

Unveiling BEEER: A Novel Green Building Rating System's Potential in Bangladesh and its Global Synergy with Sustainability Frameworks

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Abstract

The construction industry, especially the building industry, has a significant negative impact on the environment, which causes notable air pollution in urban areas. To reduce the negative impact on the environment, many officials related to green building programs, communities, and organizations have come up with green building rating systems which will enhance the efficiency and sustainability of a building in terms of energy, materials, and space. Each rating system has its own characteristics and uniqueness. Recently, SREDA (Sustainable & Renewable Energy Development Authority) has developed a new green building rating system known as BEEER, which is in its initial stage. This paper aims to analyze the possibilities of the BEEER green building rating system in Bangladesh and depicts the similarities and differences among the established green building rating systems globally. The main focus of this paper is to 1) analyze the prospects of BEER in Bangladesh as well as globally and 2) depict the sustainable factors, similarities, differences, strengths and weaknesses of different green building rating systems. LEED, BREEM, GRIHA and BEEER (Building Energy Efficiency and Environment Rating) were used in this paper to make a comparison. It was also observed that there were some hindrances to establishing the BEEER rating system worldwide compared to other rating systems. The result will be helpful for various professionals, like local governments, planners, designers, and many more. It can be concluded that BEEER will play a vital role in Bangladesh's green building construction industry.

Keywords: BEEER (Building Energy Efficiency and Environment Rating); SREDA (Sustainable & Renewable Energy Development Authority); green building; rating system; local governments

1 Introduction

The building business is critical to meeting societal needs, improving quality of life, and contributing to a country's economic progress. However, it has been strongly criticized for contributing significantly to carbon emissions, environmental degradation, and global warming because to its extensive use of natural resources and energy consumption. The construction industry utilizes one-third of all world resources, one-sixth of global freshwater withdrawals, 25% of all harvested timber, and 40% of all raw materials. The fabrication of building materials consumes about 10% of the worldwide energy supply. Furthermore, the construction and demolition industries generate a significant quantity of waste, accounting for 40% of total solid waste in developed countries ((Doan et al., 2023). Furthermore, the construction industry consumes a significant amount of energy, accounting for 40-50% of total energy consumption and anthropogenic greenhouse gas emissions globally.

Recognizing the importance of environmentally sustainable building processes, the terms "going green" and "environment sustainability" have been used for many years. According to official statistics, construction is still a large energy consumer. This could be attributed to building professionals' apathetic attitude toward implementing sustainable solutions. With rising energy costs and growing environmental concerns, the need for environmentally friendly building facilities has recently increased. Authorities and groups created green building rating systems to reduce/optimize natural resource use and pollution. Buildings accredited by these grading systems are thought to use less energy, provide a better living environment, and contribute to the property's overall reputation. It is calculated that more than 600 rating systems are available worldwide. This paper aims to compare among LEED, BREEM, GRIHA and BEEER green building rating system and showing the potentiality of adopting Bangladesh own green building rating system BEEER.

Although numerous scholars have focused on green building rating certifications over the last 20 years, there is currently no comprehensive examination of the detailed criteria and updated procedure of each rating system. A number of publications focused on the trend and credits in an individual rating tool, but no comprehensive tool comparison has been produced.

So here the comparative analysis has been made among the different green building rating system and discuss the possibility of adopting Bangladesh own green building rating system BEEER.

1.1 Objective

The main objectives of this paper are to-

- Establish a comparison among the LEED, BREEM, GRIHA and BEEER green building rating system
- Enlighten the possibility of adopting new green building rating system BEEER (Building Energy Efficiency & Environment Rating)

2 Methodology

There will be a short comparison among different green building rating systems. So individual characteristics of each rating systems has been discussed here.

2.1 LEED

LEED is a voluntary standard created by the US Green Building Council (USGBC). It was first introduced in 1998 as a pilot version (LEED 1.0). Despite the fact that it was introduced after BREEAM, it is regarded the most widely accepted rating scheme in terms of the number of nations, with over 79,000 projects spanning 135 countries in 2012, almost 150 countries and territories in 2014, and over 160 countries and territories currently (Doan et al., 2023). Between 2008 and 2016, the square footage of LEED-certified projects increased considerably (nearly 100%), from roughly 0.15 billion to over 15 billion square feet. LEED, like BREEAM, focuses on environmental concerns such as Sustainable Sites, Water Efficiency, Energy and Atmosphere, Material and Resources, and Indoor Environment Quality. The entire lifecycle of the building might be examined using criteria from the Building Design and Construction, Interior Design and Construction, Building Operations and Maintenance, and Neighborhood Development manuals.

2.2 BREEAM

BREEAM is widely regarded as the world's first green building rating assessment, having been developed and implemented by the BRE (Building Research Establishment) in the United Kingdom. It was initially introduced to the market in 1990 and was first upgraded in 1993 to assess offices. It is widely acknowledged that BREEAM has influenced practically all subsequent major green grading systems, including LEED, Green Star, and CASBEE. Because of its versatility, BREEAM is frequently used. It not only evaluates local codes and conditions, but it also enables for use in international constructions. Furthermore, BREEAM allows for the assessment of a building's lifetime in terms of design, construction, operation, and refurbishment; BRE supplies New Construction, In-use, Refurbishment and Fit-Out, Communities, and Infrastructure guidelines for planners, local governments, developers, and investors. The European market share for sustainable building certifications is dominated by BREEAM certifications, which account for 80% of the total. Although BREEAM can examine all of the sustainability pillars, the environmental element remains the most important, with eight major categories including Management, Energy, Transport, Water, Materials, Waste, Land Use & Ecology, and Pollution.

2.3 IGBC

The International Green Building Council's Green New Buildings grading system is a voluntary and consensus-based approach. The rating system was created using materials and technologies that are now available. The goal of the IGBC Green New Buildings rating system is to allow a holistic approach to creating environmentally friendly buildings, including architectural design, water efficiency, effective waste management, energy efficiency, sustainable buildings, and an emphasis on occupant comfort and well-being. Certain necessary requirements and credit points are evaluated using a prescriptive approach, while others are evaluated using a performance-based approach. The ranking system has grown to be both thorough and user-friendly. The initiative is basically intended to address national issues and improve tenant quality of life.

2.4 BEEER

SREDA created the building rating system and serves as the implementation and execution body for the Building Energy Efficiency & Environment Rating (BEEER) to assure energy efficiency. At first, the rating system will

be entirely voluntary. Furthermore, it is based on specific baselines and calculation techniques in order to analyze and compare their consequences. The grading systems that have been intended to provide a holistic approach to green buildings by taking into consideration the complete environmental footprint of buildings (e.g., water waste, resources). Furthermore, social norms and working conditions will be evaluated, as will elements such as gender equality and the rights of minorities and low-skilled workers. Poor working and safety conditions are currently prevalent in the construction sector, which predominantly employs low-skilled employees and pushes women to perform labor intensive and physically demanding construction tasks (Doan et al., 2023). The BEEER will help to fight these practices and reform the construction sector in a sustainable manner by taking social standards and working conditions into account. In addition, training sessions and information will be provided for architects, developers, construction businesses, and suppliers to address the current lack of awareness and know-how and to increase capacity.

3 Discussion

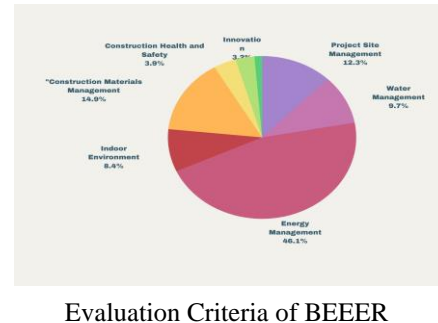
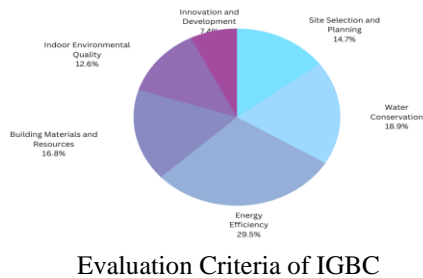
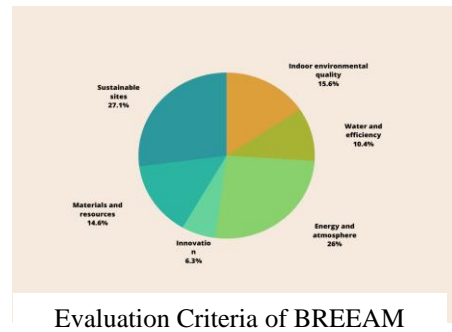
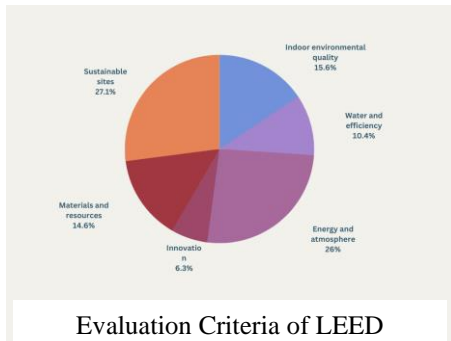
Table 1: Comparison among different rating system

Rating System	BEEER	LEED	BREEAM	IGBC
Overview	Developed in Bangladesh (drafted)	Internationally recognized	Primarily used in the United Kingdom and internationally	Developed specifically for India
Focus	Energy efficiency and environmental performance	Sustainable design and environmental performance	Environmental performance and sustainability	Sustainable design and environmental performance
Categories	Management and Planning Project Site Management Building Envelope Design Water Management Energy Management Indoor Environment Quality Construction Materials Management Construction Health and Safety Innovation Bonus Points	Integrative Process Location and Transportation Sustainable Site Water Efficiency Energy and Atmosphere Material and Resources Indoor Env. Quality Regional Priority Innovation	Management Health and Well-being Energy Transport Water Material Waste Land Use and Ecology Pollution Innovation	Sustainable architecture and Design Site selection and planning Water conservation Energy efficiency Materials and resources Indoor environmental quality Innovation and development
Additional Criteria	- Sustainable site planning and design	- Sustainable site selection and development	- Site selection and planning	- Site selection and planning
	- Energy-efficient building design and systems	- Energy efficiency and renewable energy use	- Energy use and carbon emissions	- Energy efficiency and renewable energy use
	- Water conservation and management	- Water efficiency and conservation	- Water management and conservation	- Water efficiency and conservation

	- Waste management and recycling	- Waste management and recycling	- Waste management and reduction	- Waste management and recycling
	- Indoor environmental quality and occupant comfort	- Indoor air quality and occupant comfort	- Indoor air quality and occupant satisfaction	- Indoor air quality and occupant comfort
	- Sustainable material selection and use	- Sustainable material selection and use	- Sustainable material sourcing and use	- Sustainable material selection and use
	- Biodiversity conservation and ecological enhancement	- Biodiversity conservation and ecological enhancement	- Biodiversity and ecological enhancement	- Biodiversity conservation and ecological enhancement
	- Innovation and sustainable practices	- Innovation in design and sustainable practices	- Innovation and implementation of sustainable practices	- Innovation and green building practices
Rating Levels	Certified, Bronze, Silver, Gold, Platinum	Certified, Silver, Gold, Platinum	Unclassified, Pass, Good, Very Good, Excellent, Outstanding	Certified, Silver, Gold, Platinum
Assessment Method	Points-based	Points-based	Points-based	Points-based
Certification	Optional	Optional	Optional	Optional
Regional Adaptation	Tailored for Bangladesh's climatic and environmental conditions	Can be adapted to different regions	Can be adapted to different regions	Tailored for Indian climatic and environmental conditions
Global Applicability	Primarily used in Bangladesh	Internationally recognized and used worldwide	Primarily used in the United Kingdom, but applicable globally	Primarily used in India, but applicable globally
Industry Recognition	Gaining recognition in Bangladesh	Widely recognized globally	Widely recognized in the UK and internationally	Widely recognized in India and gaining international recognition
Scope	BEEER focuses on a holistic approach to green buildings by taking the entire environmental footprint of buildings (e.g. water waste, resources) into account. In addition, social standards and working conditions will be assessed and aspects of,	LEED focuses on a comprehensive set of sustainability goals as a means of coping with climate change, enhancing occupants' well-being, and protecting water resources, as well as promoting biodiversity, regenerative material cycles, green economy, community justice, and quality of life	BREAM focuses wide-ranging environmental and sustainability issues like low impact design and carbon emissions reduction, durability and resilience, adaption to climate change, ecological value and biodiversity protection.	IGBC focuses on occupant comfort and well-being Green by facilitating a holistic approach to create environment-friendly buildings, through architectural design, water efficiency, effective handling of waste, energy efficiency, sustainable buildings.

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Focus	BEER covers various types of buildings, including residential, commercial, institutional, and industrial structures for both new construction and existing structure	LEED rating is applicable to new construction, existing buildings, commercial interiors, core and shell, homes, neighborhood development, school, and retail building types.	BREAM is applicable to the New Construction In-Use Refurbish and Fit-Out Communities.	IGBC G+A1:E20reen New Buildings rating system® is designed primarily for new buildings, both for air-conditioned and non air-conditioned buildings. New Buildings include (but are not limited to) offices, IT parks, banks, shopping malls, hotels, hospitals, airports, stadiums, convention centers, educational institutions (colleges, universities), libraries, museums, etc., Building types such as residential, factory buildings, schools, integrated townships will be covered under other IGBC rating programmes.																																																
Rating Level	<table border="1"> <thead> <tr> <th></th> <th>Points</th> </tr> </thead> <tbody> <tr> <td>1 star</td> <td>50-60</td> </tr> <tr> <td>2 star</td> <td>61-70</td> </tr> <tr> <td>3 star</td> <td>71-80</td> </tr> <tr> <td>4 star</td> <td>81-99</td> </tr> <tr> <td>5 star</td> <td>100-150</td> </tr> </tbody> </table>		Points	1 star	50-60	2 star	61-70	3 star	71-80	4 star	81-99	5 star	100-150	<table border="1"> <thead> <tr> <th>Certification Levels</th> <th>Points</th> </tr> </thead> <tbody> <tr> <td>Certified</td> <td>50-59</td> </tr> <tr> <td>Silver</td> <td>60-69</td> </tr> <tr> <td>Gold</td> <td>70-79</td> </tr> <tr> <td>Platinum</td> <td>80-89</td> </tr> <tr> <td>Super Platinum</td> <td>90-100</td> </tr> </tbody> </table>	Certification Levels	Points	Certified	50-59	Silver	60-69	Gold	70-79	Platinum	80-89	Super Platinum	90-100	<table border="1"> <thead> <tr> <th>Rating Level</th> <th>Points Range</th> </tr> </thead> <tbody> <tr> <td>Outstanding</td> <td>85-100</td> </tr> <tr> <td>Excellent</td> <td>70-84</td> </tr> <tr> <td>Very Good</td> <td>55-69</td> </tr> <tr> <td>Good</td> <td>40-54</td> </tr> <tr> <td>Pass</td> <td>30-39</td> </tr> <tr> <td>Unclassified</td> <td><30</td> </tr> </tbody> </table>	Rating Level	Points Range	Outstanding	85-100	Excellent	70-84	Very Good	55-69	Good	40-54	Pass	30-39	Unclassified	<30	<table border="1"> <thead> <tr> <th>Certification</th> <th>Points</th> </tr> </thead> <tbody> <tr> <td>Certified</td> <td>40-49</td> </tr> <tr> <td>Silver</td> <td>50-59</td> </tr> <tr> <td>Gold</td> <td>60-79</td> </tr> <tr> <td>Platinum</td> <td>80 points and above</td> </tr> </tbody> </table>	Certification	Points	Certified	40-49	Silver	50-59	Gold	60-79	Platinum	80 points and above
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From the above table variation among different rating systems are evident. Different rating systems have their own pros and cons. Among all that rating systems BEEER is our very own green building rating system. Unlike LEED, BREEAM and IGBC, BEEER don't have that worldwide exposure but it has that potentiality. In this table we can see the BEEER has its own rating systems and also some similarities with the other rating systems. So, we can hope that in near future BEEER rating system will be provided in the world stage for green building.



4 Conclusion

This study examines four green building grading systems across 17 criteria and discovered that the most commonly utilised criterion in descending average weights are energy efficiency, interior environmental quality, health and welfare, sustainable siting, material efficiency, water efficiency, and innovation.

This research helps to a deeper knowledge of the most widely used green building grading systems around the world. It draws attention to the differences in evaluation criteria and weights of the criterion, allowing developers or building managers to focus on the factors most relevant to the rating systems of interest. It suggests that overlapping parts of a rating system be examined in order to continuously improve the rating system's efficiency. It also suggests that Bangladesh develop its own green building rating system in the near future. Future research should look at how the perceived value of the green building rating criterion correlates with the allotted weights. It is also fascinating to compare how green buildings perform in different nations in terms of sustainability to nongreen structures. This study also highlights the necessity to examine rating system implementation and the barriers to implementation.

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