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An Overview of Widely Utilized Global Green Certification Systems

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ABSTRACT

The push toward sustainable design has been focused recently to embrace the delicate balance between buildings and the sustainable environment. As a result, various building rating systems have been established around the world to evaluate and rate green buildings. A green product certification is considered as a recognized award to ensure those projects are environmentally responsible and resource-efficient throughout a building's life-cycle. However, practitioners could be confused about the assessment tools for sustainable buildings owing to their various standards. This paper, therefore, examines the characteristics of BREEAM, CASBEE, LEED, and Green Star NZ. The results indicate that BREEAM and CASBEE are the most comprehensive rating schemes to assess the sustainability of projects. While LEED is unable to evaluate the economical factor and Green Star NZ is not yet matured.

KEYWORDS: Green rating systems, BREEAM, LEED, Green Star NZ, CASBEE

1. INTRODUCTION

The construction industry plays an important role in satisfying the needs of society and enhancing the quality of life (Tam et al., 2004). However, it is responsible for major energy consumption, accounting for 40-50% of all energy usage and anthropogenic greenhouse gas emissions globally (Miller et al., 2015). In addition, building sector consumes more than a third of global resources (Rode et al., 2011), one sixth of global fresh water withdrawals, 25% of wood harvested, and 40% of all material and energy flows (Alyami & Rezgui, 2012; Emmanuel, 2004).

The push toward sustainable design has been focused recently to embrace the delicate balance between buildings and the sustainable environment during to the rising energy costs and growing environmental concerns (Jalaei & Jade, 2015). As a result, various building rating systems have been established around the world to evaluate and rate green buildings. BREEAM (Building Research Establishment Assessment Method) is known as a first real rating tool to assess building performance based on certain target values for different criteria (Alyami & Rezgui, 2012). In addition, numerous schemes such as the United States' LEED (Leadership in energy and Environmental Design), New Zealand's Green Star, Japan's CASBEE (Comprehensive Assessment System for Building Environmental Efficiency) are currently using to evaluate the building performance. However, practitioners could be

confused about the assessment tools for sustainable buildings owing to their various standards. Therefore, both similar and different aspects of four mainstream schemes, including BREEAM; CASBEE; LEED; and Green Star NZ, will be examined in this paper.

2. A COMPARISON OF BREEAM, CASBEE, LEED, AND GREEN STAR NZ

All of the green rating systems had focused on an individual house/building at first (see Figure 1). At this stage, a building would be certified as the green building if they satisfy environmental requirements. However, environment is only one of three factors of sustainability besides social and economic ones (Epstein & Buhovac, 2014). As a results, new rating tools has been released and updated to measure the social and economic impacts of not only individual project but also its surrounded area. It is clear from Figure 1 and 2 that both BREEAM and CASBEE are seen as the comprehensive sustainable rating schemes, which cover all there pillars of sustainability and project lifecycle, Design-Built-Performance-Renovation. In addition, they are not limited to the domestic use with international rating tools, which are adaptable to different locations such as BREEAM International New Construction 2016 and CASBEE for Cities-Pilot version for worldwide use.

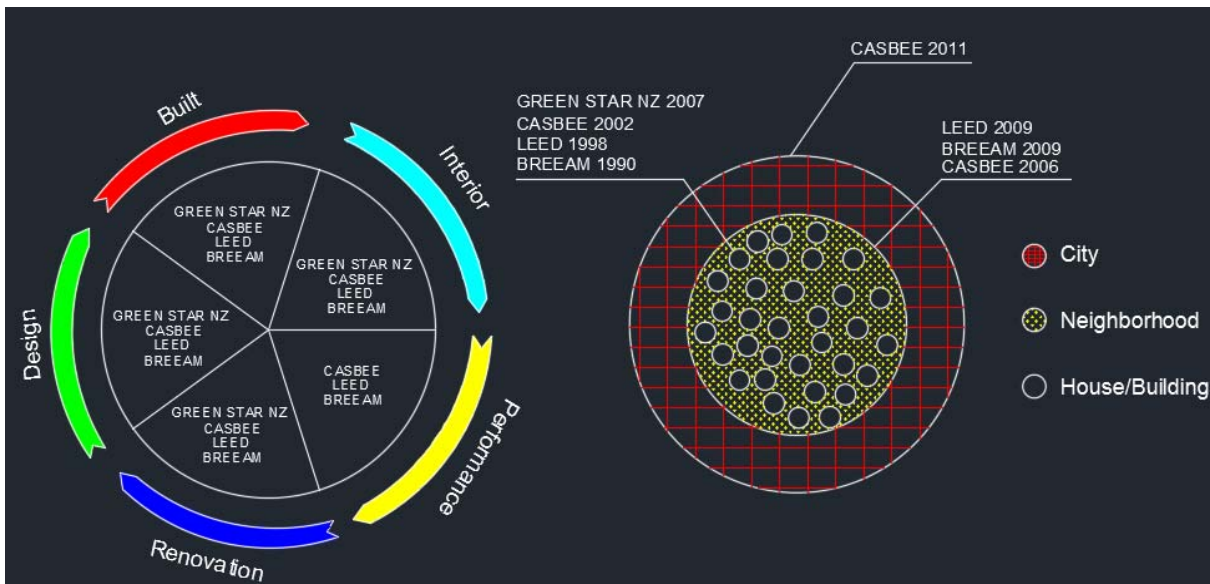


Figure 1. Overview of green rating tools

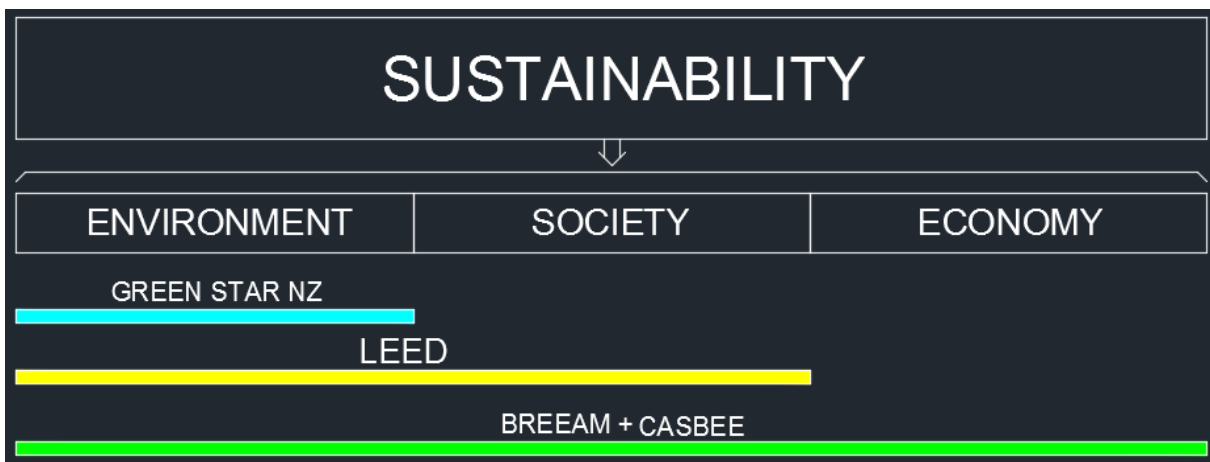


Figure 2. Sustainable assessment of green rating tools

Environmental and social factors are two main criteria in LEED rating scheme. In spite of releasing after BREEAM almost a decade, LEED is seen as the most popular and widely used, which certified over 15 billion square feet of projects in more than 160 countries and territories (LEED, 2016).

Comparing to other rating schemes, Green Star NZ is considered as “infantile” stage of the development. It currently only evaluates the environment of projects while the operation of projects is neglected (see Figure 1). However, it has seen a dramatic increase in a number of certified projects, reaching to 125 in 2016 which is ten times higher than the ones in 2009 (NZGBC, 2016).

Although these four rating schemes are used in different counties with different circumstances, they consist of six main criteria, Indoor Air Quality, Energy, Water, Materials, Pollution, Land Use and Ecology (see Table 1). It is clear from Table 1 that Green Star NZ is the weakest rating tools, which only assesses environmental factors. Followed by LEED which has increased its focused on integrative process to analyse the interrelationships among systems in order to achieve high-performance and cost-effective project outcomes besides natural conservation and social services. CASBEE evaluates all the sustainable pillars, environment; society; and economy, whereas a criterion, governance, is investigated to ensure the demands in communities in BREEAM.

Table 1. Criteria of BREEAM, CASBEE, LEED, and Green Star NZ

Criteria	BREEAM	CASBEE	LEED	Green Star NZ
Integrative Process			X	
Management	X			X
Indoor Air Quality	X	X	X	X
Quality of Service		X		
Energy	X	X	X	X
Transport	X		X	X
Water	X	X	X	X
Materials	X	X	X	X
Land Use and Ecology	X	X	X	X
Pollution	X	X	X	X
Innovation	X		X	X
Natural Conservation		X	X	
CO ₂ Absorption		X		
Governance	X			
Living Environment	X	X		
Social Services	X	X	X	
Social Vitality		X		
Industrial Vitality	X	X		
Financial Viability	X	X		
Emission Trading		X		

3. Conclusion

This paper presents the results of a comparative examination of four mainstream schemes. The results indicate that except Green Star NZ with the ignorance on building performance, BREEAM, CASBEE, and LEED assess all the life cycle of a project. Besides, environmental sustainability is the first factor that those rating schemes focus on; all of them share the same concern in assessing Indoor Air Quality, Energy, Water, Materials, Pollution, Land Use and

Ecology. LEED has updated and released new tools to evaluate social sustainability, while both social and economic pillars has been focused by BREEAM and CASBEE.

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