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AN OVERVIEW OF THE GREEN BUILDING RATING SYSTEMS IN THE MALAYSIAN CONSTRUCTION INDUSTRY

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Abstract: *It is a goal under the Malaysian government Green Technology Master Plan 2017-2030 (the GTMP) that there shall be an increase from 550 total targeted green buildings in 2020 to a total of 1,750 green buildings by 2030 with substantial targeted emission reduction in both government and private buildings. Evaluating sustainability of a project has, thus, become a necessity. In fact, the GTMP aspires to alter the current landscape of voluntary rating system by making it mandatory. The world has seen the proliferation of green building rating systems as a method to measure sustainability in buildings. In Malaysia, there are at least ten green building rating tools that had been introduced for that very purpose. However, there appears to be no consistency in terms of assessment with different rating tools focusing or giving weight on different criteria of sustainability factors or themes. This paper provides an overview of the existing green building rating systems developed in Malaysia and highlights the differences in the nature and assessment criteria, if they are to be adopted. This paper further discusses on the worldwide debate on the best practice in measuring and reporting on sustainability of a project or building and how the transition from voluntary to mandatory rating system as aspired by the GTMP may be the solution to the issue of "greenwashing".*

Keywords: *Best Practice, Green Buildings, Green Rating Tools, Malaysi*

I. INTRODUCTION

The term sustainable development has become a buzzword and key indicator in many sectors since it was first mooted in 1987 by the World Commission on Environment and Development (WCED). The WCED in its report known as the Brundtland Report defined the concept (of sustainable development) as follows:

> *"Humanity has the ability to make development sustainable – to ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs. The concept of sustainable development does imply limits – not absolute limits but limitations imposed by the present state of technology and social organisation on environmental resources and by the ability of the biosphere to absorb the effects of human activity…"(Brundtland, 1987)*

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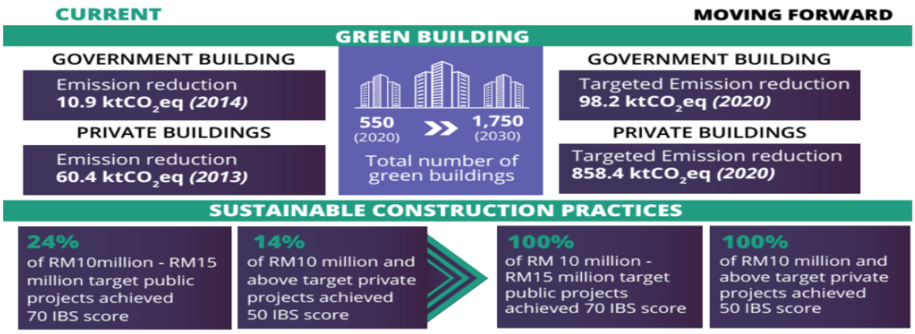
Construction sector is one of the major sectors impacted by the issue of sustainability as it uses the earth's resources to build, among others, buildings. Rapid economic growth and urbanization have led to extensive development of buildings and infrastructure. In Malaysia alone, it has been estimated that the country needs a total "8,850,554 houses between years 1995 to 2020, with an average of 1,790,820 units to be built for every 10 years" (Hamid et al., 2014). As observed by RSMeans (2011), "there is little dispute now that buildings are substantial CO_2 emitters and contribute substantially to climate change" (RSMeans, 2011).

Realising this, under the Eleventh Malaysia Plan (2016 – 2020), with "green growth" as the main strategic thrust (Economic Planning Unit, 2015), the Malaysian government came up with the Green Technology Master Plan 2017 – 2030 ("GTMP 2030") focusing on six key sectors and one of them is the building sector (KeTTHA, 2017). It is also part of the Eleventh Malaysia Plan under Chapter 8 "Reengineering Economic Growth for Greater Prosperity" and Focus Area D "Transforming Construction", a national agenda called "the Construction Industry Transformation Programme 2016 -2020" ("CITP") had been devised with the aim "to transform the construction industry to be highly productive, environmentally sustainable, with globally competitive players while focused on safety and quality standards" (CIDB, 2015).

The Initiatives under the GTMP are threefold, they are towards: (i) green building design; (ii) sustainable construction practice; and (iii) green building materials. In this respect, the Malaysian Ministry of Energy, Science, Technology, Environment & Climate Change (MESTECC) is working hand in hand with the Malaysian Construction Industry Development Board (CIDB), a statutory body entrusted with the running of the CITP. The CITP recognises among other things the inefficiencies in the construction practices and the harms they have caused to the environment as well as issues in quality, safety, and productivity (CIDB, 2015). The Malaysian government is committed towards 'greening' the Malaysian construction industry and has given its commitment amongst others, on the promotion of 'green buildings' (Ministry of Natural Resources and Environment Malaysia, 2015).

The goals of the GTMP 2030 can be seen in Figure 1 which inter alia earmarked the increase from 550 total targeted green buildings in 2020 to a total of 1,750 green buildings in 2030 with substantial targeted emission reduction in both government and private buildings.

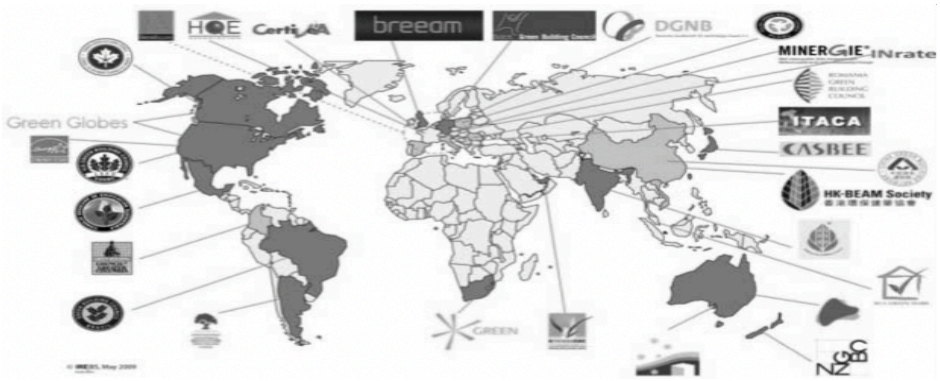
Figure 1. The goals of the GTMP 2030



Source: KeTTHA (2017)

Corollary to this, evaluating the sustainability of projects has become a necessity. Since the introduction of an assessment method called the "Building Research Establishment's Environmental Assessment Method (BREEAM)" in the UK, in 1990, the adoption of green building rating system, as a method to assess and certify sustainability of buildings has become widespread. The United States came up with a rating system called the "Leadership in Energy and Environmental Design" ("LEED"), Japan with the "Comprehensive Assessment System for Building Environmental Efficiency" ("CASBEE") and Australia with "Green Star", to name a few. LEED has been recorded to be the most widely used system, "with over 40,000 domestically and internationally certified projects" under its belt (CIDB, 2018). Figure 2 shows the other examples of green building rating tools in different parts of the world.

Figure 2. Examples of green building rating tools in different parts of the world.



Source: Reed et al. (2009)

II. RATING TOOLS – ARE THEY FOOLPROOF?

The benefits in employing these assessment tools are indubitable. As summarised by Reed et al. (2009), "It helps raising awareness of environmental issues and standards that the assessment tools recognize and encourage best practice and stimulate the market for sustainable construction and property. The tools further provide a veriable method and framework for professionals to use. It is also possible to link the tools to government policies and regulations, such as certification and labels and incentive initiatives. Finally, on an individual building level, the adoption of assessment tools improves property management and prioritization of maintenance and operational needs to enhance sustainability".

However the rating tools are not without shortcomings. For example, even for the most widely used system i.e. LEED, there was a phenomenon termed as 'LEED brain' levied against it. It has been argued that "there was a disconnect between the concept of LEED and the reality of the tool in use". The assessment was said to be "prohibitively expensive and was driven by scoring points and not on designing sustainable buildings for a particular site and use". "The energy modeling adopted by the tool was said to be 'fiendishly complicated' and the assessment process was crippled by bureaucracy" (Reed et al., 2009).

However, of more concern, according to the authors, was observation relating to the "overblown claims for green buildings." Hence, a question – "was it possible that buildings having high LEED ratings were not actually that sustainable?" LEED was not the only rating tool tainted with this issue. BREEAM were also said to have inflated their claims for green buildings under their ratings when only 1% - 2% of new stock (of green buildings) was added to the total stock each year. "It will be many decades before the entire stock is 'sustainable'", it had been argued. (Reed at al.,2009)

The rating tools that had been introduced all around the world, thus far, are for voluntary adoption. They are just benchmarking some key standards or factors in determining sustainability of a building and therefore subject to change with the progress of time and new discovery. In a recent study conducted by the Deakin University's School of Architecture and Built Environment on these relevant certification schemes in Australia, two main areas of concern were discovered: Firstly, the fact that the rating tools are not made subject to government's audit. The study observes that "most rating tools are predictive, while those few that take measurements use paid third parties with the government plays no active part". Secondly, there seems to be a disconnection

between the sustainability parameters that are measured in the rating tools with the building occupants' sustainability concerns. For example, the building occupants' concerns over access to transport and amenities may not be considered or may be given less weightage as compared to other sustainability factors. (Igor & Hosseini, 2018).

The other concern relates to the proliferation of rating tools all around the world. Each of them, observed by Igor & Hosseini (2018), "competes in the marketplace by looking to reconcile the credibility of its ratings with the disinclination of developers to submit to an assessment that will rate them poorly". The authors conclude that "there may be easy to find landmark developments labelled with green accreditations". It is however "harder to quantify what these actually mean". The issue is popularly known as 'greenwashing'.

Within these parameters of concerns, we shall now look into the rating tools in Malaysia. It aims as an overview on the available rating tools, their issues, and potential solutions.

III. METHODOLOGY

This paper provides an overview of the existing green building rating systems developed in Malaysia and highlights the differences in the nature and assessment characteristics, if they are to be adopted. This paper further discusses on the worldwide debate on the best practice when it comes to the process of measuring and reporting on sustainability of a building and touches on the issue of "greenwashing".

The methodology adopted is purely doctrinal. The sources of data are mainly library-based and relying on both primary and secondary sources. The primary sources include the relevant statutory provisions and the relevant subsidiary legislations (rules, regulations, and by-laws). The secondary sources referred to include books, journals, reports, periodicals, online publications, and other library-based information. Official reports and statistics by the relevant Malaysian government ministries, departments and agencies such as the Ministry of Works, MESTECC, Public Work Department (PWD) and other agencies such as the CIDB, Construction Research Institute of Malaysia (CREAM), Malaysian Institute of Architects (PAM), Association of Consulting Engineers Malaysia (ACEM) and the developers of the respective rating tools are the main references in coming up with the analysis.

IV. RESULTS AND DISCUSSIONS

The Rating Tools: An Overview

Consistent with the objective approach taken globally in other countries and the national agenda i.e. towards promotion of green buildings and sustainable construction, sustainability rating tools were introduced in the Malaysian construction industry. The first sustainability rating tool was introduced in 2009 and known as the "Green Building Index" ("GBI").

The GBI was developed under the initiatives of PAM together with ACEM. The GBI rating scores are based on six key criteria i.e. energy efficiency, indoor environment quality, sustainable site planning and management, materials and resources, water efficiency and innovation (GSB, 2011).

Since the introduction of the GBI, there are other green building rating tools developed by various organizations. Table 1 describes these rating tools, the developers and rating criteria.

Lack of Standardization

From the information gathered in Table 1, it is apparent that the rating tools are not standardized. Although the major themes of sustainability (i.e. rating criteria) for assessment may appear to be almost similar, there are differences in the nature and assessment characteristics.

CIDB in a study entitled Built It Green: An Overview of Sustainability Green Building Rating Tools in Malaysia remark that "each of these tools has demonstrated its capacity in showing the sustainability level of a building. However, differences in nature and assessment characteristics have caused complications for stakeholders in comparing the green performances of each building that utilizing different rating tools. Moreover, each of these rating tools aimed to be applied in different stages of construction works (i.e. design, construction, operation and maintenance) and none of them cover the whole process cycle, resulting in the necessity of adopting different assessment methods to evaluate the same project at different stages." (CIDB, 2018)

Table 1. List of green rating tools in Malaysia, their developers and rating criteria

Green Rating Tools	Developers	Year of Inception	Rating Criteria
GBI	PAM & ACEM	2009	Energy efficiency, indoor environment quality, sustainable site planning and management, materials and resources, water efficiency and innovation.
Sustainability Index (SUSDEX)	Sime Darby Berhad	2010	A bespoke index now known as SUSDEXPlus. Focusing on guiding and managing the company's townships and business processes.
Low Carbon City Framework ("LCCF")	Ministry of Energy, Science, Technology, Environment and Climate Change (MESTECC)	2011	LCCF is a national framework and assessment system to guide stakeholders for cities, township and neighbourhoods to re-assess their priorities in the planning and developing of new projects as well as strategies that can be taken by existing cities, townships and neighbourhoods in reducing their carbon emission levels. The LCCF has an in-built carbon calculator with carbon equivalents that would help stakeholders assessing their current baseline levels of the cities, townships and neighbourhood and target their intended levels.
Green Performance Assessment System ("Green PASS")	CIDB	2012	It is an evaluation system that measures the impact of building construction works and building operations on the environment by estimating carbon emission from construction phase to operation throughout the building's lifecycle for 50 years. It applies to both new and existing buildings covering five elements: site, energy, indoor environmental quality, water, and waste.
Skim Penilaian Penarafan Hijau JKR ("PH JKR")	PWD	2012	PH JKR focuses on the design stage and the assessment is based on sustainable planning and management, energy efficiency, internal environment quality, material & resources, water efficiency and innovation.
Green Real Estate ("GreenRE")	Real Estate and Housing Developers' Association (REHDA)	2013	Energy efficiency, water efficiency, environmental protection, indoor environmental quality, and carbon emissions of the development commencing from the conceptualization and design stage, construction and up to post completion. The tool is currently aimed for high rise residential building and landed houses.
Melaka Green Seal or Meterai Hijau Melaka	Melaka Green Development Organisation (MGDO) and Green Earth Design Solution (GEDS).	2014	The first green building conforming rating tool for the state of Melaka. Five criteria are covered i.e. energy efficiency, internal environment quality, sustainable management and planning, material & resources, and water efficiency.

My Green Highway Index (MyGHI)	UTM Flagship Project and Malaysian Highway Authority.	2014	MyGHI is a localized study attempt for Malaysia's highway industry. It highlights five elements namely energy efficiency, sustainable design and construction activities, environment, and water management, social and safety and material and technology.
Malaysian Carbon Reduction and Environmental Sustainability Tool (MyCrest)	Kementerian Kerja Raya Malaysia (KKR); PWD & CIDB	2016	The weightage is given to pre-design, infrastructure & sequestration, energy performance impacts, occupant & health, lowering the embodied carbon, water efficiency factors, social cultural sustainability, demolition, and disposal factors.
CASBEE Iskandar	Iskandar Malaysia (IM)	2016	CASBEE is based on the concept of environmental efficiency or co-efficiency in terms of built environment efficiency (BEE). CASBEE has been successfully used in over 1,700 municipalities in Japan.

Source: Data collated from reports by CIDB, CREAM and the respective green building rating tools websites.

Hamid et al. (2014) illustrates these comments, as can be seen in Table 2, taking as examples, the nature and assessment characteristics in GreenRe by REHDA, Green PASS by CIDB, PH JKR by JKR and GBI by PAM and ACEM. Other researchers, Hung & Fuad (2018), had categorised the rating tools into (i) criteria based and (ii) measurement based. GBI, GreenRe, Melaka Green Seal, MyCREST, PHJKR come under the former category whilst Green Pass and MyCREST the later. As can be seen from Table 2, the tools mainly focus on design and construction phases. Currently, only MyCREST covers the widest phase, from design to demolition.

A further analysis on the weightage scheme of these rating tools would show their degree of emphasis on each of themes of sustainability coverage. The literatures suggest that 'energy efficiency' is the most dominant factor in all the rating tools. However, the allocation of percentage of dominant factors vary. For example, GreenRE allocates 56% to energy efficiency, MyCREST 49%, PHJKR 39%, Melaka Green Seal 38% and GBI only 37%. There are also sustainability themes which are covered under one tool but not the others. For example, GreenRE allocates scores for transport and waste & emission, whilst PHJKR and GBI do not. PHJKR and GBI on the other hand, give higher scores on site management than GreenRE.

The rating tools could further be categorised into three categories, as shown in Figure 3, with some tools could be applied to building only and some to both building and township. For infrastructure, the available rating tool is MyGHI (CREAM, 2017).

Table 2. An illustration of the differences in nature and assessment characteristics between GreenRe, Green PASS, PH JKR and GBI

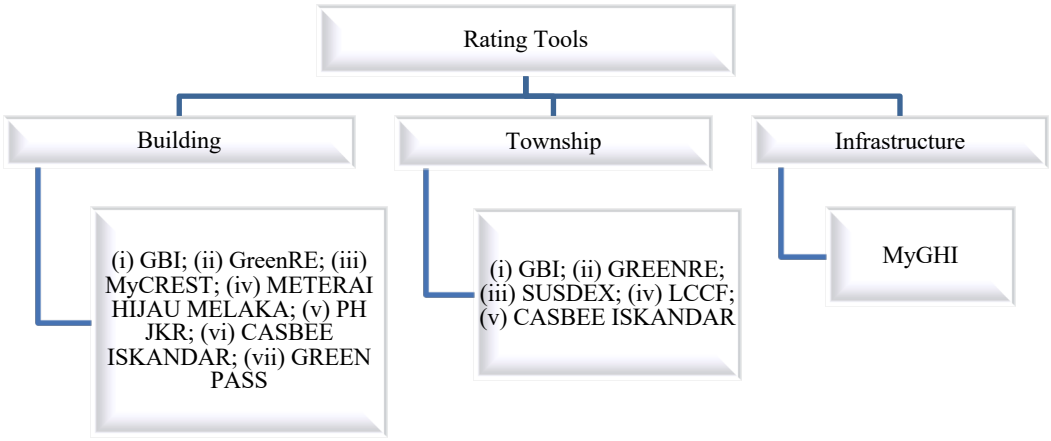
CRITERIA	GreenRE	Green PASS	PH JKR	GB1
Developed By	REHDA	CIDB	JKR	PAM and ACEM
Certification Process	Voluntary	Voluntary	Voluntary	Voluntary
Nature of Assessment	Design based (No operation)	Performance based (No design consideration)	Design based (No operation)	Design based (No operation)
Phase of Assessment	Design & Construction	Construction & Operation	Design & Construction	Design & Construction
Mode of Assessment	Criteria checklist	Based on CO_2 emission	Criteria checklist	Criteria checklist
Rating System	Score (by credits): - 90 to 150 = GreenRE Platinum - 85 to < 90 = GreenRE Gold - 75 to < 85 = GreenRE Silver - 50 to < 75 = GreenRE Bronze	Diamond rating (100% carbon neutral) – percentage of CO_2 reduction: - 100% = 6 Diamond - 70-100%= 5 - 50-70% = 4 - 30-50% = 3 - 10-30% = 2 - 1-10% = 1	Star rating (by percentage): - 40-49% = 2 star - 50-69% = 3 star - 70-84% = 4 star - 85-100% = 5 star	Score (by points): - 86+ points = Platinum - 76-85 points = Gold - 66-75 points = Silver - 50-65 points = Certified
Themes of Coverage	Energy Related Requirements: • Energy efficiency Other green requirements: • Water efficiency • Environmental protection • Indoor environmental quality • Other green features • Carbon emission of development	Building construction: • Site • Material • Energy • Water • Waste Building operation: • Indoor environmental quality (pre-requisite) – 80% satisfaction of occupants • Energy • Water	i. Sustainable site planning & management ii. Energy efficiency iii. Indoor environmental quality (IEQ) iv. Material & resources management v. Water efficiency vi. Innovation	• Energy efficiency • Indoor Environmental Quality (IEQ) • Sustainable site planning and management • Material and resources • Water efficiency • Innovation

Source: Hamid et al. (2014)

These varying approaches (from themes of coverage to scoring of dominant factors etc) from one rating tool to another, may inadvertently cause complications to

the stakeholders. However, in the worst-case scenario, it is afraid that "the green building certification may simply be a box to be checked on a list and, possibly, a marketing asset, rather than a force in saving energy and protecting the environment" (Pandey, 2015).

Figure 3. Categories of rating tools



Source: CREAM (2017).

Voluntary Rating Scheme and the Issue of 'Greenwashing'

The scheme for green building assessment and certification in Malaysia, albeit with the advent of 10 rating tools, is still on a voluntary basis. The GTMP 2030 however aspires to alter this current landscape of voluntary standard into making it mandatory. For a start, the Ministry of Works has set a target that "all new buildings designed after 2016 with a developmental value of more than RM50 million must be MyCREST certified". Whilst "the JKR has set a requirement that all new buildings designed after 2016 with a developmental value of less than RM50 million must be certified by PHJKR" (CIDB, 2015).

However, this government intervention is meant for public projects. It remains open for the developers to use any of the available rating tools for other projects. The question is whether there is this issue of 'greenwashing' or any possibility of it? In this respect, a study by Pandey (2015), is very much on point. The study and the analysis were on the first rating tool introduced in Malaysia i.e. the GBI focusing on the Non-Residential New Construction category (NRNC). The author studies a total of 112 buildings, which are all "the GBI rated buildings in the NRNC category from 2009-2013". In understanding the characteristic and qualities of the "100-point rating system" in the GBI rating in this NRNC category, the author dichotomises the assessment into two groups of impact criteria:

(i) the long-term impact criteria which refers to the elements or factors that affect the energy and resource efficiency in a building for the expected lifetime of the building; and

(ii) the short-term impact criteria which refers to the elements or factors that affect the building for a shorter duration.

The author explains that "long-term impact criteria are mostly part of the physical structure and design of the building itself, for example, thermal comfort design, daylighting, air-change effectiveness, standard of construction (QLASSIC), and material used. These are characteristics that are integrated into the initial building design and specifications, and therefore tend to remain permanently with the building. Their energy and environmental benefits can be gained year after year". Whilst "short-term impact criteria, by contrast, are not integral to the building for the most part, and as a result are unlikely to ensure effective energy efficiency and environmental gain on the part of the building in the future." (Pandey, 2015)

The short term impact criteria is referring to, for example, workers' site amenities and construction waste management which are very important during the construction phase, however are not integral to the operational phase of the building's life-cycle, thus are limited in its contribution to the building's overall energy-efficiency goals. Hence, the author argues that "the features that remain intact for the whole life of the building are effectively the ones that will determine if the building remains green and energy efficient throughout its functional life. Only through the impact of these long-term characteristics will the "green" status of the building remain valid". (Pandey, 2015)

From this observation the author moves on to compare the result of the certification/rating and finds that most of the buildings, under study, received a "Certified" rating i.e. the lowest level of certification under the GBI. This finding does not auger well with the aim of ensuring sustainability of a building throughout its lifecycle. As analysed by the author, a Certified rating requires a building to achieve only 50 out of the 100 points. The important point is the analysis by the author that 43 out of the 100 points are essentially can be derived from the short-term impact criteria. If that is the case, a building that receive a Certified rating can earn 86 percent of its points from among those short-term impact criteria. With only 14 percent represent the long-term impact criteria pointers, such low certification would definitely impair the building's performance as a sustainable green building during its expected lifetime and all the benefits that are expected to be gained albeit certification. (Pandey, 2015)

V. CONCLUSION

The rating tools are developed with purposes of assessing, ratifying, and certifying the sustainability of buildings. However, it seems that the minimum standard imposed by rating tools, as illustrated by the study, may or may not guarantee achievement towards this end. It may however achieve the purpose of "greening" at least the process during construction of the building. In any event, as observed earlier by Igor & Hosseini (2018), the voluntary scheme of rating system is just benchmarking some key sustainability standards. It is indeed volatile and there seems to be a natural inclination towards a tool that puts a company in the best possible condition.

For sustainability goal (in building) to be achieved and assured, there must be in place an audit system. Malaysia is already in the right path with numerous government's initiatives and policies towards 'greening' the Malaysian construction industry and promotion of 'green' buildings. However, these initiatives and policies must however be given the force of law where check and balance can be enforced, and any manipulations will have consequences. It is unfair to say that Malaysia do not have the required regulations to deal with the issue of sustainability, but they are more sporadic in nature and not uniform.

In Singapore for example, the country introduced a regulation called the Building Control Act ("BCA"). The BCA read together with the Building Control (Environmental Sustainability) Regulations, require a minimum environmental sustainability standard that is equivalent to the "Green Mark" (a rating tool introduced in Singapore) Certified level for new buildings. The application of the BCA and the requirement of the minimum Green Mark standards is also planned to be extended to existing buildings as and when they are retrofitted. (BCA (SG), 2012)

In Malaysia, such an initiative may prove to be an uphill task unless the country comes up with a standardized national green building rating system. There are in fact studies carried out towards this objective.

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