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The Research on Sino-US Green Building Rating System

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Abstract

This paper describes the more commonly used domestic and international green building rating systems and details of the evaluation of U.S. LEED, its old and new versions, the trend of improvement in LEED; Compared Chinese "Evaluation Standard for Green Building" (GB / T 50378-2006) with the LEED2009, the paper points out their shortcomings, and identify the existing differences between them. Then comes out the conclusion that LEED2009 is still target to the U.S. buildings, Chinese engineers should learn from its advantage, make use in our evaluation of green building, which is suitable for China's actual conditions. But we make full use of Chinese buildings of the LEED rating system is not appropriate. Finally, we make a suggestion for "Evaluation Standard for Green Building" that we should add incentives for new energy sources can effectively develop our new energy, give a positive role in environment protection.

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1. Introduction

Energy consumption in the construction industry has always been big. Reduce greenhouse gas emissions to building energy-saving mankind and set higher requirements, "green building" came into being. What is "green building"? Should be understood: in the full life cycle of buildings, to maximize conservation of resources (energy, land, water and materials), protect the environment and reduce pollution, provide people with healthy, appropriate and efficient use the space, and natural harmony of the building **【1】**. For the moment, the famous green building rating criteria are: the United Kingdom Building Research Establishment Environmental Assessment Act (BREEAM), the Canadian Green Building Challenge (referred to as GBC), the Japanese Comprehensive Assessment System for Building

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Environmental Efficiency (CASBEE), United States Leadership in Energy and Environmental Design (referred to as LEED), and China's "Evaluation Standard for Green Building". These foreign standards, the U.S. LEED most widely used in China, so far, China's total of 295 buildings have received LEED certification [2], while some construction choose "Evaluation Standard for Green Building" for green building certification. LEED and "Evaluation Standard for Green Building" What are the characteristics of each, in the end what kind of evaluation is more suitable for China? This comparative analysis will identify the similarities and differences between them.

2. LEED, Evaluation Standard for Green Building Introduction

2.1 American LEED profile

U.S. Green Building Council (referred to as the USGBC) was founded in 1993 and headquartered in Washington, DC, is a non-governmental, non-profit organization whose members come from all aspects of society. After the founding of the U.S. Green Building Council, there was important task, which is to create and implement the LEED. LEED is a voluntary assessment system used by the standard, the main purpose is to regulate a complete and accurate concept of green building, to prevent the abuse of green building, promote the integration of green building technology for the construction of green building techniques that can be implemented to provide a route. LEED rating system can be divided into several categories:

- (1)LEED-NC (LEED for New Construction)
- (2)LEED-EB (LEED for Existing Building)
- (3)LEED-CI (LEED for Commercial Interior)
- (4)LEED-CS (LEED for Core & Shell)
- (5)LEED-S (LEED for school)

In this paper, the LEED-NC standards as a comparison study, analysis.

LEED since its inception, it was adopted many times. LEED-NC v2.2 (hereinafter referred to as LEED2.2) in October 2005 revision, pushed to market in 2006; the latest LEED-NC 2009 (hereinafter referred to as LEED2009) in November 2008 revision, pushed to market in 2009. New version of the amendment by a big margin, out of 69 points from 100 points into the present (excluding the innovative design and geographical priorities of the sub-points), both of the example in Table 1:

Table 1 LEED2009 and LEED2. 2 of the score changes

	LEED2009	LEED2.2
Certified	40 - 49 points	26-32 points
Silver	50 - 59 points	33-38 points
Gold	60 - 79 points	39-51 points
Platinum	80 points and above	52-69 points

2. 2 China's "Evaluation Standard for Green Building"

According to the present situation of Chinese social development, in the year of 2005, Chinese government developed a "green building rating standards," to achieve the goal of "conservation-conscious society" from 1 June 2006 officially implemented. Start from scratch, obtained or developed by a learning process, China's green building rating standard has also experienced a series of development, in August

2007 commissioned by the Ministry of Construction Ministry of Construction and Technology Development Promotion Center developed a “green building evaluation of technical details”.

Then, on LEED2009 and LEED2.2, “Evaluation Standard for Green Building”, respectively in understanding trends and with the LEED “Green Standard” compared to what features of each.

3. LEED2009 and LEED2.2, “Evaluation Standard for Green Building” for the contrast

LEED and “Evaluation Standard for Green Building ” when conducting the evaluation, there are some conditions, need to meet these conditions in order to Part in the evaluation, in LEED it is called ‘Prerequisite’, and in “ Evaluation Standard for Green Building ” it is called "Control items."

LEED Prerequisite items and Credit each item contain 3 elements: “Intent”, “Requirements” and “Potential Technologies & Strategies”.

3.1 LEED2009 and LEED2.2, “Evaluation Standard for Green Building” “land conservation” the contrast

3.1.1 LEED2009 and LEED2.2 contrast

In Sustainable Sites, a study of the sustainability of the project has a more mixed strict definition, and evaluation system of strict construction of facilities set period of this as a gimmick to avoid some of the developers, not attached Various implementation. In addition, LEED2009 proposed the "resident car sharing" the new concept, this content is intended to encourage residents to use low-emission and fuel-efficient cars, while making several households shared car travel, thereby reducing the car parking area, saving land, saving energy, in order to achieve this purpose, the evaluation system also provides the appropriate parking fee waiver, through economic incentives to promote the residents to use energy-efficient cars, the rapid growth of motor vehicles and long-term goal of energy saving, has positive significance

3.1.2 LEED2009 “Sustainable Sites” and “Evaluation Standard for Green Building” “Land conservation with the outdoor environment” contrast

Evaluation Standard for Green Building on the main index by several weights, “land conservation with the outdoor environment,” only 15% of the weight, and LEED2009 share of 26% in the comparison, the ratio smaller. Americans are less than Chinese, so Chinese will be too few and not the average land per capita. The ultimate goal of the urbanization process is to reduce the rural population through urbanization, reduce the amount of rural residential land, and ultimately expand the cultivated land the number of protection of basic farmland, so the weight of more than should be improved through, highlighting the conservation of land on the importance of green building.

3.2 LEED2009 and LEED2.2, “Evaluation Standard for Green Building” for “saving water” the contrast

3.2.1 LEED2009 and LEED2.2 contrast

The USGBC added a necessary item: 20% reduction in water use. Some scholars have referred to LEED standards is not precise enough of a reason is no need for water conservation items, if a building other score items were passed, but the serious charges of water, is also available related to LEED certification. The prerequisite for the increase to make up for the LEED in the "Water Efficiency" big item defects unnecessary items, increased the threshold of the evaluation can also be seen that the rational use of water resources more attention by the USGBC.

3.2.2 LEED2009 “Water Efficiency” and “Evaluation Standard for Green Building” “water saving and water resource utilization” contrast

LEED2009 and “Evaluation Standard for Green Building” basically the same in the content, have stressed that water recycling, groundwater wells to reduce municipal water supply and water supply, and increase the formation pay these measures. But our infrastructure is still relatively weak, some basic facilities such as irrigation technology has been widely used in the United States, while China is still

promoting. In addition, some requirements of the LEED 2009, such as green landscape with no permanent water, only temporary irrigation when planting, and more for our country under different climatic conditions of topography is difficult at the same time requirements, but the South for the water-rich region, can be Promotion Trial.

3.3 LEED2009 and LEED2.2, “Evaluation Standard for Green Building for” “Energy saving” contrast

3.3.1 LEED2009 and LEED2.2 contrast

LEED2009 is USGBC according to American energy agency (EPA) build 13 caused by human activities to the relative importance of sequel a type will be assigned to each category, again through the form based on matrix calculated every rating scores, and thus more scientific. LEED2009 priority should belong to reduce greenhouse gas emissions, and through the energy, communications, water resources allocation scores has become the important part, some other rating items related to energy measures introduced in this not repeat.

3.3.2 LEED2009 “Energy & Atmosphere” and “Evaluation Standard for Green Building” “energy conservation and energy utilization” contrast

Evaluation Standard for Green Building provides the use of renewable energy proportion of total energy consumption of buildings accounts for more than 5%, less than 35% share of the requirements LEED2009. China is one of the most abundant wind energy, according to the Chinese Academy of Meteorological Sciences drawn national average wind power density distribution, a high level of China's wind energy on land 10m total reserves of 3.226 billion KW, ranking first in the world 【5】 , and distribution is very uniform, which is focused on developing wind power provides a convenient, the future of the "green label" by adding the clean energy or wind power projects such as the direct provisions of the development of clean energy and promote the completion of our energy reduction targets will play an important role to the concept.

3.4 LEED2009 and LEED2.2, “Evaluation Standard for Green Building” for “Materials and Resources” contrast

3.4.1 LEED2009 and LEED2.2 contrast

“Certified Wood” will serve as a separate ratings, from LEED out of come out, but at present the LEED 2009 still adopt the older version of the score is carried out by means of taking timber as main building materials of the United States, the move would think USGBC for the material sources and quality growing importance.

3.4.2 LEED2009 “Materials and Resources” and “Evaluation Standard for Green Building” “Material Saving and Material Resources Use” contrast

Make the best of the two systems are stressed, which is commendable. Strained rail capacity in China, the use of rail transport will affect the duration; long-distance road transport at high prices, low volume, and large-scale use will increase construction costs, and reduce long-distance transport from the transport and reduce environmental impacts. Therefore, the use of local materials for the construction of the economy, environmental protection is essential. Overall the United States and China, the same building materials, so the two systems are strongly advocating the use of recyclable materials to strengthen the recovery and reuse, reduce environmental impact.

3.5 LEED2009 and LEED2.2, “Evaluation Standard for Green Building” and “Indoor Environmental Quality” contrast

3.5.1 LEED2009 and LEED2.2 contrast

The USGBC didn't use the “daylight factor” (glazing factor) used in the LEED2.2 any more, instead of the computing simulation to implementation., the ceiling does not block the top through the window, the light reflected to the ground, so you can totally use the natural light for reducing lighting power consumption, and thus play energy saving.

3.5.2 LEED2009 with “Evaluation Standard for Green Building” “Indoor Environment Quality” contrast

LEED2009 Prerequisite items were on the smoking restrictions and the Evaluation Standard for Green Building no restrictions on smoking. Produced by burning tobacco smoke contains large amounts of harmful ingredients, smoking is the trend. However, the Ministry of Health in May 11, 2010 have been announced: From January 2011 all public places in mainland China, the workplace smoking ban, this provision can be regarded as the "green label" Smoking missing item to add. From the standard view, “Green Standard” score points of concern or the traditional “view, independent thermostat, condensation, sun”, but LEED2009 have focused on the “thermal comfort, indoor air pollution, and low-e materials” and so on.

4. Summary

LEED2009 compared with the previous version, in reducing greenhouse gas emissions has made important changes to energy; transportation and water constitute the main LEED2009 evaluation system. However, LEED does not use full life cycle assessment method, only the results of the appraisal by the model, which makes building, may not be true in actual energy use. So, should strengthen the management of post-certification work to ensure continued energy-saving building life cycle. In addition, the "regional priority" sub can be considered LEED project is still biased towards the United States.

LEED 2009 and “Evaluation Standard for Green Building” haven’t done the special economic analysis. Compared with ordinary buildings, green building design and construction costs will increase energy efficiency, which should be built to run until the end of the entire life cycle, green Building the rise long enough, the lack of some of the data of the buildings’ entire life cycle on the operation of reference, can achieve energy saving, environmental effects, but also to analyze the actual situation. Some developers only concern is through green certification, a higher sale price, do not really care whether the energy saving and environmental protection. Therefore, economic analysis is a direct reflection of green building; we should pay attention to research economics of green building. “Green Standard” consistent with the level of building development at this stage, we should learn from the successful experience of LEED for the “Green Standard” services, and in accordance with national conditions, to make consequential amendments to accommodate future development.

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