

The Application of Green Energy Conservation and Environmental Protection Technology in Civil Engineering

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Abstract

With the increasingly serious global environmental problems, the application of green energy-saving and environmental protection technology in various fields has attracted more and more attention. The application of green energy saving and environmental protection technology in civil engineering has attracted more and more attention. In the field of civil engineering, green energy-saving and environmental protection technology not only helps to reduce energy consumption and environmental pollution, but also improves the quality and efficiency of the project. This paper first introduces the development background of green energy saving and environmental protection technology, and then analyzes the importance and significance of green energy saving and environmental protection technology in civil engineering, the main application fields and methods of green energy saving and environmental protection technology, and the application value and advantages of green energy saving and environmental protection technology in civil engineering. Examples show that the application of these technologies can effectively reduce energy consumption and environmental load, and achieve sustainable civil engineering construction. It is of great significance to reduce resource consumption and environmental pollution in civil engineering. It is necessary to adhere to the promotion of green concept in order to achieve the sustainable development of civil engineering. In the future, green energy-saving and environmental protection technologies will continue to play an important role and make positive contributions to the construction of ecological civilization.

Keywords

Green Energy Saving and Environmental Protection Technology; Civil Engineering; Sustainable Development.

1. Introduction

With the development of social economy and the growth of population, the demand for civil engineering is increasing. Traditional civil engineering methods are often accompanied by a large number of resource consumption and environmental pollution. Therefore, how to apply green energy-saving and environmental protection technology to civil engineering to achieve sustainable development has become a hot issue in the current research. Green, energy saving and environmental protection have become the focus of attention in various fields. As an important pillar of the national economy, the civil engineering industry is also facing huge environmental pressure while promoting social development. In order to achieve sustainable development, the application of green energy saving and environmental protection technology in civil engineering is particularly important. Green energy saving and environmental protection technology is an important way to realize the sustainable

development of civil engineering. Taking green measures in architectural design, construction process and building materials can not only effectively protect the environment, reduce energy consumption and pollution emissions, but also bring significant economic benefits. [1] Facing the challenges in the promotion process, we need to pool the wisdom and strength of the government, enterprises and all sectors of society to jointly promote the application and development of green energy-saving and environmental protection technology in civil engineering. Only in this way can we realize the harmonious coexistence between human beings and the environment and create a better future. This paper will discuss the application of green energy saving and environmental protection technology in civil engineering, and deeply analyze the advantages and challenges of this technology, aiming to promote the green transformation in the field of civil engineering and realize the harmonious coexistence between human and environment.

2. Main Application Fields and Methods of Green Energy Saving and Environmental Protection Technology

2.1 Application of Green Energy Saving and Environmental Protection Technology in Energy Saving

In civil engineering, the application of green energy-saving technology mainly involves architectural design, material selection and construction process. By optimizing the building design, make full use of renewable energy such as natural light and wind energy to reduce the dependence on traditional energy; Select efficient and energy-saving building materials, such as thermal insulation materials, energy-saving doors and windows, etc; Energy saving construction technology, such as integrated insulation construction, can effectively reduce energy consumption. Energy saving is one of the important characteristics of green building. With the enhancement of environmental protection awareness and the continuous progress of technology, the development prospect of green building is broad. It is of great significance to strengthen the management of green buildings and the promotion of energy-saving measures, which not only helps to realize the sustainable development of the city, but also improves the image of the city; It also helps to improve the living environment and quality of life of residents; At the same time, it also plays a positive role in promoting the development of related industries and technological innovation. [2] Through rational design of building layout and window location, make full use of natural light and reduce artificial lighting; The use of natural light is further enhanced by the use of light conduits, solar cells and other technologies. Use high-performance thermal insulation materials and materials, such as aerogel and vacuum insulation board, to achieve building thermal insulation and reduce energy consumption in summer and winter. Use high-performance energy-saving glass and thermal insulation wall to improve the overall thermal insulation performance of the building. Use the heat recovery system to recover and reuse the waste heat in the exhaust air to reduce the loss of heat energy. Use solar water heaters, photovoltaic power generation systems, etc., to reduce dependence on traditional energy. Although the initial investment of green building may be relatively high, the cost of operation phase will be greatly reduced due to its energy-saving design. Considering the life cycle cost of buildings, green buildings will show higher economic benefits in the long-term operation. The saved energy consumption and maintenance costs can offset the initial investment costs. Ordinary buildings usually need a lot of energy in the operation phase, such as electricity and heating. The green energy-saving and environmental protection technology has greatly reduced energy consumption through a series of energy-saving measures and technologies. The promotion of green energy-saving and environmental protection technology is not only conducive to improving energy efficiency, reducing energy consumption and environmental pollution, but also an important way to achieve sustainable development. It is in line with the national policy direction of energy conservation and emission reduction, and is of great significance to promote green economic development. At the same time, green energy-saving and environmental protection technology can also improve people's quality of life and create a healthier and more comfortable living environment.

The energy-saving effect of green energy-saving and environmental protection technology is mainly reflected in the following aspects:

The first is efficient enclosure structure: the enclosure structure of green buildings usually uses materials with good thermal insulation performance, which can effectively reduce the heat loss of buildings and improve the thermal insulation performance of buildings. This can not only reduce energy consumption, but also improve the comfort of the indoor environment.

The second is the optimized energy system: in the design stage, green buildings fully consider the efficient use of energy and adopt various energy-saving technologies and equipment, such as solar water heaters, ground source heat pumps, etc. These devices can significantly reduce energy consumption and carbon emissions in the operation phase.

The third is intelligent energy management system: green buildings are usually equipped with intelligent energy management system, which can monitor and adjust the energy consumption of buildings in real time. Intelligent management can effectively avoid energy waste and further reduce energy consumption in the operation phase.

2.2 Application of Green Energy Saving and Environmental Protection Technology in Environmental Protection

Green environmental protection technology mainly includes green coverage, soil and water conservation, environmental governance and other aspects. By planting plants around the building, the absorption and purification functions of plants are used to reduce air pollution; Take effective water and soil conservation measures to prevent water and soil loss during construction; Take environmental treatment measures to properly handle the pollutants generated in the construction process and reduce the negative impact on the surrounding environment. Although the green energy-saving and environmental protection technology has been widely used in civil engineering, it still faces some challenges, such as high technical cost and construction difficulty. In the future, with the progress of technology and the enhancement of environmental protection awareness, green energy-saving and environmental protection technology will have greater development space. For example, more efficient and low-cost renewable energy utilization technologies such as solar energy and wind energy may be developed in the future; At the same time, with the continuous development of 3D printing technology, the future civil engineering is also expected to achieve more personalized green design. In addition, the concept and technology of intelligent building will also play an increasingly important role in future civil engineering. Intelligent buildings can monitor and adjust the use of buildings in real time to maximize energy efficiency and environmental performance. This is also an important development direction of green building in the future. Through these efforts, we can expect to see more applications of green energy-saving and environmental protection technologies in civil engineering in the future, so as to realize the sustainable development of human society.

The most significant environmental protection effect of green energy conservation and environmental protection technology is mainly reflected in energy conservation and emission reduction. The good heat preservation and insulation performance of green energy-saving and environmental protection technology, as well as the efficient energy system, greatly reduce the energy consumption in daily use. [3] For example, a green office building saves 30% of energy compared with traditional buildings by using solar energy, ground source heat pump and other technologies. In addition, the technologies of natural lighting, rainwater collection and reclaimed water recovery in green energy-saving and environmental protection technologies have effectively reduced the consumption of water and energy. At the same time, the emission reduction effect of green energy saving and environmental protection technology can not be ignored. Its low emission building materials and efficient air purification system have greatly reduced the emission of harmful gases and particles generated by green buildings. For example, a green residential area has significantly reduced air and water pollution by planting local plants and regularly cleaning the rainwater drainage system. The key technologies to achieve these environmental protection effects include but are not limited to: the use of renewable energy, energy-efficient equipment and systems, intelligent energy management systems, eco-friendly

building materials, etc. The government has given a lot of policy support to the promotion of green energy-saving and environmental protection technologies, including subsidies, tax incentives and loan interest rate relief. With the increasing public attention to environmental issues, the market demand for green energy-saving and environmental protection technologies is also growing. It is expected that in the future, with the progress of technology and the reduction of cost, the market share of green energy-saving and environmental protection technology will be further expanded. The use of green energy-saving and environmental protection technology is not only one of the effective ways to solve the current environmental problems, but also the inevitable trend of future building development. [4] Through continuous optimization of design, introduction of advanced technology and improvement of resource utilization efficiency, green energy-saving and environmental protection technology will play a more active role in promoting resource conservation and environmental protection.

The environmental protection effect of green energy saving and environmental protection technology is mainly reflected in the following aspects:

The first is to reduce pollutant emissions: during the design, construction and operation of green buildings, environmental protection materials and clean energy are used as much as possible, so as to reduce environmental pollution. For example, green buildings usually use non-toxic or low toxic building materials, which can effectively reduce indoor air pollution.

The second is to improve the efficiency of resource utilization: the recycling of resources, such as rainwater collection system and reclaimed water reuse system, has been fully considered in the design stage of green buildings. These systems can significantly improve the utilization efficiency of water resources and reduce the dependence on natural water resources in the operation stage.

The third is the protection and restoration of the ecological environment: green buildings are usually integrated with the surrounding ecological environment, and the impact on the surrounding environment is effectively reduced through the design of vegetation coverage and rain garden. At the same time, green energy-saving and environmental protection technologies can also help restore and improve the surrounding ecological environment and promote ecological balance.

Located in the center of the zaidas business district in Amsterdam, the financial core of the Netherlands, there is a building called the greenest office building in the world. This building is not only the headquarters building of Deloitte Netherlands, one of the four largest international accounting firms, but also rated as the greenest office building in the world by the British architectural research institute green building assessment system. The building fully considered natural lighting and ventilation in its design, and was installed with ground source heat pump and solar hot water system. Through the intelligent energy management system, the effective control of air conditioning, lighting and other systems is realized. According to statistics, compared with the same type of buildings, the energy consumption of this building has been reduced by 30%, and the indoor environmental quality has been significantly improved. In addition, the green design of the building has also enhanced its market value and social reputation.

3. Application Value of Green Energy Saving and Environmental Protection Technology in Civil Engineering

With the progress of society and the development of science and technology, human consumption of natural resources is increasing, and environmental protection has become the focus of global attention. As an important part of infrastructure construction, civil engineering is also facing huge environmental pressure while promoting social and economic development. The application of green energy saving and environmental protection technology in civil engineering not only helps to alleviate the problems of resource consumption and environmental pollution, but also improves the project quality and reduces the construction cost. On the one hand, building projects using green technology can significantly reduce energy consumption and maintenance costs in the operation process; On the other hand, with the growing demand of consumers for green buildings, these buildings are more

competitive in the market. In addition, green buildings can enhance the image of the city, attract more investment and talents, and promote the sustainable development of the regional economy. At present, some green energy-saving and environmental protection technologies have been widely used in civil engineering, such as the utilization of renewable energy such as solar energy and wind energy, energy-saving building design, and the use of environmental protection materials. The application of these technologies has achieved remarkable results in reducing energy consumption and environmental pollution.

3.1 Importance and Significance of Green Energy Saving and Environmental Protection Technology in Civil Engineering

Green energy saving and environmental protection technology refers to the technology of using environmental protection materials and processes in the construction process to reduce energy consumption, reduce pollution and improve resource utilization efficiency. In civil engineering, the application of these technologies has important practical significance and long-term development value.

First of all, green energy-saving and environmental protection technologies help to achieve sustainable development. With the acceleration of urbanization, the number and scale of civil engineering projects are expanding, and the problems of resource consumption and environmental damage are becoming increasingly serious. Adopting green energy-saving and environmental protection technology can effectively reduce resource waste and environmental pollution, which is in line with the concept of sustainable development. Secondly, green energy-saving and environmental protection technology helps to improve the quality of the project. Traditional construction methods often have problems such as low resource utilization efficiency and unstable construction process. Green energy-saving and environmental protection technology can effectively improve the project quality and prolong the service life of buildings by using new environmental protection materials and processes. Finally, green energy-saving and environmental protection technologies help to enhance the competitiveness of enterprises. With the improvement of consumers' awareness of environmental protection, the demand for green buildings is increasing. Civil engineering projects using green energy-saving and environmental protection technologies are more in line with market demand and help to enhance the market competitiveness of enterprises.

3.2 Application Value of Green Energy Saving and Environmental Protection Technology in Civil Engineering

The first is environmental protection. Civil engineering construction is often accompanied by high energy consumption and environmental pollution, such as noise, dust, wastewater and waste. The application of green energy saving and environmental protection technology can significantly reduce these negative effects, help to protect the ecological environment and improve people's quality of life. Second, in terms of energy conservation and consumption reduction, the application of green energy-saving and environmental protection technologies, such as high-efficiency energy-saving lighting technology, water-saving technology and renewable energy technology, can significantly reduce energy consumption while ensuring construction quality and progress, thus saving construction costs. The third is to improve the project quality. The application of green energy-saving and environmental protection technologies, such as green building technology and green material technology, not only helps to reduce energy consumption and environmental pollution, but also improves the quality and service life of buildings. The fourth is to promote the sustainable development of society. The application of green energy-saving and environmental protection technology conforms to the expectations and needs of society for sustainable development, and is conducive to the establishment of a good social image of enterprises, the improvement of social benefits, and the coordinated development of economy, society and environment. Therefore, the application value of green energy saving and environmental protection technology in civil engineering is significant, which not only helps to protect the environment and save energy, but also improves the project quality and social benefits, and promotes the sustainable development of society.

4. Conclusion

To sum up, the application of green energy saving and environmental protection technology in civil engineering has important practical significance and broad development prospects. In order to achieve the sustainable development of civil engineering, we need to further promote and apply these technologies, overcome technical bottlenecks and challenges, and strengthen technological innovation and R&D. At the same time, it is also necessary to strengthen the public's environmental awareness education, promote the green concept, and jointly create a better future. Green energy saving and environmental protection technology has a far-reaching impact on the operation stage of civil engineering. The adoption of green energy-saving and environmental protection technologies can effectively reduce energy consumption, reduce carbon emissions, protect the ecological environment and improve overall benefits. Although facing many challenges, with the development of science and technology and the promotion of policies, green energy-saving and environmental protection technologies will be more widely used in the future. Understanding and applying innovative green energy-saving and environmental protection technologies will help to improve the sustainability and competitiveness of civil engineering operations. Therefore, we should continue to explore and innovate, and promote the application and development of green energy-saving and environmental protection technology in civil engineering. It not only helps to reduce energy consumption and improve resource utilization, but also contributes to environmental protection. Therefore, green energy saving and environmental protection technology has played a positive role in the operation stage of civil engineering. In order to achieve sustainable development, we should vigorously promote the concept and practice of green energy saving and environmental protection technology. In the future, with the improvement of people's awareness of environmental protection and the deepening of the concept of sustainable development, the application of green energy-saving and environmental protection technology will become an important development direction in the field of civil engineering. Green energy saving and environmental protection technology has significant advantages in energy saving and emission reduction, improving indoor air quality and reducing maintenance costs in the whole stage of civil engineering. With the continuous progress of technology and in-depth research, we expect to see more new green energy-saving and environmental protection technologies make significant contributions to the sustainable development of society in the future. The application of green energy saving and environmental protection technology in civil engineering has important significance and value. Through the application of high-efficiency thermal insulation materials, economical foundation treatment, solar energy utilization and other technologies, multiple goals such as energy conservation and emission reduction, improving project quality, and creating a comfortable and healthy living environment can be achieved. Looking forward to the future, intelligent, green and low-carbon will become an important trend in the development of green civil engineering. Therefore, we should actively promote scientific and technological innovation and application practice, and make contributions to the construction of a better human home.

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