



DESIGN REFERENCE GUIDE

Super Low Energy Building (Annex to NRB and ENRB Tools

Version 1.0

February 2023

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1. About GreenRE

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2. Introduction

The GreenRE assessment scheme was established in 2013 and is a recognized green building rating system tailored for the tropical climate. GreenRE sets parameters and establishes indicators to guide the design, construction and operation of buildings towards increased energy effectiveness and enhanced environmental performance.

The Intent of this Design Reference Guide for Super Low Energy Building (referred to as “this Guideline”) is to establish environmentally friendly practices for the planning, design and construction of restaurant, which would help to mitigate the environmental impact of building interior for new restaurant, existing operating restaurant and existing restaurant undergoing renovation.

This Guideline is not intended to abridge safety, health, environmental or related requirements contained in other applicable laws, codes or policies administered by relevant authorities. Where there is a conflict between a requirement of this Guideline and such other regulations affecting the design, construction and operation of the project, the building regulations shall take precedence.

3. Revision Log

Revision	Description	Date Effective
1.0	Issued for Pilot	February 2023

4. GreenRE Assessment Stages

The GreenRE restaurant certification process is as follows:

Application

Submittal of application with relevant supporting documents for certification upon strategic inception of infrastructure project.



Pre-Assessment

A pre-assessment can be conducted (optional) to give the project team a better understanding of the criteria and evaluation of the certification level sought. This should be performed upon selection of suitable design option to allow teams to identify and maximise opportunities at the earliest stages of the project.



Actual Assessment

Actual assessment to be conducted once the design and documentary evidences (e.g. approved plan) are ready. After the actual assessment, our assessors will review the documents submitted.

Assessment process includes design and documentary reviews to verify if the infrastructure project meets:

- (i) The intents of the criteria
- (ii) The pre-requisite requirement for GreenRE Bronze, Silver, Gold and Platinum rating where applicable.

Provisional Certificate will be issued upon completion of this stage.



Site Verification

Site verification to be conducted upon project completion.

Final Certificate will be issued upon completion of this stage.

5. GreenRE Restaurant Rating System

Overview:

As an annex to GreenRE's NRB and ENRB tools, the GreenRE Super Low Energy rating system is targeted new Non-Residential building and Existing Non-Residential Building.

There are 2 categories of buildings under GreenRE SLE:

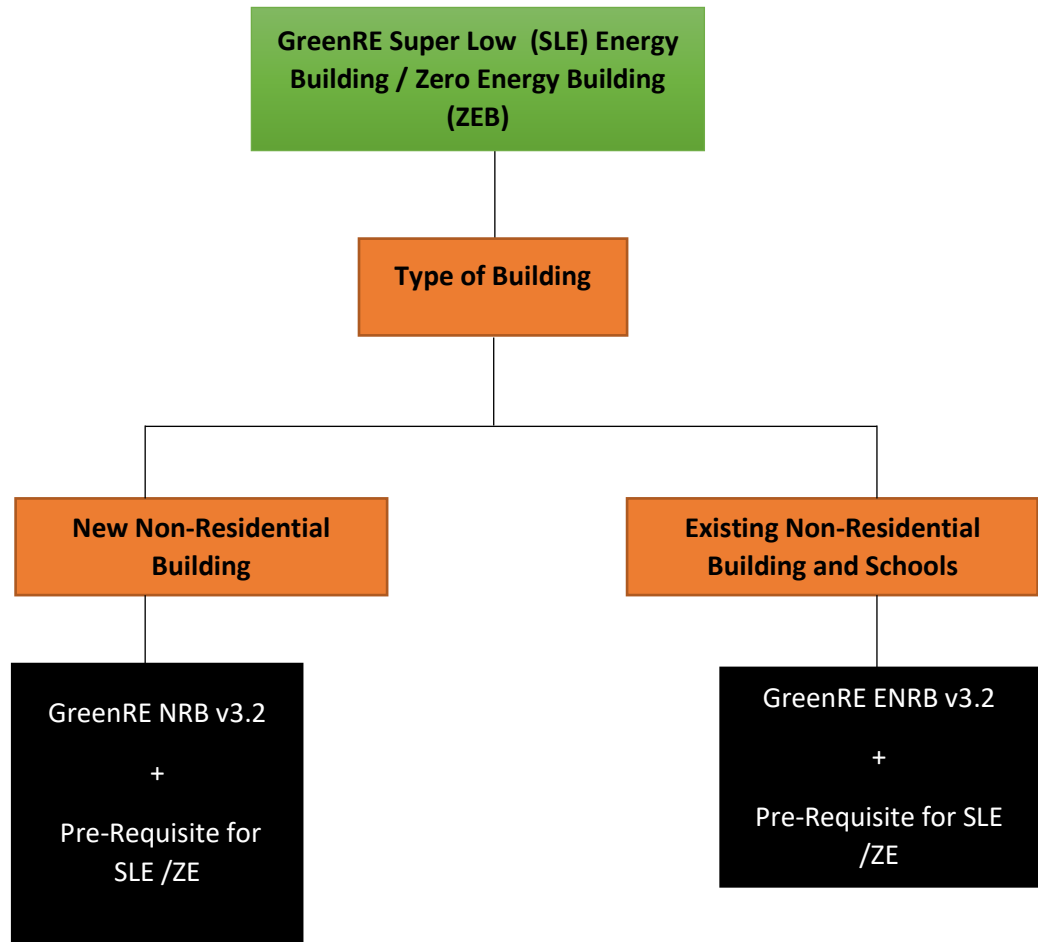
Super Low Energy Building (SLEB)

"The best-in-class energy performing GreenRE Building that achieve at least 60% energy saving based on prevailing code"

Zero Energy Building (ZEB):

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

This annex is divided into two (2) sections and the decision tree for application of this annex is as follows:



GreenRE Super Low Energy (SLE) Award

As an annex of GreenRE 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 GreenRE Gold, or Platinum- SLE or ZE.

Prerequisite Requirement (NRB)

Pre-requisites (In addition to NRB v3.2)

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

For SLE, the project must be able to achieve at least 60% energy saving from the building energy consumption. *Note : The baseline for the energy saving should base on MS1525:2007*

- 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 modelling framework set out in GreenRE Non-Residential buildings (NRB v3.2). For SLE/ZE, there is no cap of additional energy saving from passive design features and renewable energy over its reference model.

Note : The baseline for the energy saving should base on MS1525:2007

Table 1: Energy saving requirement differ from GreenRE V3.2

Energy Saving	GreenRE NRB v3.2	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.

- 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 /year)
Schools	25
Office	90
Hotel, retail & other mixed commercial development	150

Note :

- 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.

Prerequisite Requirement (ENRB)

Pre-requisites (In addition to ENRB v3.2)

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

For SLE, the Energy Use Intensity (EUI) of the building should be less than the benchmark EUI* (Table 1) OR least 60% energy saving based on prevailing code (Table 2)

Note : The baseline for the energy saving should base on MS1525:2007

- 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/m2/year)
Schools	25
Office	90
Hotel, retail & other mixed commercial development	150

- Building type not shown in Table 2 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 60% energy savings based on energy efficiency measures and improvements.

EUI for Existing Buildings is based upon the energy bill, refer to GreenRE ENRB criteria and technical guide.

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

GreenRE Super Low Energy (SLE): Criteria

New – Non-Residential Building

Design Stage Requirement

- During the design stage, when buildings has not yet been constructed/completed construction, the project targeting GreenRE SLE certification shall demonstrate the stipulated energy savings over its reference model using the energy modeling framework set out in Annex C of GreenRE Non-Residential buildings v3.2 Technical Guide and Requirements.

SLE / ZE certification	GreenRE NRB v3.2
SLE	To achieve at least 60% of energy saving through adopting energy efficient measures and onsite renewable energy
ZE	Use of onsite and offsite renewable energy to generate 100% of energy needed for building operation

Note : The baseline for the energy saving should base on MS1525:2007

- The energy modelling 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.

Verification Stage Requirement

- When the building awarded GreenRE SLE has completed construction, a verification audit shall be carried out.
- Stage 1 Verification: The GreenRE 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 utilized 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.

GreenRE Super Low Energy (SLE): Criteria

Existing- Non-Residential Building

Design Stage Requirement

- During the design stage, when buildings has not yet been retrofitted/completed its retrofit, the project targeting GreenRE 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	GreenRE NRB v3.2
SLE	To achieve at least 40% of energy saving through adopting energy efficient measures and onsite renewable energy
ZE	Use of onsite and offsite renewable energy to generate 100% of energy needed for building operation

Note : The reference model for the energy saving should base on MS1525:2007

- 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

Verification Stage Requirement

- When the building awarded GreenRE 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 utilized 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