

# **GREEN RATING CRITERIA FOR TOWNSHIP: WALKABILITY AND BICYCLE FRIENDLY**

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Green-rating tools or environment assessment methods have provided fundamental guideline for developers to achieve their sustainable goals. Developed in 1990s, BREEAM, LEED are popular rating tools adopted by many countries. Other popular rating tools include Green Star, Living Building Challenge and others. At the same time, many countries developed customized rating tool considering the country culture, location and condition including the weather condition, i.e.: Green Mark in Singapore, TREES in Thailand, GBI in Malaysia, CASBEE in Japan. Most of the green rating criteria are straightforward, developers can score by changing material, construction method or adding extra features, i.e.: electric car charging station, rainwater-harvesting system. Anyway, walkability and bicycle friendly may not be as straightforward but are definitely important element in achieving green and sustainable life style. This paper aimed to examine the existence and importance of walkability and bicycle friendly in major popular green rating tools. LEED allocate score to developer who promotes walkability but it is found a number of the green rating tools do not specified walkability and bicycle friendly as scoring criteria. This paper further suggest the element of measuring walkability and bicycle friendly should include i) safety, ii) traffic condition. The finding of this paper can be used to enhance the current green rating tools and encourage walkability and bicycle friendly for green and sustainability.

Keywords: Environment assessment method, green-rating tools, walkability, bicycle friendly

## **Introduction**

World Green Building Council (WGBC) defines green building as a building that, in its design, construction or operation, reduces or eliminates negative impacts, and can create positive impacts, on our climate and natural environment. Green building can preserve precious natural resources and will improve quality of life.

Green-rating tools or environment assessment methods have provided fundamental guideline for developers, Real Estate Investment Trusts (REIT), building owners, building managers to achieve

their sustainable goals. These tools also act as reference for tenants or buyers upon rental or purchase decision-making.

## **Development of Green Rating Tools**

Developed in 1990s, Building Research Establishment Environment Assessment Method (BREEAM), Leadership in Energy and Environment Design (LEED) are popular rating tools adopted by many countries. Other popular rating tools include Green Star, Living Building Challenge and others.

At the same time, many countries develop customized rating tool considering the country culture, location and condition including the weather condition, i.e.: Building and Construction Authority(BCA) Green Mark in Singapore, Thai's Rating of Energy and Environment Sustainability (TREES) in Thailand, Green Building Index (GBI) in Malaysia, Comprehensive Assessment System for Built Environment Efficiency (CASBEE) in Japan.

Started with rating tools for residential and commercial building, newly constructed or existing building, green-rating tools also developed standard for specific building type. LEED provide tool to evaluate school, retails and healthcare. BREEAM can measure refurbishment and building in-use. Green Mark able to measure parks and infrastructure. GBI provides total of 17 different types of tools for different categories of assessment.

Most of the green rating criteria for building are specific and measureable, developers or building owners can score according to the assessment criteria in which usually comprise energy efficiency, indoor environment quality, sustainable site planning and management, materials and resources, water efficiency and innovation.

Specific and clear standards are given in order to score. For example: provide low-emitting and fuel-efficiency vehicles for 5% of Full-Time Equivalent (FTE) occupants and provide preferred parking for these vehicles, provide motion sensor or equivalent to complement lighting zone for at least 25% net leasable area.

## **Assessment of Township Development**

Assessment of township, community or neighborhood is different from building. Township assessment can and will include plan and designed for the benefits of township, transport and connectivity, supply and demand equilibrium, overall energy strategy and other macro-economic considerations.

Current years, some green rating tools developed neighborhood or township assessment tools. These tools covers different aspects compare to building assessment. The assessment criteria usually include location and linkage, neighborhood pattern and design, green infrastructure and buildings, transportation and connectivity, energy strategy, pollution and innovation.

## **Walkability and Bicycle Friendly**

Kelly et al. (2011) defines walking as a means of experiencing and interacting with local environment and wider society in a way not possible when using other form of transport. Her case study based in Leeds, UK concludes that clean pavements, connectivity and perception of safety are key factors to improve pedestrian quality.

Similarly, Wey and Chiu (2013) have established safety, convenient and amenity as criteria for pedestrian walkability under Transport Oriented Development (TOD).

On the other hand, Millington et al. (2009) who developed the Scottish Walkability Assessment Tools listed destination, safety, aesthetics and functional as the theme of criteria to assess walkability.

In Hong Kong, Cerin et al. (2007) measured the neighborhood walkability. Residents of high walkability neighborhoods reported higher residential density, land use mix, street connectivity, infrastructure and safety for walking but low levels of traffic load and fewer cul-de-sacs and hilly streets.

Hoedl et al. (2010) mentioned in his paper that research on attributes of built environment has gained increasing significance in promoting physical activity like walking and cycling. His paper derived bikeability and walkability evaluation table that take following features into consideration: traffic speed, traffic lanes, attractiveness, land use and infrastructure.

Lowry (2012) proposed assessment of bikeability suggested comfort and safety of linear section of bikeway as assessment criteria.

In Sia (2013) research, the City Council of Petaling Jaya (MPPJ) in Selangor, Malaysia found that in tropical country like Malaysia, hot weather would affect the passion of cyclist. This is further support by Ontario Traffic Council (2014) that suggested showers and change room can be strong incentive to encourage bicycle use, particularly those who commute to work or school.

This research aims to study the element of walkability and bicycle friendly in major green-rating tools.

### **Green Rating Tools Selection**

Say and Wood (2008) in her research titled sustainable rating systems around the world did a comparison on LEED, BREEAM, Green Star, CASBEE and Green Globes. In which Green Globes was developed in 2000 and based off the structure of BREEAM.

Sebake (2014) mentioned that the three most common quantitative green rating tools are BREEAM, LEED and Green Star. Many countries adopt the tools or developed new tools based on the above-mentioned tools.

Ghaffarianhoseini et al. (2016) list BREEAM, LEED and Green Star as most reliable and popular green rating tools and performed a critical comparison among the selected tools.

As the coordinator of green building council in the world, WGBC categorized their member countries into 3 categories, prospective, emerging, established. WGBC also divided the world into 5 region namely, Africa, Americas, Asia-Pacific, Europe and Middle East and North Africa (MENA). In this paper, one established member is selected from each region and the most commonly used tools of the said country is identify.

**Table 1:** The selected established member and their green rating tools

| <b>Region</b> | <b>Selected Established Member</b> | <b>Selected Green Rating Tools</b> |
|---------------|------------------------------------|------------------------------------|
| Africa        | South Africa                       | Green Star SA                      |
| Americas      | United State                       | LEED                               |
| Asia Pacific  | Australia                          | Green Star                         |

|                                     |                |                |
|-------------------------------------|----------------|----------------|
| Europe                              | United Kingdom | BREEAM         |
| Middle East and North Africa (MENA) | Emirates       | LEED and BREAM |

The selection of green rating tools are consistent with aforementioned research, in which previous comparison paper selected LEED, BREEAM and Green Star as the most common green rating tools. In order to add on to the interest of the stakeholder in the home country this research paper is done, the Malaysia GBI and Singapore Green Mark are added. Both Malaysia and Singapore also listed as established member in WGBC.

The following table shows the basic information of each green rating tools, and the availability of tools to do assessment for township.

**Table 2:** Green rating tools and details

| <b>Tools</b> | <b>Establish</b> | <b>Country</b> | <b>Tools for Township</b> |
|--------------|------------------|----------------|---------------------------|
| LEED         | 1993             | United State   | Yes                       |
| BREEAM       | 1990             | United Kingdom | Yes                       |
| Green Star   | 2003             | Australia      | Yes                       |
| GBI          | 2009             | Malaysia       | Yes                       |
| Green Mark   | 2005             | Singapore      | Yes                       |

In different green rating tools, the concept of township was represented using different vocabulary, namely: neighborhood, communities, district or township. The word township is used in this paper to represent the concept of the above-mentioned vocabulary. Following table exhibits the standard each tool used for township assessment and their vocabulary for township.

**Table 3:** Green township rating tools

| <b>Green rating tool</b> | <b>Green township rating tool</b> | <b>Vocabulary for township</b> |
|--------------------------|-----------------------------------|--------------------------------|
| LEED                     | LEED for Neighborhood Development | Neighborhood                   |
| BREEAM                   | BREEAM Communities                | Communities                    |
| Green Star               | Green Star – Communities v1.1     | Communities                    |
| GBI                      | GBI Township Tool Version 1.01    | Township                       |
| Green Mark               | Green Mark District               | District                       |

### **Walkability and Bicycle Friendly Element in Green Township Rating Tools**

Not all green rating tools list walkability and bicycle friendly element as assessment criteria in their green rating tools, especially those without township assessment tool.

It is found all selected green rating tools, which are tools adopted by established member countries listed in WBGC consist of walkability and bicycle friendly element. Table 4 illustrates the weightage of walkability and bicycle friendly element in selected green rating tools.

**Table 4:** Weightage of walkability and bicycle friendly element in green township rating tool

| <b>Green township rating tool</b> | <b>Walkability element</b> | <b>Bicycle friendly element</b> | <b>Maximum weightage</b> | <b>Maximum percentage</b> |
|-----------------------------------|----------------------------|---------------------------------|--------------------------|---------------------------|
| LEED for Neighborhood Development | 9/110                      | 2/110                           | 11/110                   | 10%                       |
| BREEAM Communities                | 1.6%                       | 3.2%                            | 4.8%                     | 2.8%                      |

|                                |       |       |        |      |
|--------------------------------|-------|-------|--------|------|
| Green Star – Communities v1.1  | -     | -     | 5/110  | 4.5% |
| GBI Township Tool Version 1.01 | 7/100 | 3/100 | 10/100 | 10%  |
| Green Mark District            | 4/185 | 2/185 | 6/185  | 3.2% |

The denominator is the total score of the tools, i.e.: for LEED for Neighborhood Development, the walkability element can score maximum of 9 score out of 110 score. It is highlighted that, the score is maximum score not nominal score. It means, walkability element can score maximum of 9 score in the particular section, if not scoring walkability element, one can still score from other element to collect maximum score in the section.

Most green rating tools having 100 or 110 as the total score, Green Mark District developed in Singapore allocated 185 as total score. From the listed criteria, Green Mark District has more criteria to fulfill for the assessment, hence it is not that Green Mark District do not emphasis on walkability and bicycle friendly element, but the tools has need the applicant to fulfill more criteria before the award of the green rating.

## Finding and Discussion

Similar to the criteria listed in building rating tools, the township rating tools are specific and measureable. The criteria can be identify or verify within one assessment audit, for example, street sidewalks/pedestrian walkways shadedover 40% (1 point), provision for secure and sheltered bicyclefacilities to public amenities (1 point), major building entrances with good access to nearest LRT or bus stops inaccordance to local planning guidelines orwithin a 500m walking distance, with sheltered and connected linkage (2 points).

The walkability and bicycle friendly criteria as suggested by literature review including infrastructure, connectivity, convenient, aesthetics, land use mix, topography were taken care of in current green rating tools.

Anyway, there is a few criteria mismatches namely, i) safety, ii) traffic condition, those criterion are not listed in above-mentioned green rating tools. It is found that i) safety, ii) traffic condition can't be measure at the one off assessment audit.

Township is dynamics, this research proposed that for township rating, it should not be a one off assessment. Township rating should be a renewable certification to cater for the dynamic changes.

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