



BCA GREEN MARK

GM SLE

Green Mark for Super Low Energy Buildings

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Revision	Description	Date Effective
R0	Launch for Implementation	05/09/2018

Definition and Categories under Green Mark SLE

There are 2 categories of buildings under GM SLE:

Super Low Energy Building (SLEB)

“The best-in-class energy performing Green Mark Building that achieve at least 40%^[1] energy saving based on prevailing code”

[1] Note: This refers to 60% energy saving above 2005 building codes.

Zero Energy Building (ZEB):

“The best-in-class energy performing Green Mark Building with all of its energy consumption, including plug load, supplied from renewable source^[2] (both on-site and off-site).”

[2] Note: Building development should maximise the on-site renewable source first before exploring off-site renewable sources.

Assessment Process

The BCA Green Mark SLE Certification Process is as follows:

Application

- Submittal of application with relevant supporting documents for certification upon finalisation of building design.
- Upon acceptance of application and fee payable, a BCA Green Mark Assessor will be assigned for the duration of the project.

Pre-Assessment (Optional)

- Conducted to aid the project team in understanding the criteria and evaluation of the award level sought.

Assessment

- To be conducted when design and documentary evidences are ready.
- Comprises design and documentary reviews to verify if the building project meets the intents of the criteria.
- A presentation to BCA panel for evaluation is required.

Verification

- To be conducted upon project completion.
- Includes review of delivery records, updated documents on building energy performance data. Site inspection and measurement will be conducted.

Green Mark SLE Award

As an annex of Green Mark assessment framework, SLE/ZE are awarded for improving sustainable design in terms of energy efficiency and adoption of renewable energy. Depending on the level of building energy efficiency performance, the building development will be eligible for awarding under one of the ratings namely BCA Green Mark Gold, Gold^{PLUS} or Platinum- SLE or ZE.

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Green Mark SLE Prerequisites

Prerequisite Requirements (NRB)

P.1 To ensure the SLE/ZE building to meet the basic environmental sustainability, the project must be able to obtain prevailing GM Gold award.

P.2 For SLE, the project must be able to achieve at least 40% energy saving based on prevailing code.
For ZE, the renewable energy produced should be greater than or equal to the building energy consumption.

The energy savings shall be demonstrated by using the energy modeling framework set out in Green Mark Non-Residential buildings NRB: 2015 Technical Guide and Requirements. For SLE/ZE, there is no cap of additional energy saving from passive design features and renewable energy over its reference model.

Table 1. Energy saving requirement differ from GM NRB 2015

Energy Saving	GM NRB: 2015	SLE/ZE Certification
Passive Design Features	A cap of 3% of additional energy savings from passive design features over its Reference Model can be considered	No cap
Renewable Energy	A cap of 3% of additional energy savings from passive design features over its Reference Model can be considered	No cap

Exemption: Buildings with minimum air-conditioning systems (i.e. with peak building cooling load < 500RT and air-conditioned area < 5,000m²) such as schools, warehouses & institutions, can opt to meet the EUI benchmark listed in Table 2 instead of the 40% energy savings requirement.

P.3 For ZE, if off-site renewable energy is used, the Energy Use Intensity (EUI) of the building should be less than the benchmark EUI^[3] for different building types.

Table 2. Benchmark EUI for different building type

Building Type	Benchmark EUI* (kWh/m ² yr)
Schools	25
Office	100
Hotel, retail & other mixed commercial development	160

[3] Building type not shown in Table 2 will be assessed on case-by-case basis.

*EUI for New Buildings is based upon the total building energy consumption.

Green Mark SLE: 2018 Criteria

New-Non Residential Building

1.01 Design Stage Requirement

During the design stage, when buildings has not yet been constructed/completed construction, the project targeting Green Mark SLE certification shall demonstrate the stipulated energy savings over its reference model using the energy modeling framework set out in Annex C of Green Mark Non-Residential buildings NRB: 2015 Technical Guide and Requirements.

SLE/ZE certification	Requirement
SLE	To achieve at least 40% of energy saving through adopting energy efficient measures and onsite renewable energy.
ZE	Use of onsite and off-site renewable energy to generate more than 100% of energy needed for building operation.

The energy modeling for evaluating the energy performance of a building shall be carried out in a prescribed manner to quantify the potential savings based on energy efficiency measures and improvements that reduce cooling load requirement over the Reference Model.

During design stage, the expected renewable energy generated percentage and the total annual electricity consumption of the development shall be calculated. Technical product information of the renewable energy system and detailed drawings showing the location of the system shall be provided.

For Buildings using the Benchmark EUI (Table 2) a detailed calculation or energy model shall be used to calculate and justify the design EUI.

1.02 Verification Stage Requirement

When the building awarded Green Mark SLE has completed construction, a verification audit shall be carried out.

Stage 1 Verification: The Green Mark verification shall demonstrate the implementation of the design stage strategies and note any deviance from these and their effect on the ability of the project to achieve SLE/ZE

Stage 2 Verification: The energy savings for building over its reference model shall be demonstrated using 12-month actual operation data. The building shall demonstrate compliance to the committed energy saving and/or EUI which resulted in the certification with deviance less than 5%. Where Renewable Energy has been utilised the generated renewable energy, using 12-month actual operation data will be audited.

For ZE, the building shall demonstrate compliance to the committed 100% net replacement through onsite and/or off-site renewable sources.

Green Mark SLE Prerequisites

Prerequisite Requirements (ENRB & Existing Schools)

P.1 To ensure the SLE/ZE building to meet the basic environmental sustainability, the project must be able to obtain prevailing GM Gold award.

P.2 For SLE, the Energy Use Intensity (EUI) of the building should be less than the benchmark EUI* (Table 1) OR least 40% energy saving based on prevailing code (Table 2)

For ZE, the renewable energy produced should be greater than or equal to the building energy consumption.

Table 1. Benchmark EUI for different building types

Building Type	Benchmark EUI* (kWh/m ² yr)
Schools	25
Office	100
Hotel, retail & other mixed commercial development	160

[2] Building type not shown in Table 1 will be assessed on case-by-case basis.

Table 2. Energy saving requirement

Energy Saving	Energy Simulation
Energy Efficiency	Evaluation of energy performance of a building against an agreed reference model to demonstrate at least 40% energy savings based on energy efficiency measures and improvements.

*EUI for Existing Buildings is based upon the energy bill, refer to GM ENRB 2017 criteria and technical guide

P.3 For ZE, if off-site renewable energy is used, the Energy Use Intensity (EUI) of the building should be less than the benchmark EUI^[2] for different building types.

Green Mark SLE: 2018 Criteria

Existing-Non Residential Building

2.01 Design Stage Requirement

During the design stage, when buildings has not yet been retrofitted/completed its retrofit, the project targeting Green Mark SLE certification shall demonstrate the stipulated EUI through detailed calculations and building energy measurements.

In Lieu of achieving the EUI benchmarks, projects have the option to demonstrate SLE performance through demonstrating 40% against a prescribed reference model.

SLE/ZE certification	Requirement
SLE	To achieve benchmark EUI OR at least 40% of energy saving through adopting energy efficient measures and onsite renewable energy.
ZE	Use of onsite and off-site renewable energy to generate more than 100% of energy needed for building operation.

During design stage, the expected renewable energy generated percentage and the total annual electricity consumption of the development shall be calculated. Technical product information of the renewable energy system and detailed drawings showing the location of the system shall be provided.

2.02 Verification Stage Requirement

When the building awarded Green Mark SLE has completed its retrofit, a verification audit shall be carried out.

The building shall demonstrate compliance to the committed energy saving and/or EUI which resulted in the certification with deviance less than 5% using 12-month actual operational data.

Where Renewable Energy has been utilised the generated renewable energy, using 12-month actual operation data will be audited.

For ZE, the building shall demonstrate compliance to the committed 100% net replacement through onsite and/or off-site renewable sources.