

Review on Malaysia's GreenRE in Comparison with Singapore's GreenMark and UK's BREEAM

Halmi Zainol¹, Fadhilah Che Aziz², Suharto Teriman³, Haryati Mohd Isa⁴, Muhamad Asri Abdullah Kamar⁵
^{1,2,3,4,5}Faculty of Architecture, Planning and Surveying, Universiti Teknologi MARA (Perak), Malaysia,
Email: halmi461@perak.uitm.edu.my, fadhilahaziz81@gmail.com, suhar429@perak.uitm.edu.my,
harya966@perak.uitm.edu.my, masri418@perak.uitm.edu.my

Abstract

The movement of green building was started after the Agenda21. International Council for Research and Innovation in Building and Construction highlighted the main challenges that sustainable development presents to the construction industry. The Agenda had an important role in the creation of green assessment tools in building industry. An international project coordinated from Canada namely GB Tool (Green Building Tool) was the first attempt to develop green rating tool. The awareness has emerged the implementation of various rating tools such as LEED, CASBEE, BREEAM and GreenMark developed by the United States of America, Japan, United Kingdom and Singapore respectively. Many rating systems can be developed in different regions that look quite different, but share a common methodology and set of terms. In Malaysia, a new set of rating tool was developed by the Real Estate and Housing Developers Association (REHDA) known as GreenRE. This paper reviews the GreenRE and compare it with GreenMark and BREEAM. Since the latter were more established, this paper will study strengths, weaknesses, gaps and issue within the GreenRE. With the outcome of this study, it may help both the authority and industry-players to prepare a comprehensive assessment tool that suit to local practice.

Keywords: Greenrating tool; Assessment; GreenRE;

1. Introduction

The establishment of green building rating tools such as LEED, BREEAM and GreenMark has contributed to the vast movement of high performance building (Kibert, 2008). The policies may be either compulsory or voluntary or a mix of both for building sectors in these countries. Each of these programs ultimately lead to a certification which requires precise fulfillment of all terms and processes stipulated in the program's documents (Ahankoo, Morshedi & Rad, 2013). In Malaysia, REHDA, a non-profit organization has developed a rating tool namely GreenRE. GreenRE incorporates internationally recognized best practices to provide the industry with a more efficient and practical green tool (GreenRE.org, 2014). Therefore a comparison review of GreenRE with two (2) international rating tools is pivotal to set a milestone of comprehensive green rating tool in Malaysia. "Building environmental systems must reflect national, regional and local differences if they are to be accepted and used" (Todd & Geissler 1999, Todd & Lindsey, 2000). Hence, Singapore's GreenMark has similar weather condition, social and cultural value, therefore a comparison of Malaysia's GreenRE to Singapore's GreenMark is crucial. Due to the oldest established green rating tool in the world, as a comparison to the UK's BREEAM is a necessity.

GreenRE was introduced in 2013 in Malaysia after four (4) years Green Building Index (GBI) is implemented. The GreenRE attempts to set a whole new assessment tool for sustainable building. To date, the GreenRE has three (3) components of assessment according to building type, namely 1) Existing Non-Residential Building (ENRB) 2) Non-Residential Building (NRB) and 3) Residential Building (RES).

The Green Mark assessment program was developed by the Building and Construction Authority (BCA) of Singapore in January 2005 to promote sustainability in the construction industry and raise environmental awareness among stakeholders of a project. It was modeled after the same schemes adopted in countries such as USA's LEED and Australia's GBAS. GreenMark Program evaluates both residential and non-residential buildings (new or existing) to measure their performance in terms of sustainability and identify the impact of building on the environment.

The Building Research Establishment Environment Assessment Method (BREEAM) is one of the world's leading and most widely used environmental assessment method for buildings. It was launched in United Kingdom in 1990. The main function of this assessment tools are primarily on building specification evaluation including the design, construction and use (BREEAM, 2013). BREEAM sets the standard for best practice in sustainable design and claims to have become the de-facto measure used to describe a building's environmental performance

(Aspinall,Sertyesilisik, Sourani, &Tunstall, 2013). BREEAM offers assessments of buildings outside the UK. Malaysia is not exception. In March 2014, Construction Industry Development Board or CIDB of Malaysia has signed the memorandum of understanding (MoU) with BRE to collaborate in developing sustainability assessment tools and certification schemes.

2.0 Green Building And Sustainable Background

The concept of green building refers to a structure that attempts to consume zero energy and has a minimum negative impact on the environment. A remarkable growth in the advanced construction techniques has intensified significantly the needs for having sustainable buildings. Many countries have taken notable steps in this area. These steps have led to introducing sustainable assessment tools. Assessment tool is an initiative by building construction interest-group for certifying, designing and constructing sustainable buildings. It seeks to quantify sustainability by way of subjective scoring against a set of criteria. It involves many parties to develop a comprehensive checklist and guidelines for architect, designer and developer in order to achieve green building certification. Over the years, assessment tools have successfully created awareness among clients to pursue sustainable buildings.

In Malaysia, it started in 2005 with the Ministry of Energy, Green Technology and Water also known as Less Energy Office (LEO), located in Putrajaya. The LEO building's aim is to set exemplary energy efficiency office building by using 50% less energy consumption than new conventional offices (GBI, 2014). As a result, it received its recognition through the 2006 ASEAN Energy Award (Hong, Chiang, Shapiro,& Clifford, 2007). Then in 2007, Malaysia's Green Energy Office also known as GEO building was built in Bandar BaruBangi, Selangor. It has successfully reduces the energy consumption by 30% compare to the LEO building. When the GBI was launched in 2009, the GEO building was the first building certified. Both buildings are the showcases of successful green buildings in Malaysia.

3.0Parameters of Assessment Tools (Non-Residential New Construction)

The assessment parameters are varies from GreenRE, GreenMark and BREEM (UK). Six assessment categories are required for GreenRE, 5 categories for GreenMark and 9 categories for BREEM (UK). In terms of assessment marks for each tool are also different from one another. GreenRE needs 164 marks, GreenMark 190 marks and BREEAM (UK) only required 100 marks for evaluation. Assessment categories and marks as follows;

3.1 Green RE

Six (6) categories in GreenRE carry maximum of 164 marks divided by percentage as follows:

1) Energy Efficiency;	60%
2) Water Efficiency;	8.5%
3) Environmental Protection;	19.5%
4) Indoor Environmental Quality;	5%
5) Other Green Features and;	4.5%
6) Carbon Footprint of Development.	2.5%

3.2 Green Mark

Five (5) key criteria in GreenMark weigh 190 marks which isdivided into percentage as follows:

1) Energy Efficiency;	61%
2) Water Efficiency;	9%
3) Environmental Protection;	22%
4) Indoor Environmental Quality, and;	4.3%
5) Other Green Features	3.7%

3.3 Breeam (UK)

Nine (9) key categories in UK’s BREEAM carries 100 marks which weighed are as follow:

- 1) Management; 12%
- 2) Health and Wellbeing; 15%
- 3) Energy; 19%
- 4) Transport; 8%
- 5) Water; 6%
- 6) Materials; 12.5%
- 7) Waste; 7.5%
- 8) Land Use and Ecology, and; 10%
- 9) Pollution 10%

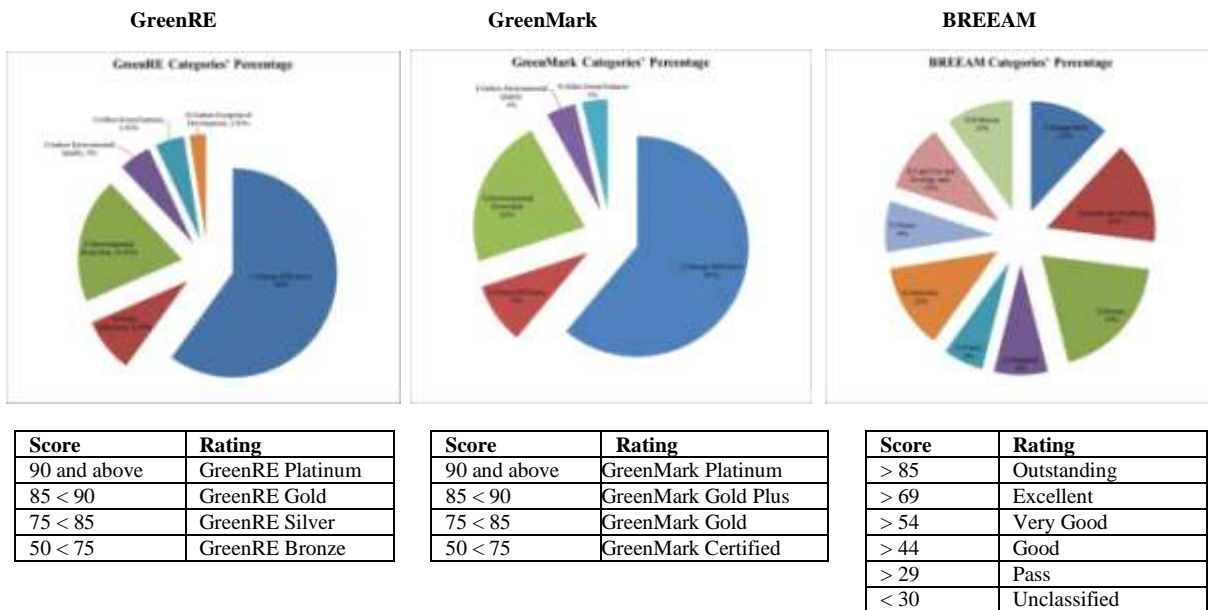


Figure 1: Percentage of award rating for each category in the GreenRE, GreenMark and BREEAM

From the charts above show GreenRE has similar weightage percentage to GreenMark. Both carries a high percentage for Energy Efficiency category. However, BREEAM has a more balanced distribution among all categories. In terms of award rating, GreenRE and GreenMark have the exact method for score and rating. Both are award rating by the sum of score for all categories, while BREEAM uses percentage. Therefore, GreenRE and GreenMark can be considered fair compare to BREEAM. For example, to be awarded GreenRE Platinum, a building should score from 90 points to 164 points. For GreenMark’s Platinum, the same building should score from 90 points to 190 points. Meanwhile in BREEAM, the highest rating is the Outstanding Award; between 90% to 100% score. In one perspective, GreenRE and GreenMark are both new rating tools in the country of origin. Perhaps the intention to promote awareness and encouragement for building owners to build sustainable buildings to meet the quality and healthy environment. BREEAM which was implemented for nearly 25 years, therefore the purpose is to maintain sustainable buildings and with such method provides feedforward to building owner.

4.0 Mapping Of GreenRE to GreenMark And BREEAM

Although the assessment parameters are vary from GreenRE, GreenMark and BREEAM (UK), however several categories are similar as shown in Table 1.

Table 1: Mapping on categories between GreenRE, GreenMark and BREEAM

GreenMark	GreenRE	BREEAM (UK)
1) Energy Efficiency (61%)	↔ 1) Energy Efficiency (60%)	↔ 3) Energy (19%)
2) Water Efficiency (9%)	↔ 2) Water Efficiency (8.5%)	↔ 5) Water (6%)
3) Environmental Protection (22%)	↔ 3) Environmental Protection (19.5%)	↔ 2) Health and Wellbeing (15%)
4) Indoor Environmental Quality (4.3%)	↔ 4) Indoor Environmental Quality (5%)	↔
5) Other Green Features (3.7%)	↔ 5) Other Green Features (4.5%)	1) Management
	6) Carbon Footprint of Development	4) Transport
		6) Materials
		7) Waste
		8) Land Use and Ecology
		9) Pollution

4.1 Comparison GreenRE to GreenMark

Five (5) of GreenRE categories are similar to GreenMark namely Energy Efficiency, Water Efficiency, Environmental Protection, Indoor Environmental Quality and Other Green Features while GreenMark does not have category no. 6 in GreenRE namely Carbon Footprint of Development. The percentages of the categories are almost the same.

4.2 Comparison GreenRE to BREEAM

Two (2) of GreenRE categories are similar to three (3) categories in the BREEAM namely, Energy Efficiency, Water Efficiency and Health & Wellbeing. However, the percentages of the categories are significant difference especially in Energy categories. The major loopholes in GreenRE as compare to BREEAM are the Management, Transport, Materials, Waste, Land Use and Ecology and Pollution.

Table 2, 3 and 4 summarize the similarity of green policies in each category for GreenRE, GreenMark and BREEAM.

4.2.1 Energy Efficiency (EE)

Table 2: Comparison on Energy Efficiency

Green Policies	GreenRE	GreenMark	BREEAM (UK)
Monitoring And Measuring Performance		√	√
Providing Renewable Energy	√	√	√
Enhanced Commissioning			√
Refrigerant Management	√	√	√
Reduced Energy Use	√	√	√
Emissions Reduction Reporting			√
Energy Efficient Lighting Systems		√	√
Electrical Sub-Metering		√	√
Artificial Lighting	√	√	√

Even though Energy Efficiency category is the highest score with 60% in GreenRE, the green policies cover by GreenRE are only four (4) namely, 1) providing renewable energy, 2) refrigerant management, 3) reduced energy

use and 4) artificial lighting. This mainly caused by major difference in construction practices, building regulations and infrastructure.

4.2.2 Water Efficiency (WE)

Table 3: Comparison on Water Efficiency

Green Policies	GreenRE	GreenMark	BREEAM (UK)
Water Conservation		√	√
Cooling Tower Water Management	√	√	
Monitoring Regularly and Leak Detection	√	√	√
Water Efficient Landscaping	√	√	
Innovation for Reducing Water Use			√
Application of Water Efficient Fittings	√	√	√
Leading in applying Advanced Wastewater Technologies			√
Minimizing indoor plumbing			

Water Efficiency category shows gaps in GreenRE, GreenMark and BREEAM. GreenRE covers four (4) areas in green policies namely, 1) cooling tower water management, 2) monitoring regularly and leak detection, 3) water efficiency landscape and 4) application of water efficiency fittings. This mainly caused by climate and construction practices.

4.2.3 Indoor Air Quality and Environmental Protection (IAQ)

Table 4: Comparison on Indoor Air Quality and Environmental Protection

Green Policies	GreenRE	GreenMark	BREEAM (UK)
Indoor air quality development		√	√
Outdoor air delivery monitoring		√	
Low-Emitting Materials	√	√	√
Indoor Chemical and Pollutant Source Control	√		√
Controllability of Systems			
Thermal comfort monitoring		√	
Daylight and views		√	√
Thermal Comfort	√	√	√
Noise Level	√	√	√
Increased ventilation	√		√
Construction Indoor Air Quality Management Plan			√

IAQ category shows major gaps in GreenRE. GreenRE covers five (5) areas in green policies namely, 1) low-emitting materials, 2) indoor chemical and pollutant source control, 3) thermal comfort, 4) noise level and 5) increased ventilation. This mainly caused by construction materials and construction practices.

5.0 Contribution To The Industry

GreenRE isaquick win tool in green building assessment. It has some key principles of green building that can give motivation to client, developer and designer to build green buildings. The industry can benefit from GreenRE tool to promote their building to the public and increase selling value. However, GreenRE shall benchmarks

BREEAM to their standards since BREEAM has set milestone in rating tool worldwide whereby they offer rating for buildings outside the UK. It is a good shift to move our construction quality to an international standard (ZuhairuseMdDarus, Nor AtikahHashim, Elias Salleh, Lim Chin Haw, Abdul Khalim Abdul Rashid & SitiNurhidayah Abdul Manan, 2009). Two of the factors to benchmark any international rating tools is the local construction practices and building regulations. Therefore, with comprehensive rating tool framework, a local building can be certified by to BREEAM by using national building regulations. The building can recognize internationally with concern of local context. Furthermore, the industry can benefit from BRE's knowledge and expertise, best practice sharing and less resources required.

6.0 Conclusions

GreenRE is currently behind GreenMark and BREEAM in term of the categories covered. Significant gaps appear between GreenRE and BREEAM in six (6) areas such as Management, Materials, Transport, Waste, Land Use and Ecology and Pollution. Nevertheless, in three (3) categories similar to GreenRE and BREEAM, GreenRE still have major loopholes in green policies for each category. GreenRE has Innovation criteria as GreenMark but locate it in Other Green Features. However, there are two (2) categories in GreenRE do not cover in BREEAM and GreenMark such as Other Green Features and Carbon Footprint of Development. GreenRE has a long way to go to be a comprehensive assessment tool in Malaysia and in the region. Therefore, these areas are suggested to be studied in future research in term of their relevancy in Malaysia's practice for current and future implementation.

7.0 References

- Ahankoob A., Morshedi S.R.E., & Rad, K.G (2013). A Comprehensive Comparison between LEED and BCA Green Mark as Green Building Assessment Tools, *The International Journal Of Engineering And Science (IJES)*, 2 (7): 31-38.
- Aspinall, S., Sertyesilisik, B., Sourani, Amr.& Tunstall., A (2013). *How Accurately Does Breeam Measure Sustainability?*, Creative Education, 3, 1-8.
- BREEAM New Construction Non Domestic Buildings Technical Manuals SD5073-2:0:2011 (<http://www.breeam.org>)
- Hong, W., Chiang, M.S., Shapiro, R.A. & Clifford, M. S. (2007). *Building Energy Efficiency: Why Green Buildings Are Key To Asia's Future*.
- Kilbert, C.J., (2012). *Sustainable Construction: Green Building and Delivery*, 3rd Edition, John Wiley and Sons, USA.
- GBI Assessment Criteria for Non Residential New Construction (NRNC), Green Building Index, April 2009.
- GreenRE Design Reference Guide Non-Residential Building NRB v1.2, REHDA (<http://www.greenre.org>)
- Todd, J.A. and Geissler, S., (1999). Regional and Cultural Issues in Environmental Performance Assessment for Buildings. *Building Research & Information*, 27 (4/5), 247-256.
- Todd, J.A., & Lindsey, G., (2000). Comparative Assessment of GBC 2000 and LEED: Lessons learned for international and national system. *International Conference Sustainable Building*, 22-25 October, Maastricht, Netherland
- ZuhairuseMdDarus, Nor AtikahHashim, Elias Salleh, Lim Chin Haw, Abdul Khalim Abdul Rashid & SitiNurhidayah Abdul Manan (2009). *Development of Rating System For Sustainable Building in Malaysia*, WSEAS Transactions on Environment and Development, 3(4), 260-272.