intermediate step-down transformers.

2.2 Energy-saving Lighting System

In the field of modern building electrical engineering, energy-saving lighting systems can be achieved through the use of LED lamps. These lamps have a long lifespan and high energy utilization rate, not only longer than traditional light bulbs, but also more environmentally friendly. At the same time, they can freely adjust color and do not contain harmful substances such as mercury and lead, which can better protect health and the environment and improve cost-effectiveness.

The construction party also needs to equip the lighting system with an intelligent control system, which can automatically adjust brightness and turn on or turn off lights through light sensors and human body sensors, achieving automated control and intelligent lighting. In addition, designers also need to achieve comprehensive protection, which means using high-performance electronic components to extend the service life of

equipment, and reducing power loss through intelligent control to achieve good environmental results.

In the same vein, the construction team also needs to build a cloud platform for the equipment lighting fixtures to ensure that the equipment is always working in its best condition and reduce manual inspection. In the design, the construction party should try to consider the full combination of natural light and artificial lighting, and make full use of various light guiding and reflecting devices to introduce natural light into the indoor lighting for the purpose of saving lighting electricity. The construction party needs to actively utilize intelligent electrical lighting systems to significantly improve the automated operation of their equipment.

It is worth noting that the intelligent electrical lighting system also has relatively soft lighting, which can protect the eyes, improve the strong light of traditional lighting, and have better adaptability. Besides, it also has a very good energy-saving effect. In the process of architectural design, designers need to minimize unnecessary lighting losses, layout lighting areas and lighting intensity reasonably. Designers need to adjust the lighting design by zoning the lights or increasing the number of lighting switch points appropriately according to the usage of the lighting design.

The control of room lighting fixtures should take the principle of energy conservation into account. For public places and outdoor lighting, automatic control with program programming or sound control and photoelectric switches can be used. Designers can also use electronic ballasts to install compensation capacitors, effectively reducing reactive power efficiency, improving users' power factor, and meeting the

needs of energy-saving lighting design. Alternatively, sensors such as sound and light sensors can be used to flexibly regulate the lighting system, preventing long-term lighting when not needed. Furthermore, real-time adjustment of lighting intensity can be achieved to optimize and control energy loss.

In summary, the modern construction industry, affected by the national policies, mostly advocates the construction concepts of green, environmental protection, and energy conservation. Building electrical itself is an important component of construction projects, so applying green environmental protection and energy-saving control technology to the electrical field is of great significance.

Designers and construction personnel need to have a detailed understanding of the core concepts of green environmental protection technology and intelligent control technology, accurately master the skills, methods, and related technologies, and do a good job in energy-saving design and construction work, in order to promote the sustainable development of the construction industry.

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