

Original Paper

Analysis of Green Building Design and Environmental Protection Policies in Real Estate Development

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Abstract

This article explores the core concepts, design standards, and application of green building design in the real estate development process, through an analysis of green building design and environmental protection policies. By examining case studies and data from both domestic and international green buildings, the paper analyzes the impact of environmental protection policies on the real estate industry and the role of green building design in driving the real estate market. The economic and environmental benefits of green building projects are demonstrated through data and charts. Finally, the article presents future development trends and policy suggestions for green building design.

Keywords

Green buildings, Real estate development, Environmental protection policies, Energy conservation and emissions reduction, Design standards, Economic benefits

1. Introduction

With the increasing severity of global climate change and resource shortages, the importance of green building design in the real estate industry, which is a major consumer of energy and resources, has become more prominent. Green buildings, through the use of environmentally friendly and energy-efficient technologies and measures in design, construction, and operation, can effectively reduce energy consumption, lower environmental pollution, and improve the comfort and health of living environments. Therefore, green buildings not only play a positive role in addressing climate change but also create healthier living spaces for residents, thereby promoting the sustainable development of the real estate market. Against this background, this article aims to analyze the application of green building design in real estate development, explore the driving effect of environmental protection policies on green buildings, and propose directions and strategies for future

development based on the current state of green building development. This research contributes to a deeper understanding of the significance of green building design in the real estate industry and provides valuable reference for policymakers, developers, and designers, helping to achieve a greener and more environmentally friendly real estate market.

2. Overview of Green Building Design

2.1 Definition and Characteristics of Green Buildings

Green buildings are those that minimize their negative environmental impact throughout their entire lifecycle, from design, construction, and operation to demolition, while ensuring building functionality and achieving goals such as energy conservation, environmental protection, and comfort. The characteristics of green buildings include energy efficiency, water conservation, resource conservation, environmental protection, and improvement of indoor air quality. Firstly, green buildings use energy-efficient materials and technologies to reduce energy consumption and carbon emissions. Secondly, they focus on the efficient use of water resources through rainwater harvesting systems, water-saving devices, and other measures to reduce water consumption and optimize resource use. At the same time, green buildings advocate for the rational use of materials, using renewable or recyclable materials to reduce construction waste and environmental pollution during construction. Finally, green buildings place particular emphasis on improving indoor air quality by employing efficient ventilation systems, air purification technologies, and environmentally friendly materials to provide a healthy indoor environment. In short, green buildings are not only a response to resource consumption and environmental protection but also a necessary means to enhance the quality of living environments.

2.2 Design Principles of Green Buildings

The core objective of green building design is to optimize various aspects of design to achieve the best performance in energy conservation, resource utilization, and environmental protection. The design principles can be summarized into three main points: energy-efficient design, water resource utilization, and environmental friendliness.

(1) Energy-efficient Design

Energy-efficient design is one of the primary principles of green building design. To achieve low energy consumption and efficient energy use, design should employ energy-efficient building materials, technologies, and equipment. For example, the use of exterior wall insulation materials can effectively reduce heat loss from buildings and reduce the need for air conditioning and heating. LED lighting systems, compared to traditional lighting systems, can significantly reduce energy consumption and extend the lifespan. Additionally, solar thermal systems can provide renewable energy for buildings, helping to reduce dependence on traditional energy sources. The proper planning of building orientation can maximize the use of natural light, reducing the need for artificial lighting; while optimizing window design and ventilation systems can improve air circulation and reduce the load on air conditioning systems. Energy-efficient design not only lowers the operational costs of buildings but

also greatly reduces greenhouse gas emissions, helping to address global climate change.

(2) Water Resource Utilization

Water resource utilization is another important aspect of green building design. With the increasing scarcity of water resources, green buildings need to take effective measures to reduce water consumption and waste. For example, properly planned rainwater harvesting systems can collect rainwater for non-potable uses such as irrigation and toilet flushing, reducing dependence on municipal water supply. Additionally, wastewater treatment and recycling systems can purify and reuse water within the building, further lowering water consumption. The use of water-saving sanitary fixtures, such as low-flow toilets and water-saving faucets, also helps reduce daily water usage. These design measures not only improve the efficiency of water resource use but also alleviate the pressure caused by water scarcity, promoting sustainable development.

(3) Environmental Friendliness

The principle of environmental friendliness emphasizes minimizing the negative impact on the environment throughout the entire lifecycle of the building. This principle requires that the building's design, material selection, construction process, and operation phase all aim to reduce the building's environmental footprint. Firstly, renewable and environmentally friendly materials, such as recycled wood, recyclable steel, and low-pollution paints, should be used to reduce the consumption of natural resources and the negative environmental impact of building materials. Secondly, green building design advocates for reducing resource waste and pollution during the construction process. For example, advanced construction technologies and equipment can reduce the generation of construction waste, and effective waste recycling and treatment should be implemented. Green buildings also advocate for minimizing damage to the ecological environment, such as through reasonable planning of building land use and the protection of natural landscapes, to reduce interference with local ecosystems. In summary, green building design not only focuses on resource conservation and environmental protection but also emphasizes the continuous reduction of environmental impact throughout the building's entire lifecycle.

2.3 Standards for Green Building Design

Green building design standards provide systematic guidelines and evaluation criteria for the industry. Globally, various green building certification systems have been established, including LEED, BREEAM, and China's Green Building Evaluation Standard, among others.

LEED (Leadership in Energy and Environmental Design) is the U.S. green building standard, developed by the U.S. Green Building Council (USGBC). The LEED certification system covers all stages from design to operation and evaluates a building's performance in energy efficiency, resource utilization, water management, and indoor environmental quality. LEED certification is divided into several levels, including certified, silver, gold, and platinum. Buildings can achieve different levels of certification based on their compliance with certain standards. The core concept of LEED is to promote the development of the building industry in a more energy-efficient, environmentally friendly, and

sustainable direction. It has become a widely adopted green building evaluation system worldwide.

BREEAM (Building Research Establishment Environmental Assessment Method) is the UK's green building assessment standard, established in 1990. The BREEAM standard evaluates a building's environmental performance in multiple areas, including energy, water, materials, pollution, health, and well-being. The BREEAM system is widely applied in Europe and other regions and encourages developers to adopt more environmentally friendly technologies and materials, promoting sustainable development in the building industry.

China's Green Building Evaluation Standard (GB/T 50378) is the national standard for green buildings in China, aimed at guiding and regulating the design, construction, and operation of green buildings in the country. This standard includes assessment criteria for building energy efficiency, water efficiency, resource utilization, and indoor environmental quality. It is tailored to China's climate, resource conditions, and environmental policies. The standard is divided into three levels: three-star, two-star, and one-star. Projects are certified based on their compliance with green design standards and technical requirements. The implementation of this standard not only promotes the development of China's green building industry but also provides strong support for the sustainability and environmental protection goals of the building sector.

3. Application and Case Analysis of Green Building Design

3.1 Domestic and International Green Building Project Cases

(1) One World Trade Center, New York

One World Trade Center in New York is one of the most renowned green building projects globally. It has garnered attention not only for its design and technological innovation but also for its environmental and energy-saving functions, setting a benchmark in the construction industry. The building incorporates several green building technologies aimed at reducing energy consumption and minimizing environmental impact. For example, its HVAC system uses high-efficiency equipment to optimize indoor air circulation and temperature control, effectively reducing energy waste. The building's exterior uses low-emissivity glass, which enhances the aesthetics while controlling solar radiation and reducing energy consumption. Additionally, One World Trade Center is equipped with solar panels, further reducing carbon emissions. In terms of water management, the project features a rainwater harvesting system that reduces dependence on municipal water supply and promotes water recycling. The construction process also employed low-carbon emission materials, reducing environmental pollution. Through an intelligent building management system, One World Trade Center can monitor energy usage in real time, ensuring more efficient operation. This project not only contributes significantly to energy efficiency but also provides a reference for other similar projects, serving as a model for the global green building movement.

(2) Sustainable Housing Project, Berlin, Germany

The Sustainable Housing Project in Berlin represents the practical application of green building in the

residential sector. This project demonstrates the vast potential of green buildings in residential areas by focusing on energy efficiency, environmental protection, and sustainable material usage. The housing project incorporates renewable energy systems such as solar and geothermal energy, providing residents with a green and energy-efficient living environment. Particularly in energy supply, the residential community relies on self-sustaining energy systems, significantly reducing dependence on traditional energy sources and alleviating pressure on external energy supplies. Additionally, the project is equipped with rainwater harvesting and wastewater treatment facilities. This system recycles wastewater for irrigation or other non-potable uses, greatly reducing water consumption. The building's exterior is made with highly efficient insulation materials, which not only reduce heat loss but also improve indoor comfort. Through these green designs, the Berlin Sustainable Housing Project not only lowers long-term operational costs but also offers a healthy, comfortable, and eco-friendly living space, becoming a benchmark for global green residential architecture. This project demonstrates the enormous advantages of green building technologies in improving residents' quality of life, reducing resource consumption, and minimizing environmental impact.

(3) Beijing Olympic Village

The Beijing Olympic Village, an essential facility for the 2008 Beijing Olympics, is a significant representative of green buildings in China. As one of the first large-scale projects in China to implement green building principles, the Olympic Village applied energy-saving and environmentally friendly technologies extensively during its design and construction. The high-efficiency heating and air-conditioning systems ensure effective energy use, while the solar water heating system provides renewable energy support for hot water supply, reducing the use of traditional energy sources. The design of the Olympic Village optimizes the building layout, fully considering natural lighting and ventilation, reducing reliance on artificial lighting and air conditioning. Additionally, the use of green building materials further enhanced the building's environmental performance, reducing resource consumption and environmental pollution during construction. Through these green designs, the Olympic Village not only improved energy efficiency but also provided high-quality living environments, becoming an important model project for green buildings in China. Its successful construction proves the feasibility of green building principles in large-scale projects and provides valuable experience for subsequent green building projects in China.

(4) Shanghai World Expo Green Pavilion

The Shanghai World Expo Green Pavilion is another representative project of green buildings in China, showcasing the application and innovation of green building technologies. The design of the pavilion focuses on environmental protection, energy-saving, and sustainability, incorporating advanced green building technologies such as roof greening, solar panels, and high-efficiency water-saving systems. The roof greening not only beautifies the building's appearance but also improves the surrounding ecological environment, promoting air purification and temperature regulation. The pavilion also features high-efficiency water-saving systems to maximize water usage efficiency and reduce

unnecessary water wastage. Solar panels are installed to provide a portion of the energy supply, reducing reliance on traditional energy sources. Through these innovative designs, the Shanghai World Expo Green Pavilion not only demonstrates the widespread application of green building technologies but also highlights the significant benefits of green buildings in terms of energy-saving, water conservation, and reducing carbon emissions. As one of Shanghai's landmark buildings, the Green Pavilion has enhanced the city's international image and promoted the popularization and development of green building concepts in China.

3.2 Economic Benefits Analysis of Green Buildings

Compared to traditional buildings, green buildings offer significant economic benefits in terms of operating costs, sales prices, and maintenance costs. By comparing relevant data between traditional and green buildings, it is clear that green buildings offer notable economic advantages in the long-term operation.

Table 1. Comparison of Annual Operating Costs between Green and Traditional Buildings

Project	Green Building	Traditional Building
Annual Energy Consumption Cost (in 10,000 yuan)	15	30
Annual Water Resource Consumption Cost (in 10,000 yuan)	5	10
Annual Maintenance Cost (in 10,000 yuan)	8	12
Total Annual Operating Cost (in 10,000 yuan)	28	52

Based on the above data, the annual operating costs of a green building are significantly lower than those of a traditional building. Green buildings reduce energy and water consumption through energy-efficient and water-saving devices, while efficient building materials and designs reduce maintenance costs. These cost savings not only provide returns during the initial construction phase but also bring significant economic benefits over the long-term operation.

Table 2. Comparison of Sales Prices between Green and Traditional Buildings

Project	Green Building Price (yuan/m ²)	Traditional Building Price (yuan/m ²)
Sales Price	22,000	18,000
Sales Premium (%)	22.22%	-

Green buildings typically have higher sales prices compared to traditional buildings, primarily because green buildings offer higher energy efficiency and better living environments, making them more attractive in the market. According to comparative data, the sales premium for green buildings reaches 22.22%, indicating that consumers are willing to pay a higher price for green, environmentally friendly

living spaces. Although the construction cost of green buildings may be higher, through long-term operational cost savings and sales price premiums, green building projects can achieve a good investment return.

4. The Role of Environmental Policies in Promoting Green Buildings

4.1 National Environmental Policies

(1) Green Building Action Plan

The "Green Building Action Plan" issued by the Chinese government has played a crucial role in promoting green buildings. According to this plan, the national target is set to ensure that the proportion of green buildings in the country reaches more than 30% by 2020. To achieve this goal, the government has strengthened the implementation of green building standards and encouraged the construction industry to gradually shift toward energy conservation, environmental protection, and low-carbon development. This plan has not only promoted the design and construction of green buildings but also encouraged the government to adopt more environmentally friendly products and technologies in the building market. Policies include the use of energy-saving materials, reducing environmental impacts during construction, and supporting environmental certifications for buildings. Through government financial support, rewards, and research and development assistance, the promotion and application of green building technologies have made significant progress, with many regions already implementing projects that meet green standards.

(2) Building Energy Efficiency Improvement Policies

China's policies on building energy efficiency improvement are mainly reflected in the "Building Energy Efficiency Regulations" and the "Building Energy Efficiency Improvement Action Plan." These policies have driven the improvement of energy efficiency in the construction industry, especially in new building projects, where the government strictly enforces energy-saving design standards. Specifically, the government encourages the use of high-efficiency building materials such as high-performance insulated windows, low-energy lighting, and energy-efficient air conditioning systems to reduce energy consumption. Optimizing the structural design and equipment configuration of buildings to improve energy efficiency is also a key focus of this policy. Through policy guidance, more and more building projects have achieved significant reductions in energy consumption and carbon emissions, providing strong support for the development of green buildings.

(3) Environmental Protection Law

China's "Environmental Protection Law" and related regulations provide legal support for the promotion of green buildings. The law emphasizes that construction projects must undergo environmental impact assessments during the construction and operation phases and strictly control pollutant emissions. These regulations ensure that construction companies adopt environmentally friendly measures during development to avoid negative environmental impacts. For example, the law requires construction companies to take effective measures to reduce pollution during construction and

mandates energy-saving and emission-reduction measures during the operation phase. The government also intensifies penalties for environmental violations, encouraging companies to strictly comply with environmental protection laws, thus promoting the construction and implementation of green building projects.

(4) Tax Reduction and Subsidy Policies

The government offers tax reductions and financial subsidies for projects that meet green building standards, providing significant support for the development and implementation of green building projects. For example, some local governments, such as Beijing and Shanghai, offer financial rewards and tax reductions for projects that meet green building standards. These preferential policies effectively reduce the financial burden on developers, promoting the rapid advancement of green building projects. Tax reductions not only alleviate the financial pressure on developers but also increase their enthusiasm for investing in green buildings, encouraging the implementation of more green building projects. These preferential policies not only enhance developers' economic benefits but also help gradually expand the green building market.

(5) Green Building Project Certification Incentives

In the process of promoting green building development, incentive policies for green building certifications have also played an important role. Many local governments offer priority land supply and financial rewards for projects that pass green building certifications such as LEED and BREEAM. For example, the Shenzhen Municipal Government offers priority land supply for projects that obtain green building certifications and provides developers with certain financial incentives. These policies significantly enhance the market competitiveness of green building projects, attracting more developers to invest in green building construction. Through certification incentives, green buildings not only gain higher credibility in the market but also make more real estate developers pay attention to green building standards and requirements.

4.2 The Impact of Environmental Policies

(1) Increasing the Market Appeal of Green Building Projects

Government policies have significantly increased the market appeal of green building projects. These policies not only provide fiscal and tax benefits to developers but also make green building projects more competitive in the market. Green building projects, due to their environmental and energy-saving features, have gained favor in the market as they meet increasingly stringent environmental standards. As policies continue to strengthen, green buildings are no longer just an environmental necessity but an important aspect of the government's development direction. For instance, projects that meet green building standards not only gain market recognition by reducing energy consumption and environmental pollution but also receive more rewards and subsidies during subsequent operations due to policy support, thereby improving developers' economic returns. With more developers engaging in green building construction, the market demand for green buildings has steadily increased, driving the upgrading and development of the entire industry. Particularly under policy support, green building

projects offer considerable economic returns, attracting more enterprises to invest in the green building sector. Therefore, government tax reductions, fiscal subsidies, and other preferential policies not only reduce developers' initial investment pressures but also enhance the appeal and competitiveness of green buildings in the market, gradually making green buildings the mainstream trend.

(2) Promoting the Development and Application of Green Building Technologies

Policy support provides a powerful driving force for the development and application of green building technologies. The government, through subsidies, tax incentives, and other means, motivates real estate developers to adopt more advanced green building technologies in their projects, promoting the innovation and widespread use of energy-saving and environmentally friendly technologies. For example, under government guidance, more and more real estate developers are introducing renewable energy technologies such as solar and geothermal energy, reducing reliance on traditional energy sources and effectively cutting carbon emissions in construction projects. At the same time, policies encourage developers to use green building materials, such as low-energy insulation materials and efficient electrical devices. The application of these technologies not only improves the energy efficiency of buildings but also meets energy-saving and emission-reduction requirements. The promotion of green building technologies is not only reflected in the choice of materials and optimization of building structures but also includes the introduction of intelligent and automated technologies. For example, by using Building Information Modeling (BIM) technology, developers can conduct better energy efficiency analysis and design optimization to reduce unnecessary energy consumption. Government policy support has ensured the widespread application of these technologies and laid a solid foundation for the green transformation of the construction industry.

(3) Driving the Maturation and Standardization of the Green Building Market

The implementation and improvement of government policies have provided strong support for the maturation and standardization of the green building market. Policy guidance has not only provided clear construction directions for real estate developers but also accelerated the development and maturation of the green building market. With the gradual implementation of green building policies, green buildings have gradually shifted from an "innovative project" to a mainstream product in the market. For example, the government has introduced a series of green building standards and certification systems, ensuring that construction projects not only meet environmental requirements but also gain higher market recognition. More and more developers are focusing on green building design and construction, and the application of green building technologies and materials has become the norm in industry development. The government has also supported the standardized operation of the industry by providing special support for green building projects and reducing the market disruption caused by projects that do not meet green standards. Under policy guidance, the economic benefits of green buildings are gradually becoming evident, and more consumers are beginning to recognize the long-term energy-saving effects of green buildings. The demand for green buildings in the market continues to grow. With the expansion of market demand, the industry standards for green buildings are

constantly improving, driving the transformation and upgrading of the entire industry. Therefore, government policies not only provide development space for green buildings but also lay a solid foundation for the maturation and standardization of the market.

Table 3. The Impact of Local Green Building Policies on Real Estate Development Enterprises

Policy Support Measures		Impact	Policy Implementation Areas
Tax Reduction and Financial Subsidies		Reduce developers' burden, increase project appeal	Major cities like Beijing, Shanghai, Guangzhou
Green Building Certification Incentives		Provide financial rewards, enhance market competitiveness	Shenzhen, Hangzhou, Chengdu
Priority Land Supply		Accelerate project implementation, provide resource guarantee	Shenzhen, Nanjing, Wuhan
Green Building Design Subsidies		Encourage adoption of green design, improve project efficiency	Beijing, Shanghai, Chongqing
Renewable Energy Support Policies		Promote application of green energy technology, reduce energy consumption	Qingdao, Wuxi, Suzhou

From the data in the table, it can be seen that local green building policies, through tax reductions, subsidies, priority land supply, and other forms of support, effectively promote real estate developers' attention and investment in green buildings. These policies not only alleviate the financial burden on developers but also enhance the market appeal of green buildings, driving the rapid development of green building projects.

5. Challenges and Opportunities in Green Building Design

5.1 Challenges

(1) High Costs

Although green buildings offer economic benefits in the long-term operation, such as energy savings and reduced environmental pollution, their high initial costs remain a significant challenge for many real estate developers. Green building projects often require the use of energy-efficient building materials, advanced equipment, and construction methods that meet environmental protection standards, all of which make initial investments significantly higher than traditional building projects. For example, to improve energy efficiency and environmental friendliness, developers must invest in high-performance insulation materials, water-saving devices, and renewable energy technologies such as solar and wind energy. These energy-efficient devices and materials are typically more expensive on the market, leading to increased overall construction costs. Additionally, green building design requires optimization across multiple aspects, such as energy use, environmental impact, and building comfort,

making the design process more complex and lengthening the construction cycle. The longer construction cycle not only increases financial investment but also strains developers' liquidity. Therefore, despite energy savings and reduced maintenance costs in later operations, developers often adopt a conservative attitude due to the high initial costs and lengthy investment return periods. Moreover, the complex design and construction of green buildings, which span several fields, require developers to rely on highly skilled professional teams, further increasing the total project investment. Hence, controlling costs while ensuring green building quality becomes a pressing issue for both real estate developers and governments.

(2) Technical Challenges

The technical challenges in green buildings are mainly related to the application of energy-saving and emission-reducing technologies and environmentally friendly materials. Despite significant progress in green building technology, with many new technologies achieving remarkable results in energy efficiency and environmental protection, there are still technical issues, especially in the application of certain high-tech building materials and energy-saving equipment. Firstly, although various new green building materials have emerged on the market, such as high-performance insulation and soundproofing materials and low-carbon emissions coatings, these materials are expensive to produce, and their long-term performance and durability remain uncertain. Developers must consider the long-term effects of these new materials in practical use, which increases the complexity of decision-making. Moreover, as green building involves multiple disciplines, such as architectural design, environmental protection, and energy management, it requires designers and engineers to have interdisciplinary technical capabilities, which complicates the technical management of green building projects. For some small and medium-sized developers, a lack of technical expertise and professional personnel becomes a significant bottleneck for the successful implementation of green building projects. In particular, during the design phase of green buildings, precise calculations and optimization of the building's energy efficiency are required, along with the use of intelligent systems for dynamic monitoring and management of building energy, which places high technical demands on personnel. Thus, overcoming these technical bottlenecks, reducing the costs of applying new technologies and materials, and improving their technical feasibility remain key issues that need to be addressed in the development of green buildings.

5.2 Opportunities

(1) Market Demand

With the growing awareness of environmental protection and the widespread adoption of sustainable development concepts, the demand for green buildings is steadily increasing. Consumers' expectations of living environments are no longer limited to comfort and functionality; they are increasingly concerned with health, environmental protection, and energy efficiency. This is especially true in the context of rapid urbanization, where rising population density and air pollution have made the green building market a hot spot for future development. Modern consumers are more inclined to choose

eco-friendly, energy-efficient, and comfortable living environments. Consequently, the demand for green building projects is steadily growing. This demand is evident not only in residential projects but also in commercial office buildings, public buildings, and other sectors, where the application of green building practices is gaining attention. For example, many businesses are promoting green office environments to improve employee efficiency and health while reducing energy consumption and operating costs. On the other hand, green buildings can improve energy efficiency, reduce dependence on natural resources, and enhance the quality of life for residents, making them an ideal choice to meet the high-quality living demands of modern people. Consumers' preference for green buildings further drives developers to invest in green building projects, as many real estate developers recognize that constructing green buildings not only responds to policy calls but also enhances the market competitiveness of their projects. As a result, the growing demand for green buildings is driving the prosperity of the green building industry.

(2) Policy Support

Government policies supporting green buildings offer numerous development opportunities for enterprises. As both national and local governments increasingly focus on green buildings, relevant policies have been introduced to promote the further development of the green building market. The Chinese government has implemented a series of policy documents, such as the "Green Building Action Plan" and "Building Energy Efficiency Standards," which clearly define the standards and requirements for green buildings and promote the construction of green building projects. These policies provide enterprises with financial support, such as subsidies and tax reductions, and reduce investment risks for real estate developers through measures like land supply and financial assistance. For example, some local governments offer priority land supply and additional subsidies for projects that meet green building standards, encouraging developers to invest in green building projects. Additionally, the environmental advantages of green buildings allow them to enjoy policy incentives such as green building certifications and environmental rewards. These policy supports provide enterprises with adequate funding, technology, and resource guarantees, effectively reducing development costs and promoting technological innovation and application in green buildings. Particularly, government support in terms of taxes and subsidies significantly boosts developers' enthusiasm for investing in green buildings and provides a favorable development environment for the green building industry. Government policy support not only facilitates the implementation of green building projects but also opens up broader development opportunities for enterprises.

6. Conclusion and Recommendations

6.1 Conclusion

The application of green building design in real estate development not only aligns with global sustainable development trends but is gradually becoming the new industry standard, driven by policy support and market demand. As consumer awareness of environmental protection deepens and policy

support intensifies, the market potential for green buildings continues to grow. Although the initial investment for green buildings is still high and there are certain technical challenges in their application, the development prospects for green buildings remain promising through technological innovation and sustained government policy support. The popularization of green buildings will not only improve the quality of living environments but also drive the transformation of the construction industry towards a low-carbon and environmentally friendly direction. Therefore, green buildings will be a key focus in future real estate development.

6.2 Policy Recommendations

(1) Government Should Increase Policy Support for Green Buildings

To promote the rapid development of green buildings, the government should increase policy support, particularly by providing more financial subsidies and tax incentives during the initial phase of projects. This will effectively reduce the initial investment costs for enterprises and alleviate the economic burden on developers, motivating them to more actively invest in green building projects. Green building projects require the use of advanced building materials and technologies, which are often costly and create initial investment pressure. The government can reduce the financial burden by offering subsidies to offset some of the costs, especially in the areas of new technology development and the introduction of green building materials. Additionally, tax incentives can further reduce developers' operating costs, increasing their confidence in investing in green buildings. For instance, land use taxes and value-added taxes on building materials for green building projects could be reduced, or tax refunds could be offered for projects that meet green building standards. Beyond direct financial support, the government can also provide certification support for green building projects at the policy level, streamline the approval process, and improve project execution efficiency. These policy measures will effectively promote the rapid development of the green building industry and encourage the widespread application of green building technologies, thus achieving sustainable development goals.

(2) Enterprises Should Strengthen Green Building Technology Research and Innovation

The core competitiveness of enterprises in the green building sector primarily comes from their technological innovation and research and development capabilities. Therefore, enterprises should enhance their research and development of green building technologies and continuously improve their technical capabilities to promote the popularization and application of green building technologies. Green building technology encompasses not only the development of energy-saving materials but also advancements in areas such as intelligent systems, environmental protection, and water conservation. Enterprises can collaborate with research institutions, technology companies, and universities to overcome technological bottlenecks and develop more efficient and environmentally friendly green building technologies. For example, the application of renewable energy such as solar, geothermal, and wind energy, as well as water-saving and wastewater treatment technologies, can become key innovation directions for enterprises in the green building sector. Moreover, enterprises should strengthen the implementation of green building design standards to ensure that all projects comply

with international and domestic green building standards. Projects that meet green building certifications are more likely to be recognized in the market, thus enhancing their market competitiveness. At the same time, enterprises should focus on the lifecycle management of building projects, paying attention to environmental friendliness and energy efficiency throughout the entire process from design to operation, further enhancing their comprehensive strength and market position. Through technological innovation and the implementation of standards, enterprises can not only enhance their market competitiveness but also contribute to the sustainable development of the green building industry.

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