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Research on Architectural Design Innovation from a Low Carbon Perspective

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Abstract: *With the improvement of living standards, people's requirements for residential functions are also increasing, that is, residential buildings should not only provide a safe and comfortable living environment for people, but also meet the low-carbon and energy-saving requirements of construction projects. Based on this, the article elaborates on the advantages of architectural design under the low-carbon concept, introduces the current development status of architectural design under the low-carbon concept, and proposes optimization strategies for architectural design under the low-carbon concept. It is necessary to use low-carbon environmental protection energy and building materials, optimize the surrounding environment of buildings, and fully utilize renewable energy, aiming to make strong contributions to the construction of ecological environment in China.*

Keywords: *low-carbon; Green buildings; Design; innovate*

1. Introduction

In the new era, the development of the construction industry must adapt to the market economy, ensuring the quality of construction while achieving economic benefits. The construction quality of construction projects directly affects the quality of construction projects. The most direct manifestation of the low-carbon concept is to reduce resource utilization and carbon emissions. In practical life, it is necessary to minimize waste emissions, continuously improve the utilization rate of various resources, and establish a harmonious relationship with the ecological environment[1]. The low-carbon concept is the key to the sustainable development of the construction industry. Integrating low-carbon concepts into architectural design can effectively reduce resource consumption during construction, accelerate project progress, improve project quality, reduce waste emissions during construction, and ultimately achieve the goal of energy conservation and carbon reduction. By scientifically designing buildings, the low-carbon concept can be reflected in all aspects of construction, reducing energy consumption during construction, selecting green and clean energy to replace traditional non renewable energy, and strengthening energy-saving system design. The low-carbon concept is a rational development based on analysis and in-depth research in the field of architecture. In addition, the concept of environmental protection should be firmly integrated into design and practice, and architectural design should be based on architectural form and structural analysis, emphasizing the interaction between the environment and architectural design.

2. Important embodiment of low-carbon concept in architectural design

When conducting architectural design, its quality is related to the overall quality and performance of the building. If the design of the building is not perfect, it will cause many problems for its future use and affect the lives, studies, and work of residents. With the strong support and promotion of the Chinese government, the low-carbon concept has been incorporated into the new development era, optimizing architectural design, and promoting sustainable development of architectural design has become a constantly discussed issue. Introducing more concepts can more effectively reduce resource waste, environmental pollution, and other phenomena in the architectural design process, thereby achieving the goal of optimizing resource allocation and improving the overall performance of buildings[2].

ISSN 2616-7433 Vol. 5, Issue 8: 100-105, DOI: 10.25236/FSST.2023.050813

2.1. Realizing the mutual unity between architectural aesthetics and low-carbon energy-saving concepts

In modern architectural design, architectural aesthetics is the focus and key, but in the current stage, a large number of cities adopt design styles that are too similar to reflect local characteristics and individuality. Under the low-carbon design concept, it can comprehensively focus on the specific characteristics and characteristics of the city, combine with the unique natural landscape and geographical conditions of the city, and integrate local content into the architectural design, which is not only conducive to energy conservation and environmental protection, but also can integrate the breath of the times into the design, showing the uniqueness of the entire architectural design and improving the design quality.

2.2. Reducing Building Energy Consumption

The resource consumption and environmental pollution caused by engineering construction under previous architectural design were relatively serious[3]. With the continuous development and comprehensive integration of green and low-carbon design concepts, materials and processes used in buildings are constantly moving towards green protection, which can further reduce energy consumption and environmental pollution. Especially, appropriate control can be exercised over the discharge of wastewater, exhaust gas, and some solid construction waste. For example, architectural designers can use natural ventilation to replace air conditioning, and solar energy to replace electric water heaters to reduce resource consumption and environmental pollution issues.

2.3. Forming a New Architectural Aesthetics

Integrating low-carbon concepts into architectural design can not only comprehensively integrate modern elements in aesthetics to meet the public's needs for building appearance and aesthetics, but also reduce carbon emissions and achieve a low-carbon, energy-saving, and green life. In previous engineering construction, due to limitations in historical background, technological materials, and other aspects, the original buildings were mostly designed around the functionality and comfort of the building, without paying attention to the requirements of energy conservation, emission reduction, and low-carbon. However, with the comprehensive popularization of low-carbon concepts at this stage, low-carbon design in buildings has become the norm in the construction industry. Green and low-carbon design can coordinate natural ecology and architecture, More able to bring a green, low-carbon and comfortable living experience to the public.

3. Current Development Status of Architectural Design under the Low Carbon Concept

With the improvement of material living standards, the public has a stronger awareness and sense of responsibility in energy conservation and environmental protection, and the low-carbon concept has been fully integrated into public life[4]. However, in construction, the consumption of resources has always been at a high level, with occasional excessive consumption, which is not conducive to achieving energy-saving and environmental protection goals. By fully applying the low-carbon concept to the process of architectural design, not only can this problem be effectively solved, but it can also bring dual economic and social benefits to the construction unit.

From the perspective of low-carbon concept, architectural design should pay more attention to the combination of partial green materials and low-carbon energy, while emphasizing the utilization of renewable resources, in order to reduce unnecessary consumption of non renewable energy and ensure that non renewable energy in China does not gradually deplete over time. The application of low-carbon concepts in architectural design can not only effectively save and control building costs, improve overall efficiency, but also further enhance the practicality of buildings, thereby exerting greater value and significance in future use. For example, in practical work, design work should fully utilize and leverage the role of natural light resources, avoiding the use of energy consuming energy. To maximize the effect and value of natural light, it is necessary to carefully analyze the internal structure of buildings, comprehensively consider geographical location, choose scientific building directions, optimize design, and encourage orientation towards higher quality.

ISSN 2616-7433 Vol. 5, Issue 8: 100-105, DOI: 10.25236/FSST.2023.050813

4. Low carbon concept architectural design content

4.1. Orientation design

When designing multi story buildings, it is necessary to study the climatic environment of the construction site, clarify the local sunlight conditions, ensure a reasonable selection of building orientation and layout, and provide sunlight lighting on each floor. The orientation of buildings should take into account the influence of the city, and the location of buildings should also pay attention to the length and strength of sunlight, and cannot blindly increase the size of buildings. The same area or even the same residential area may have issues such as uneven orientation, solar radiation, and heat loss[5]. Therefore, important factors such as climate and solar conditions in the project area should be considered when determining the orientation of the residential area. Specifically, it is necessary to analyze the elevation angle of the local sun, accurately calculate the range of solar influence, scientifically design the orientation, and accordingly increase the area of windows facing south and correspondingly reduce the area of windows facing east and north to ensure the maximum absorption capacity of solar energy.

4.2. Reasonable site selection

Modern high-rise buildings are usually designed with new structures in mind. When selecting the site, architects should integrate the concepts of low-carbon and environmental protection, and consider whether the building project has a negative impact on the environment and the size of the building's impact on the environment. When selecting suitable land for ordinary housing, comprehensive consideration should be given to factors such as local ecological environment, geographical location, and transportation conditions. Relevant site selection information should be summarized into reference tables, and the table materials should be submitted to the team leader for processing[6]. The team leader should approve the submitted materials before construction. Use reference materials to enable construction management personnel to evaluate the feasibility of the project and predict potential problems encountered in future construction based on the data. When designers determine the height and number of floors of a building, they should consider documentation. Only by successfully achieving harmony between architecture and ecological protection in the natural environment can the economic and ecological benefits of enterprises be harmonious. Architectural structure is a crucial factor in architectural design, and its quality determines the direction of architectural design.

4.3. Natural lighting

Natural lighting design should actively improve lighting efficiency and control the total lighting time to control energy consumption levels. In addition, in lighting design, factors such as the internal layout and design characteristics of the building should also be considered to ensure that the quality and safety of the building itself are not compromised. It is very important to maximize natural light, and actively improving the insulation, cooling, and other performance of the entire room can control the building's dependence on electricity. In addition, when designing buildings, it is necessary to increase the window area as much as possible, which can optimize the lighting effect while achieving insulation. Except for larger windows, the overall color tone of the building is relatively light, and the material used should mainly be glass to effectively reflect light, further enhance the brightness of the building and achieve energy conservation.

5. Innovative Strategies for Architectural Design from a Low Carbon Perspective

The overall construction process should be controlled within a manageable range, achieving environmental friendliness by fully utilizing sunlight and other renewable energy sources. The selection of materials should be based on quality assurance, taking into account the nature and status of pollution. The selection of raw materials should be based on systematic research, with a clear understanding of material properties and pollution situations[7]. The most suitable building materials should be selected, while ensuring that these materials have minimal pollution.

5.1. Selection of low-carbon and environmentally friendly energy and building materials

In the context of the continuous advancement of modern society and urbanization, building

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materials are constantly changing. In order to meet the construction needs of relevant staff in construction enterprises and the living requirements of low-carbon buildings, this article studies building design under the low-carbon concept, creating green living spaces, and making building energy utilization more reasonable and efficient. In this regard, the construction team should try to choose environmentally friendly, green, safe, and healthy materials, minimize the use of traditional building materials such as cement bricks, and thereby improve the utilization rate of green materials. Builders should pay attention to the following two needs when selecting environmentally friendly materials.

One is that when selecting green materials, stakeholders need to consider both selecting appropriate building materials for the on-site environment and reducing material waste, taking into account issues such as material transportation costs and long-term storage of materials. The reason is that some materials used in buildings are usually environmentally friendly on the surface, but in actual construction, harmful components are easily extracted from the processing. Therefore, using environmentally friendly materials not only wastes a lot of time in controlling pollutants, but also increases project costs once their environmental protection is lost.

The second is to avoid secondary pollution[8]. The relevant team for selecting building materials should make a plan in advance, analyze and understand the composition of raw materials, understand their safety performance, study their correct usage, and avoid using raw materials from unknown sources. Some materials and products have a small impact on the environment, but can seriously harm human health. In this situation, it is necessary to strictly control the selection of materials and avoid using substances that are harmful to the body. In the current context of high-end architectural design, the relevant working groups not only need to apply new energy-saving materials, but also natural materials to ensure building quality, control construction investment, and maximize the benefits of construction projects.

5.2. Optimizing the surrounding environment of buildings

To scientifically apply the low-carbon concept to architectural design, the first step is to choose the construction site, fully explore the advantages of local resources, serve project construction, and achieve sustainable resource utilization. After years of investigation and research, it has been found that the reasonable distribution of building structures can meet the requirements of daily life for ventilation and lighting, effectively reducing the number of times air conditioning and lighting equipment are used, and ensuring comfort. If the water source around the building environment is clean and sufficient, it can be used to create an artificial landscape, and the natural landscape can be incorporated into urban buildings to play a great role in beautifying the environment. The low-carbon concept places greater emphasis on urban greening, which plays a crucial role in promoting building construction. Based on the urban traffic conditions, this structural distribution has an improvement effect on human mobility efficiency. In addition, when designing buildings, it is important to pay attention to providing sufficient leisure space for people, and to incorporate low-carbon concepts throughout the design cycle through scientific planning.

The planning and design of the surrounding environment of a building may be the main content of architectural design. When selecting a site, comprehensive consideration should be given to the use of the building itself, and specific analysis should be conducted on the adaptability of factors such as the surrounding building environment, local hydrogeology, and wind direction. During the construction planning and implementation process, the main focus should be on increasing the overall coverage of green vegetation on both sides of the periphery of green buildings and adjacent transportation lines, always centered around the construction area, and enhancing the absorption capacity of dust and pollutants. In addition, the planning and design of the surrounding streamline of buildings should focus on achieving low-carbon and energy-saving building design. In addition, in modern architectural design, designers should consider the impact of the building on the environment and choose different energy-saving methods based on the actual situation of the building, striving to achieve a harmonious coexistence between humans and nature[9].

5.3. Fully Utilize Renewable Energy

Renewable energy has a significant impact on building design under the low-carbon concept. With the increasing reduction of non renewable energy, promoting the development and utilization of renewable energy has become increasingly important. At the same time, the demand for renewable

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energy is increasing. So, in order to ensure the rationality of different building designs, it is necessary to quickly change concepts, leverage the advantages of renewable energy, build a complete renewable energy system, and thereby improve the quality of the entire building design.

Firstly, due to differences in building energy consumption in different regions, it is necessary to strengthen the selection of different energy utilization methods during the specific design process, in order to implement building design. Taking northern cities as an example, their buildings place more emphasis on heating and insulation[10]. Previously, coal consumption was relatively high, and when designing, it is necessary to fully consider the heating and insulation methods of the buildings. Renewable energy should be used to replace coal and ensure that no large amount of exhaust gas emissions are generated during the heating period. Therefore, in the design process, the ventilation effect should be improved, and low energy electrical devices should be used to achieve the goal of energy conservation.

Secondly, the application of low-carbon concepts in architectural design requires the appropriate use of clean energy. The use of renewable energy instead of non renewable energy in architectural design can effectively save natural resources and play a significant role in promoting the sustainable development of the architectural design industry, in order to better reduce pollution. Designers can also leverage the reality of some resources being recyclable to achieve resource conservation by reusing them. If the wastewater filtration and recycling system is included in the planning and design of buildings, the collection and utilization of domestic wastewater can be centralized for treatment, thereby improving the efficiency of water resource utilization.

Finally, in today's increasingly severe problem of resource scarcity, the quantity of water resources is constantly decreasing, and water-saving schemes need to be considered in the design of water use systems. Using filtered water to beautify the environment, irrigation, and other methods can reduce energy consumption and wastewater discharge in intensive wastewater treatment.

6. Conclusion

In short, with the introduction of low-carbon design concepts, energy consumption in the construction industry can be effectively reduced and more green and low-carbon living conditions can be provided to the public. This is also the key to achieving sustainable development in the construction industry. Therefore, at this stage, it is necessary to fully attach importance to the integration and application of low-carbon concepts in architectural design, and design the most scientific low-carbon design scheme based on the situation during the construction period. On the basis of ensuring the quality and safety of construction projects, it is necessary to maximize the energy-saving and carbon reduction effects of buildings.

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