DESIGN REFERENCE GUIDE

HOTEL & RESORT

GreenRE®

Version 1.0, February 2025

TABLE OF CONTENTS

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 New Hotel & Resort (referred to as "this Guideline") is to establish environmentally friendly practices for the planning, design, and construction of buildings, which would help to mitigate the environmental impact of built structures.

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	Hotel & Resort	February 2026

4. GreenRE Assessment Stages

The GreenRE Hotel & Resort 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 building 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 Hotel & Resort Building Rating System

OVERVIEW:

The GreenRE Hotel & Resort Rating Tools are applicable to both **High-Rise** and **Low-Rise** hotel and resort developments, defines as follows:

- **High-Rise Hotel**: A hotel building with **more than three (3) storeys** above ground level.
- **Low-Rise Hotel**: A hotel building with **three (3) storeys or fewer** above ground level.

The GreenRE Hotel & Resort rating system is divided into six (6) sections as follows:

Part 1 – Energy Efficiency: This category focuses on the approach that can be used in the building design and system selection to optimise the energy efficiency of buildings.

Part 2 – Water Efficiency: This category focuses on the selection of fittings and strategies enabling water use efficiency during construction and building operation.

Part 3 – Environmental Protection: This category focuses on the design, practices and selection of materials and resources that would reduce the environmental impacts of built structures.

Part 4 – Indoor Environmental Quality: This category focuses on the design strategies that would enhance the indoor environmental quality which include air quality, thermal comfort, acoustic control, and daylighting.

Part 5 – Other Green Features: This category focuses on the adoption of green practices and new technologies that are innovative and have potential environmental benefits.

Part 6 – Carbon Footprint of Development: This category focuses on the use of carbon calculator to calculate the carbon footprint of the development.

These environment impact categories are broadly classified under two main groups namely (I) Energy Related Requirements and (II) Other Green Requirements.

Energy Related Requirements consist of Part 1- Energy Efficiency where credits are allocated for the various energy efficient designs, practices and features used. A minimum of 30 credits must be obtained from this group to be eligible for certification. The number of credits achievable for this group is capped at 50 credits (exclude 15 bonus credits that are obtainable under NHR 1-11 – Renewable Energy).

Other Green Requirements consist of Part 2 - Water Efficiency; Part 3 - Environmental Protection; Part 4 - Indoor Environmental Quality; Part 5 - Other Green Features and Part 6 - Carbon Footprint of Development. Credits are allocated for the water efficient features, environmentally friendly design practices, innovative green features used and carbon emission of development. A minimum of 20 credits must be obtained from this group to be eligible for certification. The number of credits achievable for this group is also capped at 50 credits.

The maximum GreenRE score achievable for a project is capped at 100 credits and this does not include 15 bonus credits that are obtainable under Energy Related Requirements if a project uses renewable energy sources. The credit scored for renewable energy provision shall not result in a double grade jump in GreenRE rating (i.e. from GreenRE Bronze or Silver to Gold or Platinum)

Under the New Hotel & Resort building criteria, the environmental impact category Part 1 – Energy Efficiency applies to both air-conditioned and non-air-conditioned spaces. Where there is a combination of air-conditioned and non-air-conditioned spaces, the credits allocated are to be prorated in accordance with the respective floor areas.

For simplicity, credits applicable to air-conditioned areas are accounted only if the aggregate air-conditioned areas exceed 1000 m^2. Similarly, credits applicable to non-air-conditioned areas are accounted only if the aggregate non-air-conditioned areas are more than 10% of the total floor areas excluding carparks and common areas.

- OTTV < 50 w/m^2 will be applicable for all air-conditioned spaces exceeding 1000m^2.
- Roof U-value requirements mandatory for all components of hotel and resort development under the certification boundary.

Framework:

To achieve GreenRE Award

Pre-requisite & Mandatory Requirements

All relevant prerequisite and mandatory requirements for the specific GreenRE Rating are to be complied with

Energy Related Requirements
Minimum 30 credits

Other Green Requirements
Minimum 20 credits

Elective Requirement for Energy Improvement (Combination of the following items to meet 30 credits)

Elective Requirement for Other Areas (Combination of the following items to meet 20 credits)

PART 1 - ENERGY EFFICIENCY

HR 1-1 Thermal Performance of Building Envelope -OTTV
HR 1-2 Air-Conditioning System
HR 1-3 Assisted Natural Ventilation
HR 1-4 Daylight
HR 1-5 Artificial Lighting
HR 1-6 Ventilation in Carpark
HR 1-7 Efficient Hot Water System
HR 1-8 Vertical Transportation System
HR 1-9 Design for Maintainability (DfM) - Passive and Active Design
HR 1-10 Energy Efficient Practices & Features
HR 1-11 Renewable Energy

PART 2 - WATER EFFICIENCY

HR 2-1 Water Efficient Fittings
HR 2-2 Water Usage and Leak Detection
HR 2-3 Irrigation System and Landscaping
HR 2-4 Water Consumption of Cooling Tower
HR 2-5 Alternative Water Sources
HR 2-6 Design for Maintainability (DfM) - Water

PART 3 – ENVIRONMENTAL PROTECTION

HR 3-1 Sustainable Construction
HR 3-2 Sustainable Products
HR 3-3 Greenery Provision
HR 3-4 Environmental Management Practice
HR 3-5 Green Transport
HR 3-6 Stormwater Management
HR 3-7 Refrigerants
HR 3-8 Design for Maintainability (DfM) Landscape

PART 4 - INDOOR ENVIRONMENTAL QUALITY

HR 4-1 Thermal Comfort
HR 4-2 Noise Level
HR 4-3 Air Quality & Indoor Air Pollutants
HR 4-4 Indoor Air Quality (IAQ) Management
HR 4-5 Lighting and Visual Comfort

PART 5 – OTHER GREEN FEATURES

HR 5-1 Green Features & Innovations

PART 6 – CARBON FOOTPRINT OF DEVELOPMENT

HR 6-1 Carbon Footprint of Development

CREDIT ALLOCATION:

	Category	Credits Allocations
(I) Energy Related Requirements		
Minimum 30 credits	**Part 1: Energy Efficiency**	
	HR 1-1 Thermal Performance of Building Envelope – OTTV	17
	HR 1-2 Air – Conditioning System	33
	HR 1-3 Assisted Natural Ventilation	4
	HR 1-4 Daylighting	6
	HR 1-5 Artificial Lighting	14
	HR 1-6 Ventilation in Carparks	2
	HR 1-7 Efficient Hot Water System	2
	HR 1-8 Vertical Transportation System	2
	HR 1-9 Design for Maintainability (DfM) - Passive and Active Design	4
	HR 1-10 Energy Efficient Practices & Features	11
	HR 1-11 Renewable Energy	15
	Category Score for Part 1 – Energy Efficiency	**110**
(II) Other Green Requirements		
Minimum 20 credits	**Part 2: Water Efficiency**	
	HR 2-1 Water Efficient Fittings	8
	HR 2-2 Water Usage and Leak Detection	3
	HR 2-3 Irrigation System and Landscaping	3
	HR 2-4 Water Consumption of Cooling Tower	2
	HR 2-5 Alternative Water Sources	3
	HR 2-6 Design for Maintainability (DfM) - Water	2
	Category Score for Part 2 – Water Efficiency	**21**
	Part 3: Environmental Protection	
	HR 3-1 Sustainable Construction	10
	HR 3-2 Sustainable Products	10
	HR 3-3 Greenery Provision	9
	HR 3-4 Environmental Management Practice	10
	HR 3-5 Green Transport	5
	HR 3-6 Stormwater Management	3
	HR 3-7 Refrigerants	1
	HR 3-8 Design for Maintainability (DfM) - Landscape	2
	Category Score for Part 3 – Environmental Protection	**50**
	Part 4: Indoor Environmental Quality	
	HR 4-1 Thermal Comfort	2
	HR 4-2 Noise Level	1
	HR 4-3 Air Quality & Indoor Air Pollutants	3
	HR 4-4 Indoor Air Quality (IAQ) Management	2
	HR 4-5 Lighting and Visual Comfort	2
	Category Score for Part 4: Indoor Environmental Quality	**10**
	Part 5: Other Green Features	
	HR 5-1 Green Features & Innovations	5
	Category Score for Part 5: Other Green Features	**5**
	Part 6: Carbon Emission of Development	
	HR 6-1 Carbon Emission of Development	3
	Category Score for Part 6 – Carbon Emission of Development	**3**
	Category Score for Part 2 to Part 6 – Other Green Requirements	**89**
	GreenRE New Hotel & Resort Building Score:	**199**

6. GreenRE Hotel & Resort Building Rating System Scoring

GreenRE Platinum	GreenRE Gold	GreenRE Silver	GreenRE Bronze
			
Score: 91 and above	Score: 86 to < 90	Score: 76 to < 85	Score: 50 to < 75

7. GreenRE New Hotel & Resort Rating System Criteria

PRE-REQUISITE

Air-Conditioned Buildings

GENERAL

- Building envelope design with Overall Thermal Transfer Value (OTTV) computed based on the methodology and guidelines stipulated in the MS1525:2019.

GreenRE Gold	OTTV of 42 W/m2 or lower
GreenRE Platinum	OTTV of 40 W/m2 or lower

- To demonstrate the 6% energy saving over its reference model using static calculation for GreenRE Bronze and Silver.
- Building Energy Intensity (BEI) calculation
- Minimum score under NHR1-5 Artificial Lighting

GreenRE Gold	≥ 5 credits
GreenRE Platinum	≥ 5 credits

- HR 2-1 Water Efficient Fittings - To demonstrate reduction of potable water usage by 10%.
- Minimum score under NHR 3-1 Sustainable Construction

GreenRE Gold	≥ 3 credits
GreenRE Platinum	≥ 5 credits

- Minimum score under NHR 3-2 Sustainable Products

GreenRE Gold	≥ 3 credits
GreenRE Platinum	≥ 4 credits

- HR 3-3 (a) Green Plot Ratio, including site inventory analysis and carbon sequestration calculation.
- HR 3-4 (a) Environmental Management Plan (EMP) during construction.

- HR 3-4 (i) Provision of facilities or recycling bins for collection and storage of different recyclable waste such as paper, glass, plastic etc and establish the Waste Management Route and Provide recycler details.
- Provision of Building User Guide and Sustainable Operation Management Guide
- HR 4-1 (a) To meet the minimum requirement of ASHRAE 62.1. Ventilation for Acceptable Indoor Air Quality.
- HR 6-1 (a) & (b) & (c) calculation of operational and embodied carbon.
- Provision of the food waste management plan for kitchen and restaurant.
- Provision of Green Procurement Policy for cleaning products, amenities, and food sourcing.

MINIMUM SYSTEMS EFFICIENCY

Air-conditioned Buildings

Minimum Design System Efficiency/Operating System Efficiency (DSE/OSE)

- For buildings using Water Cooled Chilled-Water Plant:

GreenRE Rating	Building Cooling Load (RT)	
	< 500	≥ 500
	Efficiency (kW/RT)	
Bronze	0.85	0.75
Silver	0.80	0.70
Gold	0.75	0.68
Platinum	0.70	0.65

- For buildings using Air Cooled Chilled-Water Plant or Unitary Air-Conditioners:

GreenRE Rating	Building Cooling Load (RT)	
	< 500	≥ 500
	Efficiency (kW/RT)	
Bronze	1.1	1.0
Silver	1.0	1.0
Gold	0.85	Case by case(i)
Platinum	0.78	

For building with building cooling load of more than 500RT, the use of air cooled central chilled water plant or other unitary air-conditioners are not encouraged for Gold and Platinum ratings. In general, the system efficiency of the air cooled central chilled-water plant and other unitary air-conditioners are to be comparable with the stipulated efficiency for water-cooled central chilled-water plant. Buildings that are designed with air cooled systems (e.g. stratified and/or multi-block developments) and seeking Gold / Platinum GreenRE rating will be assessed on a case-by-case basis.

Points scoring and fulfilment of pre-requisite for air-conditioning will be allowed if the air conditioning provided by developer for NLA.

Fulfilment of pre-requisite for air-conditioning without point scoring:

- Included in building user guide.
- For gold and platinum projects, savings in energy model to reflect efficiency of air-conditioners proposed in building user guide.

Note: The performance of the overall air-conditioning system for the building is based on the Operating System Efficiency (OSE) of the system during normal building operating hours as defined below:

Office Building
Monday to Friday: 9am to 6pm

Retail Mall:
Monday to Sunday: 10am to 9pm

Institutional:
Monday to Friday: 9am to 5pm

Hotel and Hospital:
24-hour

Industrial and Other Building Types:
To be determined based on the operating hours

Non-Air-conditioned Buildings

To be eligible for GreenRE Platinum Rating, ventilation simulation must be carried out to identify the most effective building design and layout. The simulation results and the recommendations derived are to be implemented to ensure good natural ventilation. Details and submission requirements on ventilation simulation can be found in Appendix B of this Guideline. Assistance from ceiling fans is allowable to improve the thermal comfort of a space whereby ventilation simulation shall prove that unassisted ventilation (NV) complies with the minimum requirement of 0.14 m/s wind velocity.

ENERGY EFFICIENCY COMPLIANCE

Projects shall demonstrate the stipulated performance through either option listed below (Gold and Platinum projects with air-conditioning system only):

Option 1: Energy Saving

- To demonstrate the stipulated energy savings over its reference model using an energy modelling framework set out. Details and submission requirements on energy modelling can be found in Appendix A Energy Modelling Guideline. (Baseline – MS1525:2019)

Type of AC System	Energy Saving Required (%)	
	Gold	Platinum
Centralized Air Conditioning system / Unitary system	25	30
District Cooling System	15	20

Option 2 – Building Energy Intensity (BEI) Benchmarking

- To demonstrate the stipulated Building Energy Intensity (BEI) using an energy modelling framework set out. Details and submission requirements on energy modelling can be found in Appendix A Energy Modelling Guideline. (Baseline – MS1525:2007)

BEI is derived using the following equation:

BEI = [(TBEC – CPEC) / (GFA excluding carpark - GLA x FVR)

Where:
TBEC = Total building energy consumption (kWh/year)
CPEC = Car Park Energy Consumption in (kWh/year)
GFA = Gross Floor Area (exclude car park area) (m^2)
GLA = Gross Lettable Area (m^2)
FVR = Floor Vacancy Rate (NLA) (m^2)

Note:

- Design BEI is based on 100% occupancy rate for consistency.
- All major active equipment to be included in the estimation of TBEC.
- During verification stage, if the occupancy rate is low, e.g., only 20% occupancy rate, it needs to be projected to 80% to get the BEI which reflects the actual operation situation

Building Type	Gold ($kWh/m^2/year$)	Platinum ($kWh/m^2/year$)
Hotel & Resort (Large) (GFA > 15,000 sqm)	240	220
Hotel & Resort (Small) (GFA < 15,000 sqm)	180	160

Table 1: Building Energy Intensity (BEI) Benchmarking

M&V SYSTEM REQUIREMENTS (FOR CENTRALIZED AC SYSTEMS ONLY)

Provision of permanent measuring instruments for monitoring of water-cooled chilled-water system and air-cooled chilled water system operating system efficiency. The installed instrumentation shall have the capability to calculate resultant plant operating system efficiency (i.e. kW/RT) within 5% of its true value and in accordance with ASHRAE Guide 22 and AHRI 550/590. Heat balance test for water-cooled chilled water system is required for verification of the accuracy of the Measurement and Verification (M&V) instrumentation.

MANDATORY REQUIREMENTS:

BUILDING ENVELOPE - OTTV

- The OTTV of the building envelope for a building, having a **total air-conditioned area exceeding 1000 m^2 and above should not exceed 50 W/m^2.**

ROOF

- In the case of an air-conditioned building, the concept of Roof Thermal Transfer Value (RTTV) is applied if the roof is provided with skylight and the entire enclosure below is fully air-conditioned.
- For roofs with skylight, the maximum recommended RTTV is 25 W/m^2.

ROOF – U-VALUE

- **The roof of the building** shall not have a thermal transmittance (U-Value) greater than that tabulated in Table 2-1.

Roof Weight Group	Maximum U-Value (W/m^2K)
Light (Under 50 kg/m^2)	0.4
Heavy (Above 50 kg/m^2)	0.6

Table 2-1 Maximum U-Value for Roof (W/m^2K)

ENERGY MANAGEMENT SYSTEM

- To Install Energy Management System where air-conditioned space is greater than 4000m^2

Provision of differently-able amenities based on recommended or best practices as UBBL, MS1183 Part-8, MS1184, MS1331 and etc.

Part 1

Energy Efficiency

Part 1 – Energy Efficiency

HR 1-1 THERMAL PERFORMANCE OF BUILDING ENVELOPE - OTTV	GREENRE CREDITS
(A) Applicable to Air-Conditioned Building Area (with an aggregate air-conditioned area > 1000m^2)	
a. Enhance overall thermal performance of building envelope to minimise heat gain thus reducing the overall cooling load requirement. Baseline: Maximum permissible OTTV = 50W/m^2 Prerequisite Requirement: GreenRE Bronze & Silver - OTTV of 50 W/m^2 or lower GreenRE Gold - OTTV of 42 W/m^2 or lower GreenRE Platinum - OTTV of 40 W/m^2 or lower	3 credits for every reduction of 1 W/m^2 in OTTV from the baseline. Credits scored = 100 – [2 x (OTTV)] where OTTV ≤ 50 W/m^2 (Up to 15 credits)
For Low-rise Resort & Hotel b. Provision of hardscaped roof that is finished with materials / finishes with Solar Reflectance Index (SRI) values of 40 **OR** provision of green roof to reduce local heat island effect.	
i. 25% of the roof area	1 credit
ii. 50% of the roof area	1.5 credit
iii. 75% of the roof area	2 credits (Up to 2 credits)

HR 1-2 AIR-CONDITIONING SYSTEM	GREENRE CREDITS
Applicable to air-conditioned Building Areas (with an aggregate air-conditioned area > 1000m^2) Encourage the use of better efficiency air-conditioned equipment to minimize the energy consumption. (System efficiency in kW/ton)	

a. Water-Cooled Chilled-Water Plant:
- Water-Cooled Chiller
- Chilled water pump
- Condenser water pump
- Cooling tower

Baseline	Building Cooling Load	
	< 500 RT	≥ 500 RT
Prerequisite Requirements Minimum system efficiency of central chilled-water plant	0.85 kW/RT	0.75 kW/RT

OR

b. Air Cooled Chilled-Water Plant / Unitary Air-Conditioners:

Air cooled Chilled-Water Plant:
- Air-Cooled Chiller
- Chilled Water Pump

Unitary Air-Conditioners:
- Variable Refrigerant Flow (VRF) System
- Water-Cooled Package Unit
- Single-Split Unit
- Multi-Split Unit

Baseline	Building Cooling Load	
	< 500 RT	≥ 500 RT
Prerequisite Requirements Minimum system efficiency of central chilled-water plant	1.1 kW/RT	1.0 kW/RT

Note (1): Where there is a combination of centralised air-conditioned system with unitary air-conditioned system, the computation for the credit scored will be pro-rated based on the air-conditioning system aggregate capacity.

a. Water-Cooled Chilled-Water Plant:

Building cooling load < 500 RT

14 credits for achieving plant efficiency of 0.85 kW/ton

0.3 credit for every percentage improvement in the chiller plant efficiency better than 0.85 kW/ton

Credit scored = 0.3 x (% improvement)

Building cooling load ≥ 500 RT

14 credits for achieving plant efficiency of 0.75 kW/ton

0.35 credit for every percentage improvement in the chiller plant efficiency better than 0.75 kW/ton

Credit scored = 0.35 x (% improvement)

(up to 20 credits)

OR

b. Air Cooled Chilled-Water Plant / Unitary Air-Conditioners:

Building cooling load < 500 RT

14 credits for achieving plant efficiency of 1.1 kW/ton

0.2 credit for every percentage improvement in the chiller plant efficiency better than 1.1 kW/ton

Credit scored = 0.2 x (% improvement)

Building cooling load ≥ 500 RT

14 credits for achieving plant efficiency of 1.0 kW/ton

0.25 credit for every percentage improvement in the chiller plant efficiency better than 1.0 kW/ton

Credit scored = 0.25 x (% improvement)

(up to 20 credits)

c. Air Distribution system:

- Air Handling units (AHUs)
- Fan Coil Units (FCUs)

Note (2): Point scoring only applicable for the building using the centralized chiller system.

Fan System Input Power

Baseline: ASHRAE 90.1:2010 Clause 6.5.3.1 and as prescribed below;

Baseline Air Distribution System Type	Allowable Fan System Input Power	
	($kW/m^3/s$)	(W/CMH)
AHUs / FCUs ≥ 4kW (Constant Volume)	1.5	0.42
AHUs ≥ 4kW (Variable Volume)	2.1	0.58
Fan systems with nameplate motor power < 4kW	0.6	0.17

Note (2): For buildings using district cooling system, there is no need to compute the plant efficiency under Part 1-2 (a) and (b). The credits obtained will be pro-rated based on the air distribution system efficiency under Part 1-2(c).

c. Air Distribution system:

0.15 credits for every percentage improvement in the air distribution system efficiency over the baseline

Credit scored = 0.15 x (% improvement)

(up to 6 credits)

d. Prerequisite requirements: Provision of permanent measuring instruments for monitoring of water-cooled chilled water plant and air-cooled chilled water plant efficiency. The installed instrumentation shall have the capability to calculate resultant plant efficiency (i.e. kW/RT) within 5% of its true value and in accordance with ASHRAE Guide 22 and AHRI 550/590. The following instrumentation and installation are also required to be complied:

- Location and installation of the measuring devices to meet the manufacturer's and engineer's recommendation.
- Data acquisition system to have a minimum resolution of 16 bit.

Applicable only to buildings with provision of water-cooled chilled water plants

2 credits

• All data logging with capability to trend at 1 minute sampling time interval for 24 hours a day, 7 days a week. • Dedicated digital power meters shall be provided for the each of equipment: chiller(s), chilled water pump(s), condenser water pump(s) and cooling tower(s). • Flow meters to be provided for chilled-water and condenser water loop (return and supply) and shall be of ultrasonic / full bore magnetic type or equivalent. • Temperature sensors are to be provided for chilled water and condenser water loop (return and supply) and shall have an end-to-end measurement uncertainty not exceeding ± 0.05°C over entire measurement or calibration range. All thermo-wells shall be installed in a manner that ensures that the sensors can be in direct contact with fluid flow. Provisions shall be made for each temperature measurement location to have two spare thermo-wells located at both side of the temperature sensor for verification of measurement accuracy.	
e. Prerequisite requirements: Verification of central water cooled chilled-water plant instrumentation: Heat Balance – substantiating test for water cooled chilled-water plant to be computed in accordance with AHRI 550/590. The operating system efficiency and heat balance to be submitted to GreenRE upon commissioning.	1 credit
f. Provision of variable speed controls for chiller plant equipment such as chilled-water pumps and cooling tower fans to ensure better part-load plant efficiency.	1 credit
g. Sensors or similar automatic control devices are used to regulate outdoor air flow rate to maintain the concentration of carbon dioxide. Indoor carbon dioxide acceptable range ≤700 ppm above outdoor concentration.	1 credit

h. Encourage the use of air-conditioning design practices that offer greater flexibility and makes it easier to serve area with different usage efficiently, such as the following:	
i. Common area, meeting rooms, event halls, etc. with specialty occupancies having controls capable of sensing space use and responding to space demand. (applicable to all spaces including guest room)	1 credit
ii. Room temperature and humidity display in applicable areas (applicable to all spaces including guest room)	1 credit

HR 1-3 ASSISTED NATURAL VENTILATION	GREENRE CREDITS
Encourage the use of better energy efficient assisted ventilation system to minimise energy consumption.	
a. Provision of mechanical - Use of ceiling fan as the mechanical cooling system in the guest room	2 Credits
b. Natural Ventilation in Common Area	
• Lift lobbies and corridors	1 credit
• Staircases	1 credit

HR 1-4 DAYLIGHTING	GREENRE CREDITS
Encourage design that optimises the use of effective day lighting to reduce energy use for artificial lighting.	
a. Use of daylight simulation analysis or any relevant calculation to verify that 50% or more of all normally occupied areas achieve adequate daylight illuminance levels as specified in MS 1525:2019. Areas with illuminance levels below or above the range do not comply.	

Percentage of Habitable spaces with Adequate Ambient Lighting Level	Credits Allocation
50% - 75%	1
76% - 90%	2
>90%	3

(Up to 3 credits)

b. Daylighting in the following common areas:	
i. Lift, lobbies and corridors	1 credit
ii. Staircases	1 credit
iii. Carparks	1 credit

Note:
a. Simulation or suitable daylight calculation is necessary for occupied space and common area to achieve the minimum daylight factors required
b. For common areas, artificial lighting circuits schematic area necessary as documentary to proof design allows controllability to maximise harvested daylight.

HR 1-5 ARTIFICIAL LIGHTING	GREENRE CREDITS
Encourage the use of better efficient lighting to minimise energy consumption from lighting usage while maintaining proper lighting level.	
a. Lighting Power Budget Baseline: Luminance level stated in MS 1525:2019 Note: a. Lux level simulation is required to show compliance per MS1525:2019 b. The lighting circuit also should comply to the following: • Light switches are to be placed near doorways and easily accessed; AND • Separate switches for lights parallel to natural lighting.	0.3 credit for every percentage improvement in the lighting power budget Credits scored = 0.3 x (% improvement) (Including tenant lighting provision) (Up to 12 credits)
b. Lighting Controls Encourage the use of lighting control circuits to minimize energy usage, such as provision of the following control strategies:	
i. Zoning of lighting for different usage/ locations - To install at least 1 light switch with labels for switched zone ≤ 30m^2. Zones ≥ 30m^2 to be matched accordingly.	1 credit

ii. Scheduling control to switch on and/ or off the lightings with some localized override control where lighting is needed beyond the scheduled period.	
• Lighting on timer control/ connected to occupancy sensors.	0.5 credit
• Toggle switch for light extension for different zones beyond pre-set period.	0.5 credit

HR 1-6 VENTILATION IN CARPARKS	GREENRE CREDITS
Encourage the use energy efficient design and control of ventilation systems on carparks. a. Carparks designed with natural ventilation. b. CO sensors are used to regulate the demand for mechanical ventilation (MV). Note (3): Where there is a combination of different ventilation mode adopted for car park design, the credits scored under this requirement will be prorated accordingly.	Naturally ventilated carparks – 2 credits Credits scored based on the mode of mechanical ventilation provided Fume extract- 1.5 credit MV with or without supply – 1 credit (Up to 2 credits)

HR 1-7 EFFICIENT HOT WATER SYSTEM	GREENRE CREDITS
Use of innovative domestic hot water heating system:	
a. Gas water heaters or energy efficient heat pump water heaters	1 credit
b. Solar water heaters	2 credits (Up to 2 credits)

HR 1-8 VERTICAL TRANSPORTATION SYSTEM	GREENRE CREDITS
Encourage the use of energy efficient lifts and escalators.	Extent of Coverage: All lifts and/or escalators
a. Lifts with the following energy efficient features: i. AC variable voltage and variable frequency (VVVF) motor drive or equivalent. ii. Sleep mode features or equivalent.	1 credit

b. Escalators with energy efficient features such as motion sensors.	1 credit

HR 1-9 DESIGN FOR MAINTAINABILITY (DfM) – PASSIVE AND ACTIVE DESIGN	GREENRE CREDITS
Aim for integrated, cost-effective adoption of good design, equipment placement, and construction strategies. • Reduce risk of corrosion and dust invasion in cooling tower • Reduce risk of fouling issue and improve condenser water quality • Reduce risk of dust and debris settlement inside the cooling tower basin • Avoid damage to the refrigerant pipe and insulation • Reduce risk of water ponding and algae growth in the AHU room • Reduce frequency of replacement for AHU filters • Reduce risk of water ingress and streaking on façade • Direct access to all protruding façade features, e.g. canopies, sunshades, niches, fins, ledges, BIPV, façade screens, etc. • Reduce risk of corrosion of exposed supporting steel structures • Reduce risk of water ponding on roofs • Reduce risk of waterproofing failure/decay on concrete roofs.	0.5 credit for every maintainability strategy implemented (Up to 4 credits)

HR 1-10 ENERGY EFFICIENT PRACTICES & FEATURES	GREENRE CREDITS
Encourage the use of energy efficient practices and features which are innovative and have positive environmental impact	
a. Computation of energy consumption based on design load in the form of Building Energy Intensity (BEI).	1 credit
b. Energy-Consuming Devices	

• Guest room - hair dryer, TV, chiller, kettle, refrigerator, microwave, iron, etc.	0.5 credit
• Office operation & facility maintenance - Computer, laptop, printer, fax, screen, lawn mower, generator, waterjet, etc	0.5 credit
• Kitchen and laundry equipment - Washing Machines, Drying Machines, Press Machine, Dish Wasters, Fridges, Freezers etc.	0.5 credit
• Inventory of energy-consuming devices/equipment that includes the date of purchase, estimated date of replacement, maintenance/services and energy-efficiency status.	0.5 credit
c. Use of Energy Efficient Features • Heat recovery devices • Thermal Insulation • Provision of vertical greenery systems • Kitchen hoods with supply/extract infrared fan controls • etc.	3 credits for every 1% energy saving over the total building energy consumption per features (Up to 8 credits)
HR 1-11 RENEWABLE ENERGY	**GREENRE CREDITS**
Encourage the use of renewable energy sources in buildings	5 credits for every 1% replacement of electricity (based on total electricity consumption) by renewable energy OR 3 credits for every 10% of roof area used for solar panels. OR
For buildings where solar panels are not installed, provide solar panel installation ready roof. Appropriate roof pitch, static loads, mounting system, and roof access to be considered.	1 credit Note: The credit scored for renewable energy provision shall not result in a double grade jump in GreenRE rating (i.e. from GreenRE Bronze or Silver to Gold or Platinum) (Up to 15 credits)
PART 1 – ENERGY EFFICIENCY CATEGORY SCORE:	Sum of NHR 1-1 to HR 1-11 (Capped at 50 Credit) *Excluding credit from HR 1-11

Part 2

Water Efficiency

Part 2 – Water Efficiency

HR 2-1 WATER EFFICIENT FITTINGS	GREENRE CREDITS
Encourage the use of water efficient fittings that are certified under the Water Efficiency Products Labelling Scheme (WEPLS). a. Basin taps and mixers b. Flushing cistern c. Shower taps and mixers or showerheads d. Sink/bib taps and mixers e. Urinals and urinal flush valve	**Weightage Scoring Based on Water Efficiency Products Labelling Scheme (WEPLS)** Efficient* | Highly Efficient** | Most Efficient*** **4 credits** | **6 credits** | **8 credits** Credits can be scored based on the number and water efficiency rating of the fitting type used. (Up to 8 credits)

HR 2-2 WATER USAGE AND LEAK DETECTION	GREENRE CREDITS
Promote the use of sub-metering and leak detection system for better control and monitoring	
a. Digital water metering and management - sub-metering of the building's major water usage and/or rainwater system.	1 credit
b. Meters and submeters linked to the Building Management System (BMS) or other specialised software.	1 credit
c. Monitoring data documentation and improvement plans	1 credit

HR 2-3 IRRIGATION SYSTEM AND LANDSCAPING	GREENRE CREDITS
Provision of suitable systems that utilise rainwater or recycled water for landscape irrigation to reduce potable water consumption.	
a. Use of non-potable water including rainwater for landscape irrigation with provision of submetering for monitoring during the operation.	1 credit
b. Use of water efficient irrigation system with rain sensor.	Extent of Coverage: At least 50% of the landscape areas are served by the system 1 credit
c. Use of drought tolerant plants that require minimal irrigation.	Extent of Coverage: At least 50% of the landscape areas 1 credit

HR 2-4 WATER CONSUMPTION OF COOLING TOWER	GREENRE CREDITS
Reduce potable water consumption for cooling purpose.	
a. Use of cooling tower water treatment system which can achieve 6 or better cycles of concentration at acceptable water quality	1 credit
b. Use of recycled water from approved sources for cooling purpose	1 credit

HR 2-5 ALTERNATIVE WATER SOURCES	GREENRE CREDITS
Use of suitable systems that utilize alternative water sources for non-potable uses: washing, water features, toilet flushing, etc (excluding cooling tower make up water) to reduce use of potable water. Alternative sources can include rainwater, greywater (for toilet flushing only), AHU condensate and recycled water from approved sources.	Credits awarded based on % reduction in total potable water usage of the applicable uses > 50 % — 3 credits ≥ 10 % to 50 % — 2 credits < 10 % — 1 credit (Up to 3 credits)

HR 2-6 DESIGN FOR MAINTAINABILITY (DFM) – WATER	GREENRE CREDITS
Encourage good design for good water plumbing and piping maintainability which allow sufficient space, minimize pipe blockage risks, and provide easy access.	
• Access space for maintenance of water tank (including rainwater tank). • Access provision to sanitary pipes and design detailing for ease of maintenance. • Reduce risk of chokes in the sanitary pipe. • Prevent the lack of flexibility for maintenance and testing of sprinkler system.	0.5 credit for every maintainability strategy implemented (Up to 2 credits)
PART 2 – WATER EFFICIENCY CATEGORY SCORE:	Sum of GreenRE credits obtained from NHR 2-1 to NHR 2-6

Part 3

Environmental Protection

Part 3 – Environmental Protection

HR 3-1 SUSTAINABLE CONSTRUCTION	GREENRE CREDITS
Encourage recycling and the adoption of building designs, construction practices and materials that are environmentally friendly and sustainable.	
a. Use of sustainable and recycled materials; Green Cements with approved industrial by-product (such as Ground Granulated Blast Furnace Slag (GGBS), silica fume, fly ash) to replace Ordinary Portland Cement (OPC).	
b. Concrete Usage Index (CUI) Encourage more efficient concrete usage for building components.	

% Replacement of OPC by approved industrial by-products	Credits Allocation
10	1
20	2
30	3
40	4
>50	5

(Up to 5 credits)

Project CUI (m3/m2)	Credits Allocation
≤ 0.70	1
≤ 0.60	2
≤0.50	3
≤0.40	4
≤0.35	5

(Up to 5 credits)

Prerequisite Requirement:

Minimum score under NHR 3-1:
GreenRE Gold ≥ 3 credits
GreenRE Platinum ≥ 5 credits

HR 3-2 SUSTAINABLE PRODUCTS	GREENRE CREDITS
a. Encourage the use of products that are environmentally friendly and sustainable as follow: • Eco Label products • Wood products certified by the Forest Stewardship council (FSC) or the Malaysia Certification Council (MTCC) • Agreement of the manufacturer or suppliers for the buyback programmes within the life cycle or at the end of materials life for recycling reuse purpose	Credits scored will be based on the extent of use of environmentally friendly product. (Up to 8 credits)
b. Reuse Salvaged Materials Salvage or reuse construction materials for 2% of building materials based on the total material cost (extracted from the bill of quantities).	1 credit
c. Recycled Content Encourage the utilisation and use of recycled content material so that the total of post-consumer recycled content plus half of the pre-consumer content constitutes at least 10% based on the total material cost. *<u>Prerequisite Requirement:</u>* *Minimum score under NHR 3-2:* *GreenRE Gold ≥ 3 credits* *GreenRE Platinum ≥ 4 credits*	1 credit

Extent of use of environmentally friendly product	Weightage for Credit Allocation
Low Impact	0.5
Medium impact	1
High Impact	2

HR 3-3 GREENERY PROVISION	GREENRE CREDITS
Encourage greater use of greenery and restoration of existing trees to reduce heat island effect.	

a. Green Plot Ratio (GnPR) is calculated by considering the 3D volume covered by plants using the Leaf Area Index (LAI).	<table><tr><th>GnPR</th><th>Credits Allocation</th></tr><tr><td>1.0 to < 2.0</td><td>1</td></tr><tr><td>2.0 to < 3.0</td><td>2</td></tr><tr><td>3.0 to < 4.0</td><td>3</td></tr><tr><td>4.0 to < 5.0</td><td>4</td></tr><tr><td>5.0 to < 6.0</td><td>5</td></tr><tr><td>≥ 6.0</td><td>6</td></tr></table>
b. Restoration of trees on site, conservation, or relocation of existing trees on site. (at least 20%)	1 credit
c. Provision of compost bins to recycle organic waste to meet at least 30% of landscape fertilizer needs.	1 credit
d. Integration of fruit, herb, or vegetable garden/farm in the development and included as ingredients for restaurant and/or café menu.	1 credit
HR 3-4 ENVIRONMENTAL MANAGEMENT PRACTICE	**GREENRE CREDITS**
Encourage the adoption of environmentally friendly practices during construction and building operation.	
a. Implement effective environmentally friendly programmes including monitoring and setting targets to minimise energy use, water use and construction waste during construction stage and include the following practices: • To record the electrical consumption during the construction stage and hence, minimise energy usage by on-site utilities.	1 credit

• Appointment of safety, health and environment officer. • To prepare an Environmental Management Plan and conduct a complete Erosion Sedimentation Control Plan (ESCP). • To prepare a Construction Waste Management Plan. • To include commitment to recycle and/or salvage 50% of the volume of non-hazardous construction debris. • Provide at least the minimum level of sanitation/safety facilities for construction workers. • Use a low-flow flushing system and efficient fitting tap in the construction site office/ showroom. • Provision of the Rainwater Harvesting System and the strategies of rainwater. • Develop and implement and IAQ Management plan for Construction.	
b. Main builder that has good track records in the adoption of sustainable, environmentally friendly, and considerate practices during construction.	1 credit
c. Building quality is assessed and passed under the Quality Assessment System (QLASSIC) or Construction Quality Assessment System (CONQUAS) or Building Quality Assessment System (BuildQUAS).	1 credit
d. To performs IBS content scoring based on CIDB IBS scoring scheme.	1 credit for IBS score ≥ 50% 2 credits for IBS score ≥ 70%
e. Developer, main builder, M&E consultant and architect are ISO 14000 certified.	0.25 credit for each firm (Up to 1 credit)
f. Project team comprises one Certified GreenRE Accredited Professional /Green Mark AP/ MyCrest QP.	1 credit

g. Provision of building users' guide including details of the environmentally friendly facilities and features within the building and their uses in achieving the intended environment performance during the building operation.	1 credit
h. Provision of Sustainable Operation and Management Guideline and briefing to the building management team. The Sustainable Operation and Management Guideline must include the following practice: • Proposed water-saving measures should be quantified, including efficient appliance use, towel and linen reuse programs, and on-site reuse of treated wastewater.	1 credit
i. Provision of facilities or recycling bins for collection and storage of different recyclable waste such as paper, glass, plastic etc. and establish the waste management route and provide recycler details	1 credit
HR 3-5 GREEN TRANSPORT	**GREENRE CREDITS**
Promote environmentally friendly transport options and facilities to reduce pollution from individual car use.	
a. Good access (<800m walking distance) to public transport networks such as MRT/LRT stations or bus stops.	1 credit
b. Provision of covered walkway to facilitate connectivity and the use of public transport.	1 credit
c. Provision of infrastructure for electric charging stations to at least 10% of available parking spaces.	1 credit

d. Provision of hybrid/electric vehicle charging stations and priority parking lots within the development.	1 credit Extent of coverage: Minimum 1 number priority parking bays for every 100 carpark lots. EV chargers – 1 for every 200 parking bays. (Cap at 3)
e. Alternative/Energy efficient transport options for activities and operation (e.g. bike rental, shuttle service, buggy, e-scooter,etc) for guests and staff.	1 credit

HR 3-6 STORMWATER MANAGEMENT	**GREENRE CREDITS**
Encourage the treatment of stormwater runoff through provision of infiltration or design features before discharge to public drains. Provision of infiltration features or design features for new development and redevelopment in accordance with MSMA.	Reduce post development stormwater peak discharge rate and quantity from exceeding pre-development peak discharge rate and quantity: 5 - 15% - 1 credit 16 - 25% - 2 credits > 25% - 3 credits (Up to 3 credits)

HR 3-7 REFRIGERANTS	**GREENRE CREDITS**
Reduce the potential damage to the ozone layer and the increase in global warming through the release of ozone depleting substances and greenhouse gases.	
a. Refrigerants with ozone depleting potential (ODP) of zero **OR** with global warming potential (GWP) of less than 100.	0.5 credit
b. Use of refrigerant leak detection system at critical areas of plant rooms containing chillers and other equipment with refrigerants.	0.5 credit

HR 3-8 DESIGN FOR MAINTAINABILITY (DfM) - LANDSCAPE	GREENRE CREDITS
Ensure landscape elements are easy to maintain by using efficient systems, durable materials, and accessible designs. • Design for water tap for irrigation with maximum 15 m radius from each point. • Access for maintenance of underwater lighting systems. • Reduce risk of damage/degradation to outdoor landscape furniture • Access to all parts of vertical greenery for maintenance and replacement of perished plants both indoor and outdoor, e.g. catwalk, ladder, access corridor, etc. • Access for landscape on roofs and sky terraces. • Access to planter boxes on building edge - Provide minimally 600 mm access walkway to planter boxes for maintenance	0.5 credit for every maintainability strategy implemented (Up to 2 credits)
PART 3–ENVIRONMENTAL PROTECTION CATEGORY SCORE:	Sum of GreenRE credits obtained from HR 3-1 to HR 3-8

Part 4

Indoor Environmental Quality

Part 4 – Indoor Environmental Quality

HR 4-1 THERMAL COMFORT	GREENRE CREDITS
Air-conditioning system is designed to allow for cooling load variations due to fluctuations in ambient air temperature to ensure consistent indoor conditions for thermal comfort.	
a. Meet the minimum requirements of Section 4 through 7 of ASHRAE Standard 62.1, Ventilation for Acceptable Indoor Air Quality or any applicable local code, whichever is more stringent and requirement as follow: • Indoor temperature between 23°C to 26°C • Relative Humidity between 50% to 70%	1 credit
b. Room temperature and humidity displays in all guest room & all applicable areas.	1 credit

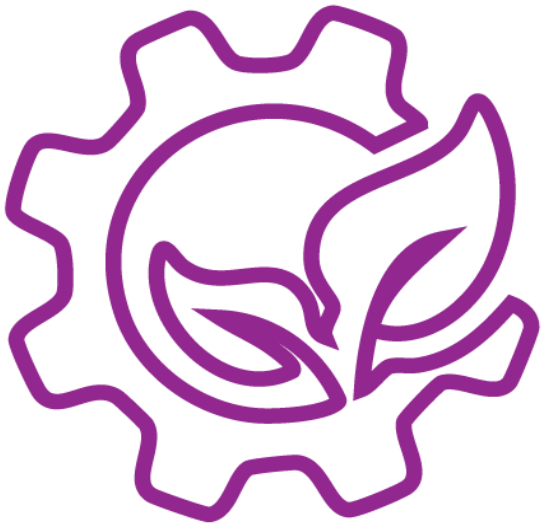
HR 4-2 NOISE LEVEL	GREENRE CREDITS
a. Noise from HVAC, mechanical equipment and functional areas within the facility are built to minimise noise pollution to external environments and guests.	0.5 credit
b. An acoustic assessment or mitigation plan shall be prepared for developments located near sources of significant noise disturbance, such as major roads with heavy traffic, flyovers, highways, or high-activity tourism attractions.	0.5 credit

HR 4-3 AIR QUALITY & INDOOR AIR POLLUTANTS	GREENRE CREDITS
Minimise airborne contaminants, mainly from inside sources to promote a healthy indoor environment.	
a. Use of low volatile organic compounds (VOC) paints certified under local/international certification body.	1 credit
b. Use adhesives certified under local/international certification body for composite wood products.	1 credit
c. To discourage, reduce and/or eliminate environmental tobacco smoke during construction/ operation.	0.5 credit – smoking is banned to all common area and facility 1 credit – smoking is banned across the entirety of the site

HR 4-4 INDOOR AIR QUALITY (IAQ) MANAGEMENT	GREENRE CREDITS
Ensure that building ventilation systems are designed and installed to provide acceptable IAQ under normal operating hours.	
a. Provision of filtration media and differential pressure monitoring equipment in Air Handling Units (AHUs).	1 credit
b. Implement effective IAQ management plan to ensure that building ventilation systems are clean and free from residuals left over from construction activities.	1 credit

HR 4-5 LIGHTING AND VISUAL COMFORT	GREENRE CREDITS
To provide effective lighting that enhances visibility, comfort, and safety through thoughtful design, appropriate placement, and energy-efficient systems.	

a. Lighting level to comply with MS1525:2014	1 credit
b. High frequency ballasts in the fluorescent luminaries. OR Use of driver with output frequency > 200Hz and < 30% flicker for LED lighting.	1 credit
PART 4 – INDOOR ENVIRONMENTAL QUALITY CATEGORY SCORE:	Sum of GreenRE credits obtained from HR 4-1 to HR 4-5

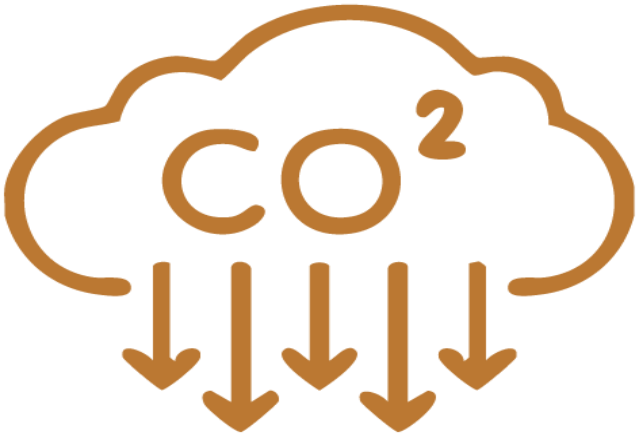


Part 5

Other Green Features

Part 5 – Other Green Features

HR 5-1 GREEN FEATURES AND INNOVATIONS	GREENRE CREDITS
Encourage the use of green features which are innovative and have positive environmental impact. Examples: • Geofencing, digital wayfinding and digital storytelling tools for hotel operation and tourism product • Knowledge Transfer - comprehensive communications document detailing embedded sustainability in the building document for the benefit of non-technical users (including marketing teams) • Educational Corners / Green Corners • Treatment of kitchen exhaust with green technologies such as UVC emitters, electronic air filtration, etc. • Technologies that also incorporate noise dampeners. • Replacement of labor with technology e.g., Self-service ordering via tablets, cashless payments at table. • Innovations with demonstrable carbon or energy reducing outcomes. • Innovation encapsulating social sustainability values. • etc	1 credit for high impact item 0.5 credit for low impact item (Up to 5 credits)
PART 5 – OTHER GREEN FEATURES CATEGORY SCORE:	Sum of GreenRE credits obtained from HR 5-1



Part 6

Carbon Footprint of Development

Part 6 – Carbon Footprint of Development

HR 6-1 CARBON FOOTPRINT OF DEVELOPMENT	GREENRE CREDITS
a. Recognise the carbon emission based on operational carbon footprint computation of the building comprising energy [B6] and water consumption [B7].	1 credit
b. Calculation of product stage embodied carbon based on following building materials [A1-A3]: • concrete • steel • bricks • cement • metal / aluminium	0.5 credit
c. Calculation of construction stage embodied carbon [A4-A5]	0.5 credit
d. Reduction from reference embodied carbon (for Ready Mix Concrete, Cement, Steel Reinforcement, Bricks, Metal /Aluminium)	>10% 0.5 credit >30% 1 credit
Part 6 – CARBON FOOTPRINT OF DEVELOPMENT CATEGORY SCORE:	Sum of GreenRE credits obtained from HR 6-1

GreenRE Score (New Hotel and Resort)

GreenRE Score (HR) = ∑Category score [(Part 1-Energy Efficiency) +
(Part 2-Water Efficiency) +
(Part 3-Environmental Protection) +
(Part 4-Indoor Environmental Quality) +
(Part 5-Other Green Features) +
(Part 6-Carbon Footprint of Development)]

Where:

Category Score for Part 1≥ 30 credits and
∑Category score for Part 2 to Part 6 ≥ 20 credits