



Research: Assessment of the Environmental Impact of Zero Carbon Property Management

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Abstract. As the issue of climate change attracts more and more attention, how to achieve the goal of "carbon peak and carbon neutrality" in the property management industry has become an urgent task to be solved. However, the property management industry has not yet formed a unified zero carbon management system. The purpose of this study is to extract the experience and lessons in the process of realizing zero-carbon management by using literature analysis and case analysis, and propose the strategy of implementing zero-carbon property management in the property management industry and the method of environmental benefit assessment, so as to provide reference for the implementation of zero-carbon management in the property management industry. The study found that the implementation of zero-carbon management in property has positive significance in reducing greenhouse gas emissions, improving energy saving effect and improving environmental quality. The property management industry needs to establish a scientific and reasonable management system according to its own situation.

Keywords: zero carbon, property management, environmental benefit, assessment.

1 Introduction

1.1 Background introduction

The problem of global warming and climate change is increasingly serious, with the United Nations 17 "Sustainable Development Goals" and "carbon peak and carbon neutrality" goals put forward, how to achieve energy conservation and carbon reduction has become a hot issue of social concern. China has also actively responded to climate change, demonstrating its responsibility as a major country. At the 75th United Nations General Assembly in 2020, China made a "double carbon" commitment to the world,

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striving to achieve "carbon peak" by 2030 and "carbon neutrality" by 2060. Property management as a rapid development of an industry in recent years, its environmental responsibility also has attracted more and more attention. China's Ministry of Housing and Urban-Rural Development in 2022 issued the "urban and rural construction carbon peak implementation plan" proposed the construction of green low-carbon city implementation measures, including to explore the construction of zero-carbon community, encourage the construction of zero-carbon buildings and near-zero energy buildings and zero-carbon farm housing. [1] Therefore, property management has become an important part of achieving carbon peak and carbon neutrality goals.

1.2 Research objectives

At present, there are relatively few researches on zero-carbon property management at home and abroad, and most of them stay in the preliminary exploration stage, and have not yet formed a unified and complete management system. In the study of Koutra Sesil et al., it is also mentioned that currently there is no universally accepted zero-carbon building and community management system in the world[2], so the realization of zero-carbon property management is a certain challenge. The purpose of this study is to provide reference for environmental protection strategies for property management by summarizing the energy-saving management of property and evaluating the impact of zero-carbon property management on the environment.

1.3 Article structure

The paper is divided into six parts: introduction, literature review, implementation strategy and environmental benefit assessment of zero-carbon property management, case analysis and conclusion. As the first part of the paper, the introduction mainly introduces the research background and objective of the paper, and outlines the structure of the paper. The second part introduces the theories and research related to this paper, including the concepts of zero carbon and property management, as well as the positive significance and evaluation system of the implementation of low-carbon green property management in existing studies, and the research methods used in this study: literature analysis and case analysis. The third part and the fourth part respectively study the strategy of implementing zero carbon management and how to evaluate the environmental benefit. The fifth part compares the outstanding cases at home and abroad in order to deeply understand the specific measures of property management and summarize its management experience. The sixth part concludes that the implementation of zero-carbon property management has a positive impact on the environment.

Starting from the background of global climate change and recognizing that the property management industry is increasingly valued by the state and society, this paper studies and analyzes relevant literature, and finds that there are relatively few researches on zero-carbon property management at home and abroad, and property management enterprises lack a unified management system, so this paper proposes the research goal of providing reference for environmental protection strategies for property management. On the basis of the existing data, the paper analyzes the strategy of the

property and the assessment of the environmental impact in the process of realizing zero carbon. Through the study and analysis of representative cases, the successful experience of zero-carbon property management is extracted, and the positive effect of property management on the environment is summarized and emphasized.

2 Literature review

2.1 Definition and implementation of zero-carbon property management

At present, there is no clear definition of the concept of zero-carbon property management at home and abroad. Property management in the "Property Management Regulations" refers to the activities of the owner through the selection of property service enterprises, by the owner and property service enterprises in accordance with the property service contract, the maintenance, equipment and management of the house and supporting facilities and equipment and related venues, and the maintenance of environmental health and related order in the property management area. [3] "zero carbon" means achieving net zero carbon emissions.[4] There is no doubt that "zero carbon property management" means that the property adopts scientific management measures to achieve zero carbon dioxide equivalent emissions.

2.2 Existing studies on the environmental impact of property management

In *The Implementation of Green Property Management in Property Management Services*, Yuting Zhang summarized the significance of the implementation of green property management and concluded that the implementation of green property management can reduce the generation of pollutants to a certain extent and has positive significance for the improvement of environmental quality. [5] Fengjuan Jing established an evaluation system for environmental protection and community greening after the implementation of green property management in the paper "Impact of Green Property Management on Human Habitation Environment" in 2021. [6] Although no follow-up work has been carried out, it also plays a certain guiding role in the establishment of an environmental benefit evaluation system for properties. In addition, in a study on zero carbon housing, the authors evaluated the actual energy consumption and carbon performance of a large case study housing development in England, providing lessons for zero carbon housing assessment.[7] Existing studies focus on finding problems, extracting experience and putting forward suggestions from the measures to implement low-carbon management in properties, and there are few analyses on the impact on the environment caused by the implementation of environmental protection responsibilities.

2.3 The theoretical basis and research methods of the research

On the basis of national and provincial policies, Shenzhen Housing and Construction Bureau issued the "Green Property Management Project Evaluation Standards" in 2018, with the purpose of better saving resources, protecting the environment, standardizing

the evaluation of green property management projects in Shenzhen, and promoting the development of green property management. [8].

Literature analysis: This study is based on a full understanding of the research topic, and the relevant literature is searched. The sources of literature are not limited to journals, but also include national policies and company official website information.

Case analysis: This study selected Shenzhen Poly Property, Landsea and Northwest Bicester as zero carbon management cases, summarized their management measures in energy conservation, consumption reduction and green development, and carried out comparative analysis, so as to extract zero carbon management experience.

3 Implementation strategy of zero-carbon property management

3.1 Energy efficiency improvement: such as optimizing the operation mode of equipment, improving the thermal insulation performance of buildings, etc.

For the completed buildings, large-scale equipment has been put into operation, and it is difficult and costly to change the existing buildings and equipment. Therefore, to improve energy efficiency, property companies can focus on how to optimize the operation mode of equipment and improve the thermal insulation performance of ready-made buildings. In terms of optimizing the operation mode of equipment, professional technicians of property management companies can scientifically adjust the operation mode and operation parameters of facilities and equipment, [9] such as parameter adjustment of elevator equipment, lighting equipment and drainage equipment, and regular inspection and maintenance of these equipment, which not only extends the life of the equipment, but also improves the efficiency of energy use. In terms of improving the thermal insulation performance of buildings, the use of thermal insulation materials is one of the most effective building energy saving methods. [10] Property management companies can choose good thermal insulation materials for building transformation on the basis of old buildings.

3.2 The application of renewable energy: such as solar energy, wind energy and other renewable energy in the use of property management

Renewable energy also plays an important role in property management. Solar energy is a pollution-free, renewable and clean energy, and solar energy has a wide range of applications. In property management, solar energy is used in homes and outdoor lighting systems, such as installing solar panels on the top of the house to convert solar energy into electricity, achieve efficient use of energy and reduce the consumption of electricity. In addition, the use of solar water heaters also reduces the consumption of traditional energy. In terms of heating, property management companies use clean energy for heating, reducing the use of traditional energy sources such as coal. In addition, the comprehensive utilization of wind and light energy in property management has

also played a role in energy conservation and consumption reduction. Xianzheng Wu, general manager of Shenzhen Tian 'an Cloud Grain Industry Service Co., LTD., pointed out: "In terms of indoor climate creation, we make better use of wind environment and light environment to create comfortable indoor and outdoor environments, such as sky gardens and ventilation corridors." [11] Therefore, the use of these renewable energy sources not only protects the environment, but also provides residents with a healthy and comfortable living environment and improves the quality of life of residents.

3.3 Waste management: such as garbage classification, recycling, etc

The scope of property management services is in the densely populated area, and the continuous improvement of residents' quality of life also makes the production of domestic waste gradually increase. In order to facilitate the management of garbage in the service area, the property adopts the method of garbage classification, requiring residents to classify different kinds of garbage into corresponding garbage bags and throw them into corresponding garbage cans. After that, the property will uniformly transport the garbage that meets the regulations to the relevant garbage disposal center, recycle the recyclable garbage, and bag the non-recyclable garbage. [12]

3.4 Green procurement: such as giving priority to environmentally friendly products and suppliers.

The early stage of a property project is the basic work for a property management enterprise to implement low-carbon management, property management can put forward reasonable suggestions on energy conservation and emission reduction from the aspects of building design, construction and the selection of materials, facilities and equipment. [9] Property management can give priority to green procurement, which can be divided into the choice of building materials, the choice of environmental protection products and the choice of suppliers. In terms of building materials, the property should choose energy-saving and environmentally friendly materials, and new materials can be selected as far as possible; in the choice of environmentally friendly products, you can choose on hydropower facilities, air conditioning and other equipment to reduce the consumption of traditional energy; in terms of supplier selection, property companies can consider the operation mode of cleaning companies, garbage disposal, heating and other companies, and choose suppliers that are less harmful to the environment.

4 Environmental benefit assessment of zero-carbon property management

4.1 Changes in greenhouse gas emissions

Changes in greenhouse gas emissions can intuitively reflect the environmental benefits generated by property management. A greenhouse gas detection device is installed in a property implementing zero carbon management to objectively assess the impact on the

environment caused by the change of greenhouse gas emissions before and after the implementation of zero carbon management. Property management enterprises can establish their own greenhouse gas monitoring system, but before this, the property should identify its own greenhouse gas emission sources and select suitable monitoring devices according to the types of emission sources.

4.2 Monitoring changes in energy consumption

By monitoring electricity meters, water meters, etc., and calculating various energy consumption in accordance with national or provincial energy consumption monitoring requirements, the property evaluates the energy-saving effect brought by zero-carbon management by comparing the changes in energy consumption or energy utilization. The Guidelines for Green Property Management of Shenzhen City pointed out that the energy consumption of electricity, natural gas, biomass energy, heat and other energy should be measured by classified metering meters; regular statistics of key energy consumption systems (such as elevators, water pumps, lighting, central air conditioning systems, etc.) electricity parameters, timely analysis and comparison. [13].

4.3 Improvements of environmental quality

Air quality: The installation of air quality detection devices (according to the use of different types of detection devices, such as indoor monitoring and outdoor detection), can detect changes in air pollutant concentration in real time, and can accurately analyze the degree of change in air quality by comparing with international standards and national average levels.

Water resources pollution: Scientifically collect water samples and record relevant data of water bodies, such as PH value, transparency and other physical, chemical and biological indicators, and compare with relevant national water quality regulations.

Questionnaires, network surveys, visits and other forms are issued to investigate owners' intuitive feelings about environmental improvement and compare the changes in owners' satisfaction before and after the implementation of zero-carbon management.

5 Case analysis

In order to better draw experience from the implementation of zero-carbon management properties, it is convenient for property management enterprises to better develop their own environmental protection strategies. This study selects two representative property companies and one foreign zero-carbon project, and analyzes the management measures adopted by them and the environmental benefits brought by them, and extracts experiences and lessons from them.

5.1 Analysis of representative property cases at home and abroad for implementing zero-carbon management

Shenzhen Poly Property Management Co., Ltd., established in 2001, is a professional enterprise engaged in integrated property asset management services. It is a first-level property management qualification enterprise certified earlier in China, and a leader in the development of modern property in China. Shenzhen Poly Property actively responds to the national "carbon peak and carbon neutral" call and takes the lead in the development of green property, its office project Dachong Business center in the aspect of energy conservation, uses LED lights to transform, and installs solar lights, and uses VRV multi-line air conditioning spray; in terms of water saving, promotes the use of water-saving appliances, and regularly checks the water pressure and pumps. The work of Shenzhen Dachong Business Center in energy conservation and consumption reduction has brought certain environmental benefits. The use of LED light transformation, compared with the traditional lamps, the comprehensive energy saving reached 30%, the use of water-saving appliances, making the non-traditional water sources and circulating water are fully utilized, improving the utilization rate of water resources, VRV multi-line air conditioning spray reduces the multi-line load in high temperature weather, to achieve energy saving and consumption reduction. [14].

Landsea is a professional development service provider with green environmental protection and vertical integration capabilities. As a founding member of the China Green Building Council and a member of the Green Building Council of Germany and the United States, it has always adhered to the concept of low-carbon green development. [15] Landsea Shanghai Langshi Center is a typical case of green and low-carbon transformation, based on the old building, it carries out the renovation design of building facade, interior functional space, electromechanical and water supply and drainage, and rationally designs underground space. Combined with the Shanghai climate and its architectural characteristics, the use of excellent peripheral protection system and efficient facilities and equipment, and the use of Landleaf-tech's intelligent control system, during the renovation of the selection of decoration materials in line with international certification standards. After the renovation, the overall energy consumption of Shanghai Langshi Center is more than 30% lower than the average of Shanghai office buildings, and the use of intelligent system ensures the indoor air quality; the selection of materials with international certification standards, the concentration of indoor pollutants is lower than the national standard, improves the air quality, and provides a comfortable and healthy office environment for employees. [16]

Located to the west of London, Northwest Bicester is a pioneering project to develop green, low carbon and healthy living under the UK's Eco-town policy. Realizing the full coverage of residential solar panels and rainwater collection system, improving the utilization rate of energy; installing smart energy meters for all users, you can understand the energy consumption at any time, and it is easy to improve the energy saving method according to the actual situation; providing convenient transportation routes and modes for residents to reduce greenhouse gas emissions caused by automobile use, it also creates places for recreation and entertainment for residents and provides a healthy and comfortable living environment. [17]

5.2 The environmental benefits of the property after the implementation of zero carbon management

The above research on the implementation of zero-carbon management of properties shows that after the implementation of zero carbon management measures, it will bring certain environmental benefits to the property. By adopting appropriate energy management methods, the consumption of electricity, water and other resources of the property is reduced, the utilization rate is improved, and the emissions of greenhouse gases are reduced. At the same time, the air quality is improved, the living environment of residents is greener and healthier, and the quality of life is also improved.

5.3 Experience and lessons

First, the property should actively respond to the call of the state, be good at seizing opportunities, and have the courage to explore zero-carbon management methods.

The second is the use of advanced technology, through the application of intelligent devices and systems, to monitor and control energy consumption, but also easy to find management omissions and timely improvement.

The third is to combine external factors with the actual situation of the property, consider geographical location and climatic conditions, and adopt appropriate equipment and systems.

Fourth, while achieving zero-carbon management, it is necessary to adhere to the concept of "people-oriented" and combine it with the daily activities of residents to create a convenient living and office environment.

6 Conclusions

This paper studies the impact of zero-carbon management on the environment from three aspects: implementation strategy of property management, environmental assessment and analysis of some typical cases, and explores and summarizes: zero-carbon property management has positive significance for the environment in the above aspects:

1. Reduction of greenhouse gas emissions

Greenhouse gas emissions are reduced by adopting a zero-carbon management approach. In the North West of the United Kingdom, Bicester adopts a green mode of transportation, which does not affect the lives of residents, but also reduces the greenhouse gas emissions caused by car use.

2. Improvement of energy saving effect

Shenzhen Poly Property Management Co., Ltd. and Northwest Bicester use energy-saving products and rational use of renewable energy; Landsea retrofits old buildings using materials that meet international standards; both Landsea and Northwest Bicester use intelligent systems. These measures have reduced energy consumption and improved the efficiency of energy use.

3. Improvement of environmental quality

As the reduction of greenhouse gas emissions, air quality also improves. Landsea adopts intelligent control system to realize real-time monitoring of indoor environment and ensure that the air quality can meet the standard for a long time.

Even though the current research results have a certain guiding role in the implementation of zero-carbon management of properties, from the perspective of fact, it still has certain limitations due to personal ability, shallow research and lack of investigation. Therefore, property management enterprises should also proceed from the actual situation, actively respond to the call of the country, in accordance with national or provincial requirements, with reference to domestic and international standards under the premise of scientific and reasonable development of their own zero-carbon management system, choose the appropriate energy saving methods.

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