Research on the Whole Life Cycle Management of Environmental Protection and Energy Saving for New Green Buildings

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Abstract. China’s construction industry accounts for a large proportion of energy consumption and has become one of the burdens of environmental protection. How to achieve environmental protection and energy conservation in the construction industry is also an important issue in the current construction industry. Green buildings have become an important measure for environmental protection and energy conservation in the construction industry. The main problems of the current development of buildings, based on the perspective of the whole life cycle, analyze the application analysis of the environmental protection and energy saving of green buildings in all stages of the whole life cycle, and propose the whole life cycle management application strategy for environmental protection and energy saving of green buildings to promote the environmental protection of new green buildings Energy-saving development.

Keywords: green building; full life cycle; environmental protection and energy saving.

1. Foreword
In recent years, as a pillar industry of my country's national economy, the construction industry is also energy-intensive. The problem of energy consumption has attracted more and more attention. The implementation of the green building concept is of great significance to the sustainable development of the construction industry. Green is an environmental protection concept, that is, building products make full and efficient use of natural resources and environmental conditions, which can not only meet the functional requirements of building products, improve people's living comfort, but also coexist harmoniously with the environment, protect the ecology, save energy and environmental protection. Project life cycle management is to divide the construction project into four stages: the pre-planning and design stage, the scheme design stage, the construction management stage and the operation and maintenance stage. A large number of studies have shown that the production of building materials required for building construction has a large amount of carbon emissions, and the adoption of green technologies can reduce carbon emissions. As shown in Table 1, the practical feasibility of building energy saving. Therefore, in the process of facing the huge amount of energy consumption and carbon emissions, new technologies and new methods should be adopted from the whole life cycle of the project to control building energy consumption more effectively and rationally from the source to ensure the healthy development of my country’s economy. has great significance.
Table 1. Carbon emissions during the production phase of the building materials required for the construction process

| Building materials   | Carbon emission/kg | Carbon emissions after adopting green technology/kg | Save carbon emissions/kg |
|----------------------|--------------------|-----------------------------------------------------|--------------------------|
| Cement               | 37045.43           | 32304.31                                            | 4741.12                  |
| Concrete             | 130487.46          | 126371.53                                           | 4115.93                  |
| Rebar                | 83520.87           | 83520.87                                            | 0                        |
| Concrete aerated block | 28642.70         | 23629.05                                            | 5013.65                  |
| Sand                 | 28021.92           | 28021.92                                            | 0                        |
| Coating              | 1615348.00         | 1603621.20                                          | 11726.80                 |
| Quicklime            | 1471.60            | 1405.10                                             | 66.50                    |
| Lime paste           | 25769.95           | 22054.42                                            | 3715.53                  |
| Bricks               | 200624.60          | 200624.60                                           | 0                        |
| Mixed mortar         | 17330.10           | 14318.40                                            | 3011.70                  |
| Cement mortar        | 3387.80            | 3057.30                                             | 330.50                   |
| Total                | 2171650.43         | 2138928.70                                          | 32721.73                 |

2. The current status of environmental protection and energy saving of new green buildings

2.1. The design of green buildings has not developed in harmony with the actual situation
In the development of my country's construction industry, green building has not fully considered the actual situation of the region. The local human environment is completely ignored, and the building and the environment are not fully integrated, which causes the people's needs and the building form to be far apart.

2.2. The design and implementation of green buildings are far apart
Due to the large number of green building design parameters and complex composition, the increase or decrease in life cycle costs caused by various measures cannot be reflected in the design. When designing green buildings, water supply and drainage, electrical and other aspects need special attention. For example, water circulation system, ventilation system, etc. are related to people's living conditions and living requirements in the future. However, some developers pay too much attention to the external features of buildings, and invest less energy in how to improve the interior of the buildings, which makes many buildings have poor living conditions after the completion of construction.

2.3. The green building standard system is not perfect
Although the construction of energy-saving green buildings in my country has been around for some time, the results have been minimal and there are still problems such as high energy consumption and pollution. The engineering construction standards of green buildings mostly focus on evaluation, but there is no effective technology and evaluation standard system in terms of design, construction and acceptance, operation and maintenance. It is more obvious that the materials used in construction and the hardening of the ground on the construction site are more likely to cause environmental pollution. In the end, there is no scientific basis. Some machinery and equipment are chaotic, and the result is waste of related resources and growing industrial waste. Therefore, it is very necessary for the resources in the construction field to be scientifically processed, which can effectively improve environmental pollution and is beneficial to the country's governance of industrial resources and the environment. For the lack of building quota standards for green buildings, this will also increase the difficulty of the project cost of green buildings.

2.4. Green building regulations are not perfect
At present, my country has not formed a systematic framework for green building regulations. The concept of green building has not been specifically defined in the construction law, energy law, energy...
conservation law, etc., and the status of green building has not been established from the legal level. A complete management system for the entire life cycle of planning, design, construction, operation, and demolition has not been established. In addition, the government's supervision is still relatively weak. Therefore, only by strengthening quality supervision on the basis of law, and guiding it through publicity, can the development of green buildings break through existing difficulties and achieve widespread promotion.

3. Application analysis of green building environmental protection and energy saving based on full life cycle management

3.1. Analysis on the application of environmental protection and energy saving of new green buildings in the design stage

In the process of green building design, it is necessary to control the building's energy-saving standards. The BIM model can be transferred to the green analysis software for analysis and optimization. The energy consumption and thermal engineering of each system are analyzed and optimized through simulation tools to improve energy efficiency. Utilization rate. Through the energy-saving design, in order to avoid material waste caused by collisions during the construction phase, save the cost of human resources and shorten the construction period in the later construction process, and achieve the goal of saving materials and energy in green buildings. In cost management and control, using the feature of BIM in the entire life cycle of green building projects, in the budgetary link of the design stage, the BIM model is transferred to the cost software and linked with the list standard and the quota standard to form a calculation model, quickly and accurately generate the project’s list volume and fixed price report to guide the design of the quota. In the confession, the visualization and parameterization features of the BIM model are used to assist the communication between the participating parties. Especially in the green energy-saving benefit assessment link, the timeliness of communication between various units has been significantly improved.

3.2. Analysis on the application of environmental protection and energy saving of new green buildings in the construction stage

At this stage, BIM virtual construction technology is used to simulate construction, find problems and risks in construction in time, and propose optimization plans in advance, which can shorten the construction period, save costs, improve construction efficiency, and provide for the development and construction of environmentally friendly green buildings. Strong support. Based on the BIM model combined with the Internet of Things and mobile terminals, it is used to guide on-site construction and to supervise and track green building materials, thereby greatly improving the management level of material products in ultra-low energy green building projects. This is obviously achieved through the method of digital material integrated management The evaluation criteria of green building materials saving. During the construction process, the BIM system tracks the construction quality and progress of the project in real time, and compares the on-site construction status with the construction plan in real time, automatically analyzes the existing risks and control measures, and promptly reminds the managers to adjust the plan to ensure the smooth progress of the green building construction. The use of BIM4D's visualization, real-time, and intelligent features improves the precision of green building schedule management and greatly reduces the risk of delays in construction schedules. Through the BIM5D model, not only can the construction schedule be calculated quickly and accurately to reduce the time and errors of the budget and final accounts, but also the material consumption, labor consumption, and construction machinery consumption of the construction schedule can be automatically calculated in real time, and the construction schedule can be dynamically controlled in real time. The management cost data finally reached the development concept of smart construction of green buildings. Precisely preview the complex construction parts on site through BIM construction animations to complete the pre-quality control; integrate the on-site video monitoring system and environmental monitoring system into the BIM cloud platform collaboration system to monitor and track
the construction conditions and pollutant emissions of key parts of the construction site in real time, complete In-process quality control: The system automatically analyzes the construction error rate of the acceptance component and the corresponding component of the Internet of Things connection BIM model to complete the post-event quality control. Therefore, the BIM-based digital chemical land technology has improved the efficiency of green building site quality management in an all-round way and reached the requirements of noise reduction and emission reduction. Fill in the relevant security questions in the space corresponding to the BIM model and upload it to the management system in time. BIM technology supervises the civilized safety of the green building construction site in all aspects and real-time, and minimizes safety risks.

3.3. Analysis on the application of environmental protection and energy saving of new green buildings in the operation and maintenance stage
First, monitor and analyze indoor energy consumption based on the BIM model combined with equipment sensors and other technologies to achieve low-energy operation of green buildings; secondly, the spatial location and related parameters of the components can be quickly obtained through the BIM visualization characteristics, and the work is fed back through the mobile terminal Information, to achieve efficient maintenance and inspection work; finally, through the management and statistics of fixed assets and facilities, all-round on-site safety monitoring, emergency plan simulation, etc., digital intelligent operation and maintenance can be realized. With the assistance of BIM technology, energy-saving green buildings can greatly save operation and maintenance costs on the premise of providing people with healthy, comfortable and smart living places, and meet the needs of accurate, detailed and comprehensive information in the green building operation and maintenance stage.

4. Green building environmental protection and energy saving application strategy based on full life cycle management

4.1. Improve the environmental protection level in the planning stage
First, when planning, you can use BIM modeling and GIS software to simulate green buildings and sites, and analyze the site climate conditions, topography, surrounding environment, ventilation and lighting air index that affect the design, such as lighting, heating, cooling, etc. Carry out accurate analysis of energy consumption, select a reasonable and ideal site layout, and improve the overall environmental protection level. Second, in the investment estimation, the BIM technology is introduced into the green building evaluation system, and the preliminary construction planning and scheme demonstration are optimized, and introduced into the design of the whole life cycle. Whether it is energy consumption assessment or investment estimation, it provides strong support for further optimization and improvement programs.

4.2. Reduce resource consumption in the design stage
First of all, assist the coordination of multi-discipline cooperation, use Revit software for multi-discipline modeling, simulate the energy consumption of air conditioning, water supply and drainage, ventilation, lighting and other systems in complex projects, simulate building envelopes, outdoor thermal environment and other scenes, models and The engineering quantity can be converted to the IFC standard format and imported into the BIM5D system to sort out and share all relevant information about green buildings, and promote the smooth and efficient progress of green building projects. To achieve the goal of unified standards and the same model of different professions, while shortening the construction period and reducing resource loss. Second, improve traditional methods, optimize energy consumption analysis methods, and use BIM technology to analyze energy consumption. No need to model again, and the BIM model can be imported into Energy Plus to calculate the results. Finally, check collisions, use BIM technology to perform 5D construction simulation, engineering quantity statistics, collision detection optimization and other functions, which are accurate and fast, and the
comparison results after repair are intuitive and obvious, effectively reducing the loss of resources during construction and reducing project costs.

4.3. Save material waste in the construction phase
The whole process of management and arrangement during the construction phase is monitored in real time by using BIM technology to input the information in the 4D model (see Figure 3). The BIM4D construction simulation technology can accurately grasp the construction progress in the project process, manage the resources such as artificial materials and machinery as information, and revise the plan in time to ensure the maximum extent of the construction period, making the project schedule efficient and reasonable. The cost of a project is closely related to the progress. The establishment of a cost information model facilitates the adjustment of capital investment and capital allocation during the construction process. Because the model is related, it is more convenient to change in time. Using BIM technology to safely manage the construction plan simulation, prevent the problems on the construction site in advance, so as not to find irreparable problems during the acceptance.

4.4. Building energy consumption in the measurement and control operation phase
With the combination of BIM technology visualization and VR technology, people can perceive the real space and evacuation path of the building in an immersive experience, perform evacuation simulation, crowd behavior simulation, and establish a real emergency plan. The humanized design experience is also helpful for design feedback guidance. The energy consumption problem in the later operation stage of the building should not be underestimated. Relying on the BIM building model, when the property operation finds equipment problems, the part model of the place where the problem occurred, and the drawing location will be clearly presented in the form of a model. Reducing the cost of later maintenance and testing, and investing more technical control equipment management in operation and maintenance has become a future development trend.

5. Conclusion
As environmental problems continue to intensify, the energy consumption of the construction industry is a major breakthrough. Reasonably and efficiently optimize the design of green buildings, accelerate project progress, avoid construction waste, and reduce energy consumption throughout the life cycle. Healthy development is of great significance and is the future development trend. However, the development of green buildings in my country is still in an incomplete stage. Therefore, it is necessary to use information technology to improve the environmental protection level in the planning stage, reduce the resource consumption in the design stage, save the waste of materials in the construction stage and the building energy consumption in the measurement and control operation stage. The whole life cycle management of green building energy saving realizes the harmonious symbiosis between the building and the environment, and reduces the pollution discharge during the building life cycle.

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