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Energy Saving and Emission Reduction in the Operational Phase of Public Buildings Design of the Carbon Inclusion System

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Abstract. In response to the global challenge of climate change, China has set the goals of peaking carbon emissions by 2030 and achieving carbon neutrality by 2060 in its 14th Five-Year Plan. Given that the operational phase of public buildings is a significant source of carbon emissions, this paper focuses on energy-saving and emission reduction mechanisms in this sector and proposes a carbon-inclusive system design aimed at converting carbon reductions into tradable financial assets. Drawing on domestic and international experiences, the paper analyzes the emission reduction mechanisms in buildings across three areas: energy substitution, energy-saving technologies, and energy management. A baseline energy consumption model is constructed based on the Carbon Performance Evaluation Standard for Building Operations (LEBORS). On this basis, a trading mechanism centered around "BER"(Building Emission Reduction) from energy-saving renovations in existing buildings is designed. Through case analysis, the paper demonstrates how this mechanism effectively incentivizes building owners to engage in energy-saving renovations, thereby reducing carbon emissions. This research provides theoretical support for the development of carbon-inclusive policies and offers feasible pathways for practical carbon reduction efforts.

Keywords: Public Buildings; Building Operational Phase; Energy Saving and Emission Reduction; Carbon Inclusion; Carbon Trading; LEBORS; BER; Dual Control of Carbon Emissions; Green Finance; Low-Carbon Building Operation Rating.

1. Introduction

In response to the urgent challenge of global climate change, China has set the ambitious goals of reaching carbon peak by 2030 and achieving carbon neutrality by 2060, known as the "dual carbon" targets. These objectives are further emphasized in the 14th Five-Year Plan, which highlights the importance of green buildings in meeting these goals. The "Opinions on Promoting Green Development in Urban and Rural Construction" clearly identify the construction industry as a critical sector for achieving carbon reduction targets. According to the International Energy Agency's (IEA) "2023 World Energy Outlook," the building sector accounts for 30% of global final energy consumption, positioning it alongside industry and transportation as one of the three major energy-consuming sectors[1]. Similarly, the "2023 China Building and Urban Infrastructure Carbon Emissions Research Report" reveals that carbon emissions from building operations in China totaled 2.3 billion tons of CO_2, constituting 21.6% of national carbon emissions. Notably, public buildings exhibit significantly higher embodied carbon intensity than residential buildings, reflecting a greater potential for emission reductions[2].

However, progress in the energy efficiency retrofitting of existing public buildings has been slow, primarily due to the absence of effective market-driven mechanisms to support low-carbon transformation. Currently, most energy-saving retrofitting projects rely on the Contract Energy Management (CEM) model, which often faces challenges in achieving a reasonable and balanced distribution of benefits among stakeholders, posing a significant barrier to the large-scale

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implementation of energy-saving measures[3]. Additionally, the existing green finance system predominantly focuses on purely green projects and provides limited support for transformation-oriented projects, further hindering the low-carbon transition in public buildings[4].

To address these challenges, this paper proposes the development of a carbon-inclusive mechanism tailored to the operational phase of public buildings. This system aims to convert carbon emission reductions into economically valuable carbon credits, thereby incentivizing building owners to implement energy-saving and emission reduction measures, thereby driving the low-carbon transformation of the construction sector. By integrating carbon-inclusive mechanisms and financial support, this approach aims to promote the sustainable development of the building industry, offering both theoretical and practical insights for policymaking. This study provides innovative solutions for achieving the "dual carbon" objectives within the building sector.

2. The Current Status of the Development of Carbon Inclusiveness in the Construction Industry: Domestic and International Perspectives

2.1 Current Status of Development in China

Currently, the carbon inclusiveness mechanism in the construction industry is gradually developing and being refined. The "Carbon Inclusiveness Carbon Reduction Products Method for Residential Buildings in Hebei Province" provides accounting procedures and methods for carbon dioxide emission reductions in residential buildings, where energy-saving actions in residential buildings can be offset against property fees, heating fees, electricity costs, and other expenses[5]. The Guangdong Provincial Department of Ecology and Environment has issued several carbon inclusiveness methodologies, including those for installing distributed photovoltaic systems, using energy-efficient air conditioning, and adopting domestic air-source heat pump water heaters. While the application of technologies such as distributed photovoltaic systems and energy-efficient air conditioning can significantly improve the energy efficiency of buildings, reduce fossil energy consumption, and lower carbon emissions, these methodologies are not directly targeted at the construction industry. At present, the national carbon market requires businesses to have annual carbon emissions exceeding 26,000 tons in order to be included. As individual buildings do not meet this threshold, they are temporarily excluded from the national carbon market[6]. To address this issue, it is necessary to break the current limitations by improving the carbon accounting standards system, optimizing incentive mechanisms, and enabling small-scale emission reduction projects in the construction industry to participate in the carbon trading market, thus promoting the development of the carbon inclusiveness mechanism within the sector.

2.2 International Development Status

Australia's carbon inclusiveness mechanism in the construction industry targets both the corporate and residential sectors, implemented through regional policies such as the New South Wales Energy Savings Scheme (ESS) and the Victoria Energy Upgrades (VEU) program. These initiatives encourage building owners to install or replace energy-saving equipment to reduce energy consumption, with the resulting energy savings being converted into tradable energy certificates[7]. In the creation of energy certificates, the National Australian Built Environment Rating System (NABERS) plays an important role in assessing the overall energy efficiency of buildings and their improvement. The certification levels awarded by NABERS are directly used to generate these energy certificates[8].

Participants in the Australian carbon inclusiveness mechanism include both individuals and businesses, who enter the mechanism through Accredited Certification Providers (ACPs). Participants typically transfer the rights to create certificates to ACPs in exchange for discounts on the costs of emission reduction projects. ACPs use NABERS evaluation data to verify energy efficiency improvements and register and manage energy certificates on platforms such as TESSA

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or ESC. These certificates can be sold on the trading market to energy retailers who are required to fulfill energy-saving obligations.

This market-based mechanism is guided by government legislation setting emission reduction targets, which steer participants' energy-saving actions, while regulatory authorities ensure transparency and fairness in trading. Additionally, the government mandates that energy suppliers purchase a certain number of certificates, ensuring a stable market demand for the certificates.

Australia's carbon inclusiveness mechanism combines carbon emission reductions with market demand, driving the green transformation of the construction industry and enhancing market vitality through tradable certificates.

3. Design Concept

Carbon inclusiveness is an innovative incentive mechanism that realizes the value of carbon emission reduction contributions. The underlying operating logic involves identifying users' low-carbon behaviors, quantifying and certifying their carbon reductions based on methodologies, and then monetizing these reductions through certain business models. The economic benefits generated are subsequently returned to users through commercial incentives, policy benefits, and honor rewards[9]. This paper analyzes the emission reduction mechanisms, methodologies, and calculation methods for carbon reductions during the operational phase of public buildings. Based on this analysis, a trading model is designed to convert the carbon emission reductions of public buildings into economically valuable carbon credits, facilitating their smooth trading in the carbon market, thereby achieving value conversion and monetization.

4. Design Concept

4.1 Emission Reduction Mechanism

Building carbon emissions can be reduced by optimizing energy use behaviors, focusing on three key emission reduction mechanisms: energy substitution, energy-efficient technologies, and energy management strategies. Energy substitution leverages differences in carbon emissions from various energy sources, replacing high-carbon energy with low-carbon alternatives to achieve emission reductions. This approach involves modifications and upgrades to energy systems, including changes in energy supply methods. For example, replacing traditional coal- or oil-fired heating systems with electric heat pumps can significantly reduce carbon emissions. Energy-efficient technologies aim to enhance end-use energy efficiency and minimize energy waste by implementing measures such as replacing conventional lighting with high-efficiency alternatives and installing intelligent temperature control systems to lower overall energy consumption. Energy management strategies focus on cost-effective and easily implementable measures to achieve carbon reductions by optimizing user behaviors and making small-scale equipment upgrades. Unlike large-scale retrofitting or high-cost investments, this approach relies on minor yet impactful energy-saving actions to generate significant emission reductions. Based on these mechanisms, ten specific carbon reduction measures have been identified, as detailed in Table 1

Table 1. Energy Optimization Behaviors for Building Users

Numble	Type	Typical Behavior	Emission Reduction Mechanism
1	energy substitution	Replacing gas heating with electric air conditioning	Utilizing the emission disparity between different energy sources to substitute high-carbon energy with low-carbon alternatives.
2	energy substitution	Replacing coal-fired boilers with natural gas boilers	Leveraging the characteristic of natural gas having lower emissions compared to coal.

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3	energy substitution	Installing solar photovoltaic panels or geothermal energy systems	Replacing traditional thermal power generation to reduce carbon emissions, while also minimizing energy loss during the electricity transmission process.
4	energy substitution	Purchasing green electricity, such as wind or hydroelectric power	Utilizing clean energy to reduce carbon emissions
5	energy-efficient technologies	Installing an intelligent energy management system	Reducing energy consumption through monitoring and controlling energy use
6	energy-efficient technologies	Replacing energy-efficient equipment	Improving energy efficiency to reduce energy consumption
7	energy-efficient technologies	Improving energy efficiency to reduce energy consumption	Improving building insulation performance to reduce heating and cooling energy consumption
8	energy management strategies	Properly setting temperature control devices	Reducing air conditioning load to decrease electricity consumption
9	energy management strategies	Regularly cleaning and maintaining equipment	Reducing additional energy consumption caused by performance degradation of equipment
10	energy management strategies	Turning off lights when not in use and unplugging devices from standby power	Avoiding unnecessary electricity consumption

4.2 Methodology Research

Methodology is a key technical guideline in the carbon inclusiveness mechanism, typically developed by local governments or professional institutions. Similar to voluntary emission reduction projects (CCER), it requires that the emission reductions generated by the project must be real and reliable, with measurable, traceable, and verifiable characteristics, ensuring the accuracy and transparency of emission reduction outcomes. The main difference is that the carbon inclusiveness mechanism aims to simplify the certification process and lower participation thresholds, thus eliminating the need to demonstrate additionality.

Based on the emission reduction mechanisms in the building sector and drawing on the experiences of the Clean Development Mechanism (CDM), this paper constructs a carbon inclusiveness methodology for calculating carbon reductions in energy-saving projects during the operational phase of public buildings. This methodology systematically quantifies the emission reduction contributions in building energy-saving projects and provides a complete and simplified accounting process. Through the application of this methodology, the effectiveness of energy-saving and emission reduction efforts in building projects can be precisely measured, offering scientific support for relevant decision-makers.

4.2.1 Universal Model for Building Emission Reductions

By quantifying the carbon reduction achieved through energy optimization behaviors in the building sector, this paper proposes a calculation formula:

$$CR = \sum_{i=1}^{n} (BD_i \times EF_i - AD_i \times EF_i) \tag{1}$$

In equation (1), CR represents the carbon reduction achieved by the building through energy optimization behaviors during the project period, BDi represents the consumption of the i-th energy type before energy optimization (baseline), EFi represents the carbon emission factor for the i-th

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energy type, ADi represents the consumption of the i-th energy type after implementing energy optimization (project period).

BDi and ADi are primarily based on historical energy consumption data and energy monitoring systems of the building. The building's energy consumption is typically obtained through energy monitoring systems or energy bills. If the building is equipped with an energy monitoring system, detailed energy consumption data can be directly accessed from the system. In cases where actual data for the baseline is unavailable, standard model calculations may be used as a reference, estimating the baseline energy consumption based on similar buildings or industry-standard models. EFi can be determined based on official data released by the Ministry of Ecology and Environment of China.

Using the above calculation formula, the carbon reduction effect achieved by a building after implementing energy optimization behaviors can be systematically assessed, providing quantitative data support for carbon reduction in the building sector.

4.2.3 Research on the Carbon Inclusiveness Methodology for Buildings Based on Carbon Performance Evaluation Standards during the Operational Phase

To fill the gap in China's building sector carbon inclusiveness mechanism, the successful experience of Australia can be referenced. By using a methodology to convert the carbon reduction achievements of both enterprises and residential buildings into tradable carbon credits and integrating them into provincial carbon market systems, the domestic carbon inclusiveness system can be improved. This paper introduces the concept of the Carbon Performance Evaluation Standard for Building Operations (LEBORS) and systematically evaluates the carbon emissions during the operational phase of buildings, identifying the emission reduction mechanisms and quantities. This evaluation mechanism provides the foundation for quantifying building carbon emissions within the carbon inclusiveness system, allowing for accurate measurement of emission reduction results. Through the LEBORS carbon performance evaluation standard, customized reduction plans can be formulated for different buildings, improving the specificity and effectiveness of the reduction measures. The emission reductions verified by LEBORS can be directly traded on the carbon inclusiveness platform, simplifying the verification process, reducing complex certification procedures, and providing direct economic incentives for enterprises and residents. LEBORS provides scientific support for the carbon inclusiveness system and, through simplifying the methodology, encourages enterprises and residents to actively participate in energy-saving and carbon reduction projects, driving the green transformation of the building sector.

4.2.3.1 Carbon Performance Evaluation Standard for Building Operations

Currently, the domestic evaluation system primarily focuses on the construction and design phases of buildings, such as the Green Building 3-Star standard. However, there is a lack of a scientific, standardized, and universal evaluation system for the operational phase of buildings that can provide effective guidance for energy-saving and carbon-reduction efforts. To address this gap in the field of building energy consumption evaluation, the concept of carbon performance evaluation for the operational phase is introduced. A comprehensive lifecycle evaluation system is established, covering both the construction/design and operational phases of buildings, thus providing technical support for achieving the national "dual carbon" goals.

4.2.3.2 Overview of the LEBORS System

LEBORS is a comprehensive standard for evaluating energy consumption and carbon emissions levels during the operational phase of public buildings. The system considers various factors such as geographic location, climate conditions, building size, and operational duration to quantify energy usage and carbon output. It provides a fair, scientific, and precise method for evaluation, utilizing a 1 to 6-star rating scale (with half-star increments). This system incentivizes building owners to strive for higher energy efficiency by aiming for a higher star rating. A 6-star rating represents market-leading performance, while a 5-star rating indicates outstanding energy efficiency.

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A 3-star rating reflects average performance in the market. Annual evaluations through the LEBORS system guide buildings toward their energy-saving and carbon reduction goals.

4.2.3.3 Principles of the LEBORS System

The LEBORS methodology relies on the measurement of energy consumption data and the establishment of a carbon emission impact factor model, based on extensive energy consumption samples for each building type. This model predicts the expected carbon emissions during a building's operational phase. By comparing actual emissions with predicted levels, the system assesses the building's carbon emissions performance relative to its peer group, leading to a comprehensive evaluation.

4.2.3.4 Baseline Energy Consumption Calculation Based on LEBORS

This paper outlines how baseline emissions are calculated according to the LEBORS evaluation standard, with a focus on two specific scenarios: buildings that have undergone energy-saving retrofits and those that have not.

For buildings that have undergone retrofits, the baseline emissions are determined by first consulting the LEBORS building baseline star rating table for the relevant project baseline year. This provides the average energy consumption and carbon emission levels for the specific building type, which helps establish its baseline star rating. The baseline star rating is then entered into the LEBORS energy consumption calculator, which calculates the maximum permissible energy consumption to achieve the target star rating. This allows for the determination of the building's baseline energy consumption (BD).

For existing buildings that have not undergone energy-saving retrofits, their baseline emissions are calculated using the LEBORS baseline evaluation report, with the baseline star rating adjusted to reflect the project period year. The adjustment formula is as follows:

$$X_{BL} = \chi_{BL} + \omega_{LEBORS} \times (y_{BL} - y_{PJ}) \tag{2}$$

In equation (2), X_{BL} represents the adjusted baseline star rating, χ_{BL} represents the original baseline star rating of the building, ω_{LEBORS} represents the baseline star rating adjustment factor, selected based on the project's regional location, y_{BL} represents the baseline year, y_{PJ} represents the project year. If the difference between the baseline year and the project year exceeds one year, an adjustment is required. The adjusted baseline star rating is then entered into the LEBORS energy consumption calculator to determine the building's baseline energy consumption (BD).

4.2.3.5 Carbon Emission Reduction Model Based on LEBORS

The LEBORS carbon emission reduction calculation model determines the difference in carbon emissions between two evaluations, with the first evaluation serving as the baseline and the second evaluation representing the project period. The calculation is as follows:

$$ER_y = BE_y - PE_y \tag{3}$$

In equation (3), ER_y represents the carbon emission reduction for the project in year y, measured in tons of CO_2 (tCO_2), BE_y represents the baseline emissions for year y, measured in tons of CO_2 (tCO_2), PE_y represents the project emissions for year y, measured in tons of CO_2 (tCO_2).

4.2.3.6 Integration of LEBORS with the Carbon Benefit Market

The carbon reduction model based on LEBORS calculates the overall emission reduction of a building by integrating and simplifying the methodologies of various subsystems, such as lighting, HVAC, and others. It is directly applicable to the carbon benefit market while ensuring the authenticity and effectiveness of emission reductions. As illustrated in Figure 1, LEBORS consolidates the emission reductions of traditional subsystem methodologies into the overall building framework and streamlines the verification process by third-party organizations, serving the carbon benefit market. This system not only helps companies gain relevant tax incentives but

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also allows them to enter regional carbon trading markets to offset emissions quotas from regulated entities. Additionally, it can serve as the foundation for carbon neutrality certification.

LEBORS sets strict evaluation criteria for various factors such as the operating duration of buildings during both the project phase and baseline phase, as well as the vacant space within the building. This helps avoid inaccurate emission reduction calculations caused by long periods of building vacancy. The rating system of LEBORS is intuitive; when the star rating during the project phase is higher than the baseline, carbon benefit-certified emission reductions can be issued. LEBORS follows a standardized data collection process that ensures the accuracy of data, providing a reliable foundation for calculating emission reductions.

Moreover, LEBORS can quantify the emission reductions of individual buildings, regardless of their size, and allows them to participate in the carbon benefit market. This fosters greater engagement from the market, promoting more widespread participation in sustainable building practices and carbon reduction initiatives.

4.2.3 The design of BER (Building Emission Reduction) trading

This paper designs a carbon trading mechanism centered around the concept of "BER" (Building Emission Reduction) based on the LEBORS carbon emission reduction model. The trading mechanism is illustrated in Figure 1. In this system, Building B generates emission reductions through effective energy-saving measures, which are then converted into carbon credits called "BER." These "BER" credits can be purchased by Building C, which is nearing its carbon neutrality target, to offset its minor emissions and achieve carbon neutrality certification. Alternatively, they can be purchased by high-emission Building A to offset its excess emissions. This mechanism facilitates the overall emission reduction goal and strengthens support for high-quality environmental practices.

In practical applications, "BER" can be integrated with the residential carbon inclusive market. For instance, small amounts of "BER" generated by individual buildings can be converted into carbon credits, which can then be exchanged for tax incentives or cash rewards. On the other hand, high-emission buildings that undergo energy-saving retrofits and generate significant emission reductions can have their reductions developed into "BER" credits through methodology and traded in local carbon markets, or purchased by companies to achieve carbon neutrality certification. This mechanism breaks down the trading barriers between building emission reductions and the carbon market, stimulating market activity and promoting the widespread application of carbon trading.

To ensure the effective implementation of this mechanism, building owners must undergo annual LEBORS evaluations before and after energy-saving retrofits. The emission reductions documented in the evaluation reports are then used, in conjunction with developed methodologies, to issue the corresponding "BER" credits. To enhance the efficiency of project funding, it is allowed for project developers to pre-issue projected "BER" for the next three years, with annual verification to ensure actual emission reductions align with projections, adhering to the principle of compensating for overestimations or underestimations. Furthermore, to ensure long-term stable emission reduction outcomes, a building project can issue "BER" credits for a maximum of ten years. This approach helps alleviate the initial financial burden on building owners, incentivizes more companies to engage in green renovations, and, through annual and long-term issuance arrangements, enhances the stability and predictability of carbon reduction credits. This, in turn, promotes the liquidity, transparency, and reliability of the carbon market, laying a foundation for the creation of an efficient and trustworthy carbon trading environment.

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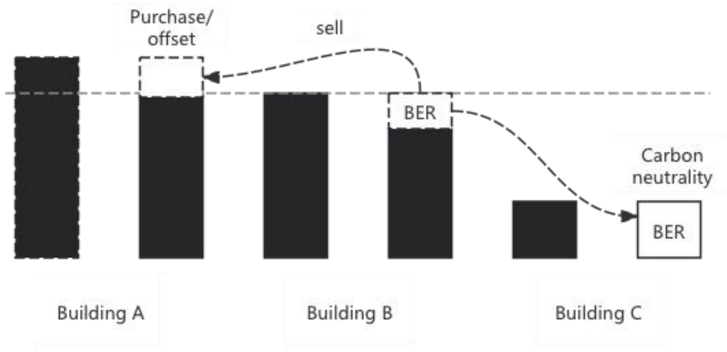

Fig. 1 Schematic of "BER" (Building Emission Reduction) Trading.

4.2.4 Mechanism design

Establishing a "Evaluation-Transformation Finance-Retrofit-Reevaluation-Carbon Inclusive" Green Closed-Loop Mechanism:

① Initial Evaluation

The LEBORS carbon performance evaluation standard is used to conduct a comprehensive assessment of the building. The evaluation criteria are updated regularly to reflect the latest technological advancements and regulatory requirements, ensuring the accuracy of the results.

② Transformation Finance Support

Based on the initial evaluation, improvement targets are set. Transformation financial tools, such as low-interest loans and bonds, are utilized to provide funding for energy-saving retrofitting projects, helping to achieve higher energy efficiency ratings.

③ Implementation of Retrofit Plan

After securing financial support, the building owner implements the energy-saving retrofit according to the established plan.

④ Reevaluation

Upon completion of the retrofit, the building undergoes a second LEBORS energy efficiency evaluation to verify the retrofit's effectiveness. Based on the reevaluation results, adjustments are made to any areas that have not met the expected standards, ensuring the retrofit meets its intended goals and providing accurate data for calculating the building's carbon emission reductions.

⑤ Carbon Inclusive Mechanism

The energy-saving benefits from the retrofit can be converted into certified emission reductions for existing buildings (Building Emission Reduction, BER), i.e., carbon credits, which are traded on the carbon inclusive platform. This not only boosts market activity but also offers additional economic incentives to building owners, driving the implementation of energy-saving and emission reduction projects.

4.2.5 Case Study

A case study of an office park located in Changning District, Shanghai, with a total area of 30,315.56 square meters, consisting of six office buildings (Buildings 1-6). Five buildings were included in the evaluation, excluding the conference hall. The initial star rating indicated varying levels of energy efficiency across the buildings. To improve the overall energy efficiency of the park, a carbon reduction target of over 30% was set for the entire site. In 2022, a series of comprehensive measures were implemented, including, but not limited to, the installation of rooftop photovoltaic systems, deployment of intelligent control systems, optimization of energy usage behaviors, and space utilization improvements.

The retrofit period lasted for 9 months. The buildings were evaluated before and after the retrofit, and the evaluation results as of 2024 are shown in the table below:

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Table 2. Building Project Star Rating Evaluation

Year	2021	2022	2023	2024
Buildings	Baseline Star Rating	Emission Star Rating	Emission Star Rating	Emission Star Rating
1	1.5	1.5	3.5	3.5
2	1	1	3	3
4	1	1	2	2
5	1	1	3	3
6	3	3	3.5	3.5

In 2022, as the energy retrofit was still in progress, only 60.53 tons of carbon emission reductions were achieved. In 2023, with the completion of the retrofit, the full-year reduction reached 444.63 tons. Due to variations in the efficiency of energy-saving equipment, the actual emission reductions fluctuated, decreasing to 420.15 tons in 2024.

Table 3.Carbon Reduction of Building Project

Year	Carbon emission reduction（t）
2021	0
2022	60.53
2023	444.63
2024	420.15

Based on the LEBORS emission reduction model, the issuance of "BER" (Building Emission Reduction) credits is as follows:

Table 4. BER Issuance of Building Project

Year	BER（t）
2021	0
2022	60.53
2023	444.6335
2024	444.6335
2025	444.6335
2026	444.6335

In 2022, the "BER" credits that could be issued amounted to 60.53 tons. After the retrofit was completed in 2023, it became possible to pre-issue the projected "BER" credits for the next three years, totaling 1,839.05 tons. Based on the current market price of 60 CNY per ton of CO_2, the estimated economic benefit for this period is 110,343 CNY. It is expected that the total economic benefit over the entire project cycle will reach approximately 200,000 CNY.

According to the regulations, the pre-issued "BER" credits must undergo annual verification, with a "refund or supplement" system applied. In 2024, the emission reduction was adjusted to 420.15 tons, lower than the expected value, meaning an adjustment is required for the previously pre-issued portion of "BER" credits.

5. Summary

This paper, through a study of the carbon emission characteristics during the operational phase of public buildings, proposes a carbon-inclusive system framework and market-based mechanism aimed at effectively promoting energy conservation and emission reduction in public buildings. As

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global demands for carbon reduction continue to rise, the issue of carbon emissions in the building sector has become increasingly prominent, especially during the building's operational phase. Establishing a well-rounded carbon-inclusive system will help elevate the green development level of the building industry and provide technical support for China’s "dual carbon" goals.

In the carbon-inclusive mechanism, building owners are incentivized to achieve emission reductions through the substitution of clean energy, the application of energy-saving technologies, and lightweight energy-saving measures. At the same time, emission reductions are quantified into tradable carbon credits through LEBORS (Building Operational Phase Carbon Performance Evaluation Standard), promoting the linkage between carbon reduction and economic value. The core of this system design lies in the "BER" (Building Emission Reduction) trading mechanism, which enables the emission reductions of individual buildings to enter the carbon market, breaking down participation barriers in carbon trading within the building sector and stimulating market activity.

As the carbon market continues to develop, the carbon-inclusive mechanism will have a profound impact on the sustainable development of the building industry. With the collaborative efforts of governments, building owners, financial institutions, and society, the promotion and implementation of the carbon-inclusive system will drive the green transformation and low-carbon development of the entire industry.

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