



Energy Saving and Emission Reduction Technologies for Property Management and Sustainable Development Strategies

Lina Huang, Xiao Jiang, Yuchen Yang, Zhixiao Ye*, Chao Han

Department of Property Management, School of Public Affairs Zhejiang Shuren University, 36 Zhoushan East Road, Hangzhou, Zhejiang 310015, China

*Correspondence: 601145@zjsru.edu.cn

Abstract. With the rapid development of the global economy and the acceleration of urbanization, property management is facing severe challenges in energy consumption and environmental pollution. Energy conservation and emission reduction, as an important means to alleviate energy pressure and achieve sustainable development, play an increasingly important role in property management. Explore energy-saving and emission reduction technologies in property management and their sustainable development strategies. By analyzing the main sources and characteristics of energy consumption in property management, point out the problems of low energy utilization and high energy consumption in conventional buildings. Introduce various energy-saving and emission reduction systems and functions, and propose effective energy-saving and emission reduction measures and management strategies, such as the implementation of green property management, strengthening environmental protection publicity and education, resource conservation and recycling, etc., making positive contributions to exploring new paths and models of sustainable development.

Keywords: Energy saving and emission reduction system, green property, sustainable development

1 Introduction

Under the global climate governance and the "dual carbon" goals, the construction industry, with carbon emissions accounting for over 40%, is transitioning from a "maintenance oriented" to a "green empowerment oriented" property management as energy conservation and emission reduction during its operational phase are key to sustainable development. Intelligent technology provides new tools for energy consumption monitoring, technological innovation reconstructs energy utilization models, and ESG concepts promote the collaborative evolution of management strategies. However, existing research mostly focuses on single dimensions and lacks exploration of the coupling mechanism of "technology strategy system", resulting in research gaps such as climate

adaptation and cost-benefit models. This article explores the relationship between energy-saving and emission reduction technologies and sustainable development strategies in property management by searching and analyzing relevant information on energy-saving and emission reduction technologies and methods in property management.

1.1 The Role and Importance of Property Management in Modern Society

Property management plays a significant role. On the one hand, it ensures the normal operation of property facilities, extends their service life, and enhances property value through professional services; Responsible for community greening, environmental sanitation, creating a beautiful living environment, and improving residents' quality of life; Carry out community cultural activities, mediate neighborhood disputes, promote community harmony and stability, and enhance residents' cohesion.

On the other hand, in urban development, providing a safe, clean, and orderly living environment is conducive to the rational utilization and protection of urban assets; To enhance the efficiency and level of urban management and improve the image of the city through specialized and systematic services; Promote sustainable urban development in terms of environmental protection, energy conservation, and emission reduction.

The property management company provides a wide and detailed range of services, including security and hygiene, to ensure the normal operation of the property and create a good living environment; We also organize community activities to enhance interaction and communication among residents, improve their sense of belonging and community cohesion. With the acceleration of urbanization in modern society, the importance of property management is becoming increasingly prominent. As a comprehensive profession in this field, the professional level of property managers directly affects the quality of life of residents and the harmonious development of the community. Therefore, improving service quality and promoting the development of the property management industry have become important tasks at present.

1.2 The Significance of Energy Conservation, Emission Reduction, and Sustainable Development for Property Management

Firstly, energy conservation, emission reduction, and sustainable development are beneficial for the property management industry to reduce costs and increase efficiency. The daily operation and maintenance of property management consume a lot of energy. Implementing energy-saving and emission reduction measures such as using efficient equipment, optimizing management systems, and enhancing employee awareness can reduce energy consumption, cut costs, and improve economic benefits.

Secondly, energy conservation, emission reduction, and sustainable development help the property management industry achieve sustainable development goals. Implementing systematic energy management can not only reduce carbon emissions and promote social sustainable development, but also enhance the environmental image of property enterprises and improve market competitiveness.

Thirdly, energy conservation, emission reduction, and sustainable development are key measures for the property management industry to respond to the national dual carbon policy and practice ESG concepts. The ESG competitiveness of international property service companies is constantly improving, and the ESG practice in China's property management industry is still in its infancy. Implementing energy conservation and emission reduction, publishing reports, and participating in practice can enhance the industry's ESG performance and promote green and sustainable development.

2 Analysis of Energy Consumption Status in Property Management

2.1 The Main Source of Energy Consumption

With the development of cities and the increase in buildings, the issue of energy consumption in property management has become prominent, mainly due to high consumption of electricity and water resources. In terms of electricity, central air conditioning, elevators, lighting and other equipment consume huge amounts of electricity, and the energy consumption of different devices varies greatly, which is a key focus of energy conservation. In terms of water resources, building water supply, drainage, and sprinkler irrigation systems consume a lot of water. Due to the large proportion of building energy consumption in the total social energy consumption, property management energy consumption affects the efficiency of social energy utilization and the environment. Analyzing the current energy consumption situation and taking energy-saving measures is of great significance, which is related to energy utilization, cost reduction, and sustainable development

2.2 Analysis of the Problems of Low Energy Utilization and High Energy Consumption in Conventional Buildings

2.2.1 Problem Analysis

Firstly, issue is the aging and improper selection of equipment, with some devices having a long service life, severe aging, and decreased performance. Additionally, energy conservation was not fully considered during initial selection, resulting in excessive power or outdated technology.

Secondly, the operation management is not scientific, the equipment operation time planning is unreasonable, the start/stop order is chaotic, and the operating parameters are not optimized according to the environment and requirements.

Thirdly, there is a lack of intelligent monitoring and a complete system for real-time monitoring of energy consumption, making it difficult to detect high energy consumption areas and equipment failures in a timely manner, and unable to adjust management strategies in a timely manner.

Fourthly, users have a weak awareness of energy conservation and engage in unreasonable behavior when using electrical equipment, which increases energy consumption.

Fifthly, issue is the problem of building envelope structure. Some building envelope structures have poor thermal insulation performance, resulting in abnormal indoor and outdoor heat exchange, which increases the energy consumption burden of air conditioning and heating equipment.

2.2.2 Solution

Firstly, carry out equipment updates and optimizations, gradually replace high-efficiency energy-saving equipment such as LED lighting fixtures, and carry out energy-saving renovations on existing equipment to improve energy utilization efficiency.

Secondly, carry out scientific operation management, develop equipment operation schedules based on regional and time requirements, optimize the order of start and stop, adjust parameters in real time, and reduce energy consumption.

Thirdly, establish an intelligent management system, introduce intelligent property management systems, monitor energy consumption data in real time, use data analysis to locate high energy consumption points and abnormal situations, and achieve equipment automation and remote management.

Fourthly, strengthen energy-saving publicity and training, enhance users' energy-saving awareness through various activities, provide energy-saving training for property personnel, and improve management and operational skills.

Fifth, optimize the building envelope structure and carry out energy-saving renovations, such as adding external wall insulation layers, replacing energy-saving doors and windows, and reducing energy consumption for air conditioning and heating.

3 Energy Saving and Emission Reduction Technologies in Property Management

3.1 Lighting Energy-saving Technology

Lighting energy-saving technology utilizes natural light, solar energy, and photoelectric control devices to achieve energy conservation and intelligent control.

Lighting energy-saving technology has the properties of energy saving, environmental protection, economy, comfort, safety, etc. It can improve lighting quality and visual effects, reduce operating costs and improve economic benefits, and promote the development of intelligent buildings and smart cities.

Energy saving in lighting systems can be optimized from multiple aspects: firstly, reasonable layout, scientific planning based on building functional zoning and demand, ensuring uniform and comfortable lighting while avoiding waste; The second is to utilize natural light and fully introduce natural light through reasonable building orientation during design, reducing the use of artificial lighting; The third is energy management and monitoring, installing smart meters and monitoring systems to monitor energy consumption in real time, identifying anomalies and optimizing them, analyzing data in depth to evaluate energy-saving effects, and helping to formulate energy-saving strategies and improve operational efficiency.

3.2 Intelligent Water-saving Equipment

Intelligent water-saving equipment is a device that utilizes advanced information technology and automation technology to achieve efficient utilization and precise management of water resources.

The use of intelligent water-saving devices can effectively save water, improve management efficiency, reduce costs, and be environmentally friendly and energy-saving. By adopting a contract based water-saving management model, installing intelligent water-saving irrigation systems, smart water-saving management systems, rain-water collection and utilization systems, etc., water resource consumption can be effectively reduced, water resources can be utilized reasonably, and sustainable development can be achieved.

3.3 Intelligent Sorting Technology

In recent years, the continuous increase of urban kitchen waste has greatly constrained the urban environment and economic development. As the managers of crowded areas in the city, community property management is an important part of the city. How to effectively reduce the pollution caused by kitchen waste in the community, modernize the technology of kitchen waste treatment, and achieve the recycling of kitchen waste is of great significance for modern community management. [1]

Intelligent sorting technology is a technique that utilizes advanced sensors, machine vision, deep learning, automation control, and other technologies to automatically identify, classify, and sort materials.

The main functions of intelligent sorting technology are resource recycling and utilization, environmental protection, industrial production, and quality control. By high-precision sorting of material characteristics, efficiency and production capacity can be improved, and application areas can be expanded to achieve effective recycling and high-value utilization of multiple types of resources. It can also effectively separate recyclable and hazardous waste, reduce pollution, separate impurities in the mining industry, improve coal quality, reduce pollutant emissions, and help green mines.

4 Sustainability Strategies for Property Management

4.1 Cooperation and Exchange

Property managers should strengthen cooperation and exchanges with the government, community organizations, environmental protection agencies, etc., and promote community environmental protection through participation in projects, sharing resources, and exchanging experiences, so as to integrate forces to solve environmental protection problems, and at the same time learn from successful cases to improve their own environmental protection management level.

4.2 Implementation of Green Property Management

Green property management refers to the integration of environmental protection concepts and green management measures in property management, such as the use of energy-saving equipment technology, the implementation of garbage classification and recycling, and the establishment of a green management system.

The report of the 20th National Congress of the Communist Party of China proposes to promote green development and promote the harmonious coexistence of man and nature. Green property is the practice of sustainable development strategy. Green property emphasizes green, low-carbon, environmental protection and energy saving to reduce damage to the environment and continuously improve the use efficiency, economic value and quality of the living environment. Greening is of far-reaching significance for promoting the innovation and upgrading of the property industry and achieving the coordinated development of economy, society and environment.[2]

4.3 Green Buildings and Communities are Built Together

With the rapid development of Internet and Internet of Things technology, green property management has begun to be deeply integrated with modern information technology, forming an intelligent management model based on the Internet and the Internet of Things. This model not only improves the efficiency of property management, but also enhances the interaction with the owners, so that the service content and service mode of green property management have been significantly improved.[3]

5 Energy Saving, Emission Reduction and Sustainable Development

5.1 Environmental Benefits

The use of high-efficiency thermal insulation materials, energy-saving equipment and renewable energy utilization systems can reduce building energy consumption, reduce carbon emissions, and alleviate the pressure of climate warming. The implementation of green buildings and energy-saving and emission reduction measures, such as rain-water harvesting, can reduce resource exploitation and consumption and environmental pollution, and protect the ecological environment.

5.2 Economic Benefits

Green buildings can reduce operating costs, save energy and water bills by improving energy and resource efficiency, and save a lot of money in the long term due to their long life and low maintenance costs. At the same time, it can also enhance the value of assets, enhance market competitiveness, and bring higher economic benefits.

5.3 Social Benefits

Green buildings improve the living environment and improve the quality of life of residents by ensuring good air quality, suitable temperature and humidity, sufficient lighting and ventilation, etc. At the same time, its promotion can enhance social awareness of environmental protection, drive more people to participate in environmental protection actions, and contribute to the sustainable development of society.

6 Case Studies and Practical Explorations

6.1 Successful Cases of Energy Conservation and Emission Reduction in Property Management

ISS Facility Management used the "Heat Pump +" heat source system in the process of serving an international school. Through the clever combination of air source heat pump, solar water heating and boiler, the system has successfully replaced the original high-energy electric boiler or gas boiler, and achieved remarkable results of more than 60% energy saving throughout the year.

6.2 The Enlightenment and Reference Significance of the Case

The case of ISS facility management demonstrates the clever combination of air source heat pump and solar water heating system, which can greatly improve energy efficiency and reduce dependence on traditional energy sources. The comprehensive application of this high-efficiency and energy-saving technology provides strong support for the realization of energy-saving and emission reduction goals. ISS Facility Management has successfully applied the "Heat Pump +" heat source system in international schools, which not only achieves energy conservation and emission reduction, but also improves the overall environmental quality of the school. This reflects the specific application of the concept of sustainable development in the practice of property management, that is, to promote the green transformation and sustainable development of property management through the use of environmentally friendly and energy-saving technologies and products.

7 Conclusion

7.1 The Future Trend of Energy Conservation, Emission Reduction and Sustainable Development of Property Management

At present, property management should pay attention to energy conservation and emission reduction. On the one hand, it will promote green building and energy-saving technologies, adopt high-efficiency lighting, intelligent temperature control and other systems, introduce renewable energy technologies such as air source heat pumps, and explore new green technologies in the future. On the other hand, with the help of the

Internet of Things, intelligent and digital transformation will be realized, remote monitoring facilities will be built, and digital platforms will be built, and intelligent applications will be deepened and management processes will be optimized in the future.

7.2 Suggestions and Prospects for Energy Conservation and Emission Reduction in the Property Management Industry

The country's emphasis on energy conservation, emission reduction and sustainable development has brought opportunities and challenges to the property management industry. The opportunity lies in the growing demand for a green living environment among property owners, prompting properties to expand and diversify their businesses. However, the challenge is not small, the level of housing construction operation and maintenance costs directly affects the economic benefits and market competitiveness of enterprises, therefore, how to effectively optimize the operation and maintenance costs has become an urgent problem to be solved in the industry. ^[4] Strategically, property companies should pay attention to technological innovation and management optimization. In terms of technological innovation, we actively explore intelligent energy monitoring systems, elevator energy-saving transformation technologies, etc., develop personalized energy-saving and emission reduction solutions, accurately grasp energy consumption, reduce energy waste, and stand out in the industry reform.

Property management is an important part of social governance, from the broader vision of the social governance mechanism, deeper to explore the solution path, and effectively clarify the main responsibilities of the government, enterprises, owners and other parties, in order to solve the problems faced by the development of the industry, and promote the effective integration of property management into grassroots social governance. ^[5] In terms of management optimization, the property should establish a scientific energy management system, clarify the energy-saving responsibilities of the post, and include it in the assessment to motivate employees. Use big data to analyze the energy use habits of owners, share experience and discuss problems through industry exchanges, promote the green transformation of the industry, and help the country save energy and reduce emissions.

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