



DESIGN REFERENCE GUIDE

OFFICE INTERIOR

TABLE OF CONTENTS

1	About GreenRE	2
2	Introduction	2
3	Revision Log	2
4	GreenRE Assessment Stages	3
5	GreenRE Office Interior Rating System	4
6	GreenRE Office Interior Rating System Scoring	7
7	GreenRE Office Interior Rating System Criteria	8

1. About GreenRE

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GreenRE Sdn Bhd
Wisma Rehda,
No.2C, Jalan SS5/6D,
47301 Petaling Jaya,
Selangor, Malaysia

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 Office Interior (referred to as "this Guideline") is to establish environmentally friendly practices for the planning, design and construction of office interior, which would help to mitigate the environmental impact of building interior for new offices, existing operating offices and existing offices undergoing renovation. This tool is dedicated for office interior other than retail and hospitality.

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 Implementation	22nd June 2018
1.1	Issued for Implementation	March 2022
2.0	Issued for Pilot	September 2022
2.0	Issued for Implementation	February 2023

4. GreenRE Assessment Stages

The GreenRE Office Interior 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 project meets:
 - i. The intents of the criteria
 - ii. The prerequisite 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 Office Interior Rating System

OVERVIEW:

The GreenRE office interior 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 – Sustainable Management & Operation: This category focuses on the design, sustainability management and operation that would reduce the environmental impacts of interior.

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 Emission of Development: This category focuses on the use of carbon calculator to calculate the carbon Emission of the development.

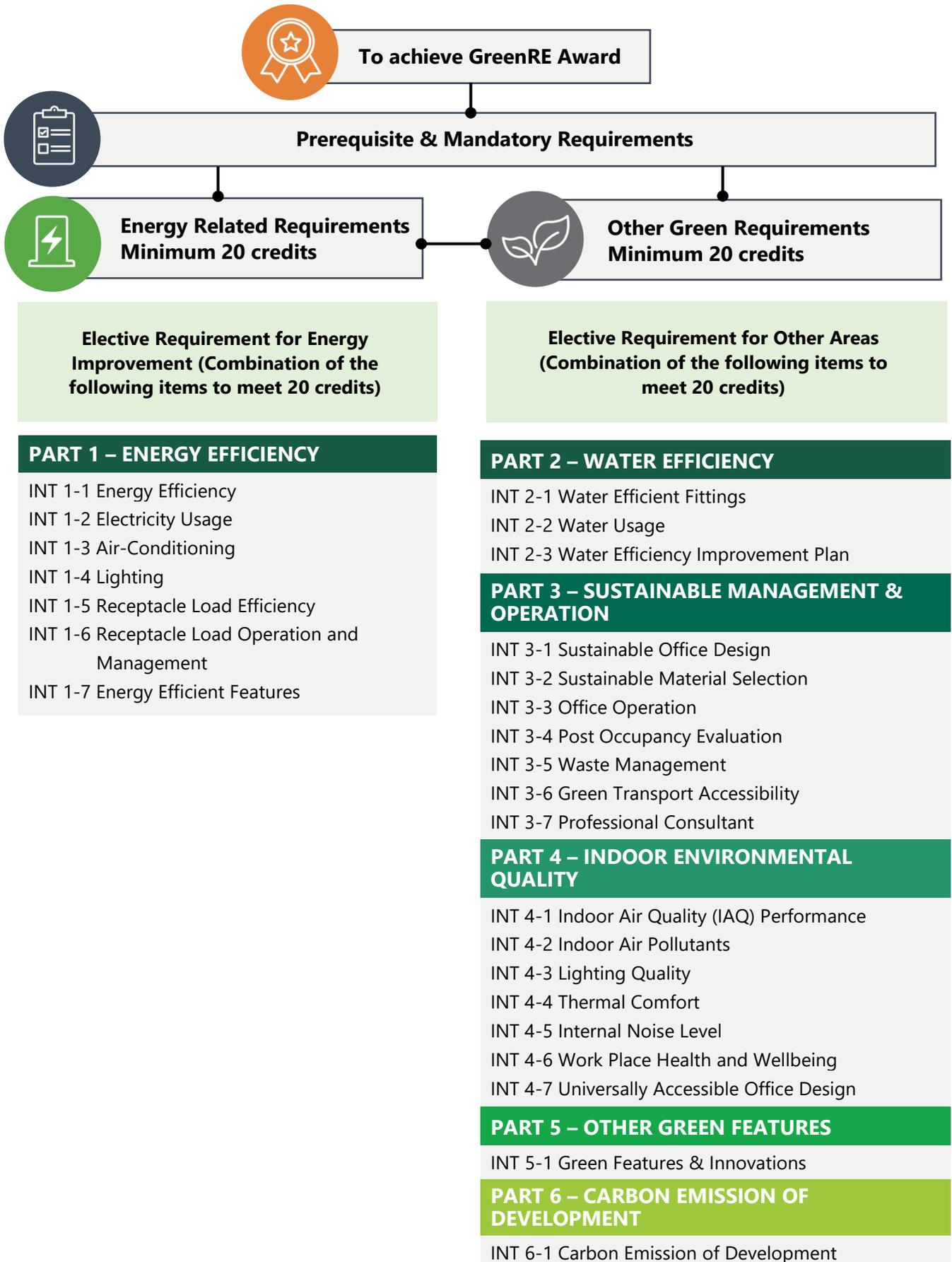
These environment impact categories are broadly classified under two main groups namely (I) Energy Related Requirements and (II) Other Green Requirements.

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 20 credits must be obtained from this group to be eligible for certification.

Other Green Requirements consist of Part 2 - Water Efficiency; Part 3 - Sustainable Management & Operation; Part 4 – Indoor Environmental Quality; Part 5 - Other Green Features and Part 6 - Carbon Emission 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 maximum GreenRE score achievable for a project is capped at 100 credits.

This rating tool is to be read in conjunction with latest version of NRB and ENRB.

Framework:

CREDIT ALLOCATION:

Category		Credits Allocations	
(I) Energy Related Requirements			
Minimum 20 credits	Part 1: Energy Efficiency		
	INT 1-1 Energy Efficiency	4	
	INT 1-2 Electricity Usage	2	
	INT 1-3 Air – Conditioning	9	
	INT 1-4 Lighting	15	
	INT 1-5 Receptacle Load Efficiency	10	
	INT 1-6 Receptacle Load Management and Operation	2	
	INT 1-7 Energy Efficient Features	8	
Category Score for Part 1 – Energy Efficiency		50	
(II) Other Green Requirements			
Minimum 20 credits	Part 2: Water Efficiency		
	INT 2-1 Water Efficiency	6	
	INT 2-2 Water Usage	2	
	INT 2-3 Water Efficiency Improvement Plan	1	
	Category Score for Part 2 – Water Efficiency		9
	Part 3: Sustainable Management & Operation		
	INT 3-1 Sustainable Office Design	5	
	INT 3-2 Sustainable Material Selection	12	
	INT 3-3 Office Operation	3	
	INT 3-4 Post Occupancy Evaluation	3	
	INT 3-5 Waste Management	5	
	INT 3-6 Public Transport Accessibility	2	
	INT 3-7 Professional Consultants	2	
	Category Score for Part 3 – Sustainable Management & Operation		32
	Part 4: Indoor Environmental Quality		
	INT 4-1 IAQ Performance	9	
	INT 4-2 Indoor Air Pollutants	4	
	INT 4-3 Lighting Quality	5	
	INT 4-4 Thermal Comfort	2	
	INT 4-5 Internal Noise Level	1	
INT 4-6 Work Place Health and Wellbeing	2		
INT 4-7 Universally Accessible Office Design	2		
Category Score for Part 4: Indoor Environmental Quality		25	
Part 5: Other Green Features			
INT 5-1 Green Features & Innovations	8		
Category Score for Part 5: Other Green Features		8	
Part 6: Carbon Emission of Development			
INT 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		77	
GreenRE Office Interior Building Score:		127 (MAX)	

6. GreenRE Office Interior Rating System Scoring



Score:
91 and above

GreenRE Platinum



Score:
81 to < 90

GreenRE Gold



Score:
71 to < 80

GreenRE Silver



Score:
50 to < 70

GreenRE Bronze



7. GreenRE Office Interior Rating System Criteria

PREREQUISITE

To be eligible for GreenRE for Office Interior, the office's temperature setting should not be lower than 23°C unless due to specific needs which will be reviewed on a case-by-case basis.

To be eligible for GreenRE certification, the office has to meet the following prerequisite requirements:



GENERAL

For buildings in operation for more than one (1) year, A formal IAQ management plan must be established and implemented to ensure a healthy indoor environment for all occupants. The policy should outline procedures for maintaining acceptable indoor air quality, including ventilation, pollutant source control, and regular maintenance of HVAC systems. The policy should contain at least the following:

- **Ventilation Management:** Ensure adequate ventilation rates in accordance with recognized standards (e.g., ASHRAE 62.1 or local equivalents) to dilute indoor pollutants and maintain fresh air supply.
- **Pollutant Source Control:** Identify and minimize sources of indoor air contaminants, including volatile organic compounds (VOCs), particulate matter, and biological pollutants. This includes the selection of low-footprint materials and proper storage of chemicals.
- **HVAC System Maintenance:** Establish a routine inspection and maintenance schedule for HVAC systems to ensure optimal performance, cleanliness, and efficiency. Filters should be replaced regularly, and air ducts cleaned as needed.
- **Monitoring and Response:** Implement procedures for periodic IAQ monitoring and establish a response procedure for occupant complaints or IAQ-related incidents.
- **Occupant Awareness:** Promote awareness and education among building users regarding IAQ practices, including the importance of reporting issues and maintaining cleanliness.



FOR GREENRE GOLD RATING

- Building Energy Intensity (BEI) of 80 Kwh/m²/year or lower

Note: For office where each staff is occupying office space of 12 square meter or lower, higher BEI will be considered on a case-by-case basis, but the BEI should not be more than 90 Kwh/m²/year

- Lighting power budget of 10 W/m² or lower
- Setting of sustainable and environmentally friendly procurement and purchasing policy and use and purchase of sustainable and environmentally friendly products for office stationery and cleaning products
- For offices whereby air-conditioning is non-centralized (i.e. unitary systems), system efficiency shall comply with Suruhanjaya Tenaga 5-star or equivalent.



FOR GREENRE PLATINUM RATING

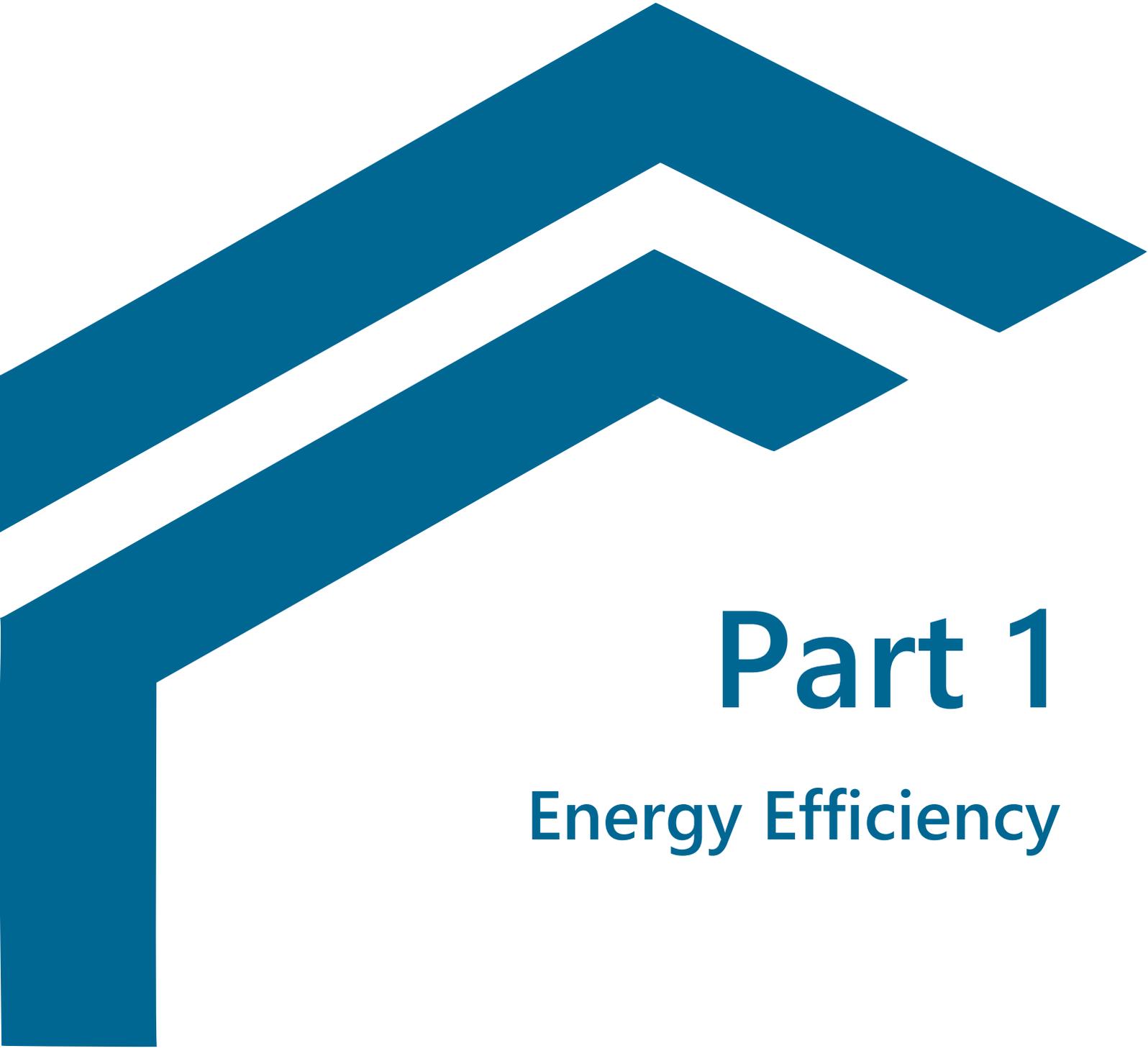
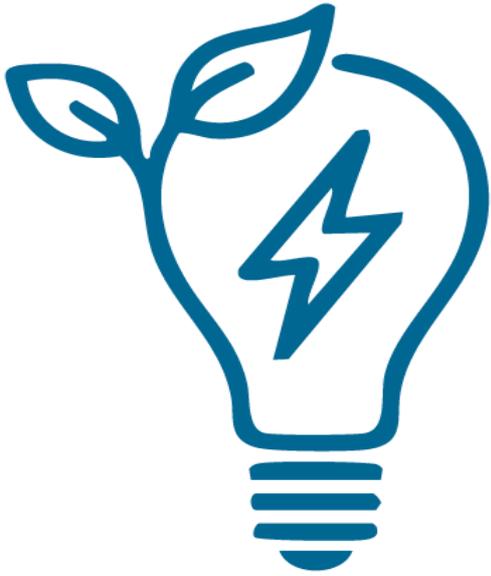
- Building Energy Intensity (BEI) of 70 Kwh/m²/year or lower

Note: For office where each staff is occupying office space of 12 square meter or lower, higher BEI will be considered on a case-by-case basis, but the BEI should not be more than 80 Kwh/m²/year

- Lighting power budget of 8 W/m² or lower
- Setting of sustainable and environmentally friendly procurement and purchasing policy and use and purchase of sustainable and environmentally friendly products for office stationery and cleaning products
- For offices whereby air-conditioning is non-centralized (i.e. unitary systems), system efficiency shall comply with Suruhanjaya Tenaga 5-star or equivalent.

Note:

1. BEI calculation is based on 55 hours working week and excludes air-conditioning usage which is normally provided by landlord.
2. Office interior assessment also excludes server rooms.



Part 1

Energy Efficiency



Part 1 – Energy Efficiency

INT 1-1 ENERGY EFFICIENCY	GREENRE CREDITS
<p>a. Encourage selection of energy efficient base building. Building is awarded GreenRE Gold / Platinum rating OR demonstrates 25%-30% energy savings trend over last three years.</p>	<p>Gold: 2 credits Platinum: 3 credits</p>
<p>b. Encourage office with energy efficiency improvement plan Setting target to improve office energy performance. To show intent, measures and implementation strategies of energy efficiency improvement plan over the next three years. Committed energy savings accrued from proposed measures should be quantified.</p>	<p>1 credit</p>
INT 1-2 ELECTRICITY USAGE	GREENRE CREDITS
<p>To encourage tracking of the office’s energy use with data presented in a relevant manner to make occupants aware of what they are consuming and engage them to be involved in managing end-use energy consumption.</p>	
<p>a. Electrical Sub-Metering Provide private sub-meters to monitor the major energy use system in the office:</p> <ul style="list-style-type: none"> • Air-conditioning / FCUs • Lighting • Plug loads <p>Note: Energy consumption of data centres/server rooms/hub rooms should be separately metered for the purpose of monitoring and BEI calculation. Hence, no further point will be given for submetering of these rooms.</p>	<p>1 credit</p>

b. Energy Portal and Dashboard

- Linking the private sub-meters to the office’s energy management system (either web based or mobile application) or equivalent for purpose of trend logging and readouts
- The provision of an energy portal or dashboard in the form of digital displays in the office or on the company’s intranet.

0.5 credit

0.5 credit

INT 1-3 AIR-CONDITIONING

GREENRE CREDITS

Encourage the use of more efficient air-conditioning to minimize energy consumption

a. A/C system efficiency

For centralized air-conditioning systems:

Use of centralized air-conditioning system which meet the efficiency requirement as per NRB v3.3. Central plant efficiency as per adjacent table.

Note: For base building using district cooling can score full credit if air-side efficiency to meet fan power limitations stated.

Water-Cooled Chilled Water Plant Building Cooling Load (RT)		Credit
< 500	≥ 500	
Efficiency (kW/RT)		
0.85	0.75	1
0.80	0.70	2
0.75	0.68	3
0.70	0.65	4

Air-Cooled Chilled Water Plant Building Cooling Load (RT)		Credit
< 500	≥ 500	
Efficiency (kW/RT)		
1.1	1.0	1
1.0	Not Applicable	2
0.85		3
0.78		4

Air Distribution system:

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

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

2 credits

For unitary air-conditioning systems:

Efficiency of air-conditioning system to be as per Suruhanjaya Tenaga or equivalent.

Note: This can be prescribed and enforced via DMC and green fit out guidelines to unit owner / tenant if not installed by developer.

Energy Efficiency Rating	Credit
****	3
*****	4

(Up to 4 credits)

b. Zoning and controls

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. Zoning of air-conditioning system to serve areas with different usage/occupancy needs.

1 credit

ii. Scheduling control to switch on and/or off the air-conditioning with some localized override control where air-conditioning is needed beyond the scheduled period.

- Air-conditioning on timer control

1 credit

<ul style="list-style-type: none"> Alternative cooling modes for after office hours (e.g. auxiliary air-con for selected areas only, localised cooling through fans, etc.) 	<p>1 credit</p>
<p>iii. Meeting rooms, pantry, etc. with specialty occupancies having controls capable of sensing space use and responding to space demand.</p>	<p>1 credit</p>
<p>iv. Room temperature and humidity display in applicable areas</p>	<p>1 credit</p>
<p>INT 1-4 LIGHTING</p>	<p>GREENRE CREDITS</p>
<p>Encourage the use of better efficient lighting to minimize energy consumption from lighting usage while maintaining proper lighting level based on the maximum lighting power density (LPD) stipulated in MS1525:2019.</p>	
<p>a. Lighting power budget</p> <p>Baseline: Maximum lighting power budget and average illuminance level as per MS-1525:2019.</p> <p>Note: Design should include task lighting required to achieve intended lux level for workspace.</p>	<p>0.3 credit for every percentage improvement Credits awarded = 0.3 x (%improvement)</p> <p>(up to 12 credits)</p>
<p>b. Lighting controls</p> <p>Encourage the use of lighting control circuits to minimize energy usage, such as provision of the following control strategies:</p>	
<p>i. Zoning of lighting for different usage / locations.</p>	<p>1 credit</p>
<p>ii. Scheduling control to switch on and / or off the lightings with some localized override control where lighting is needed beyond the scheduled period.</p>	
<ul style="list-style-type: none"> Lighting on timer control/connected to occupancy sensors 	<p>1 credit</p>

- Toggle switch for light extension for different zones beyond pre-set period

1 credit

INT 1-5 RECEPTACLE LOAD EFFICIENCY

GREENRE CREDITS

Encourage the selection and use of energy efficient labelled office equipment to reduce the overall energy consumption.

Use of energy efficient labelled office equipment (such as Energy Star, Suruhanjaya Tenaga Labelling Scheme or equivalent) to support general office function shall include but not limited to the following:

- Computer
- Monitor
- Printer
- Photocopier
- TV, Projector
- Microwave, portable air conditioner, mechanical fans, fridge, etc.

Credits awarded based on the number (type of equipment) and energy efficiency rating (highest rating for applicable labelling scheme) of the equipment used

(up to 10 credits)

INT 1-6 RECEPTACLE LOAD MANAGEMENT AND OPERATION

GREENRE CREDITS

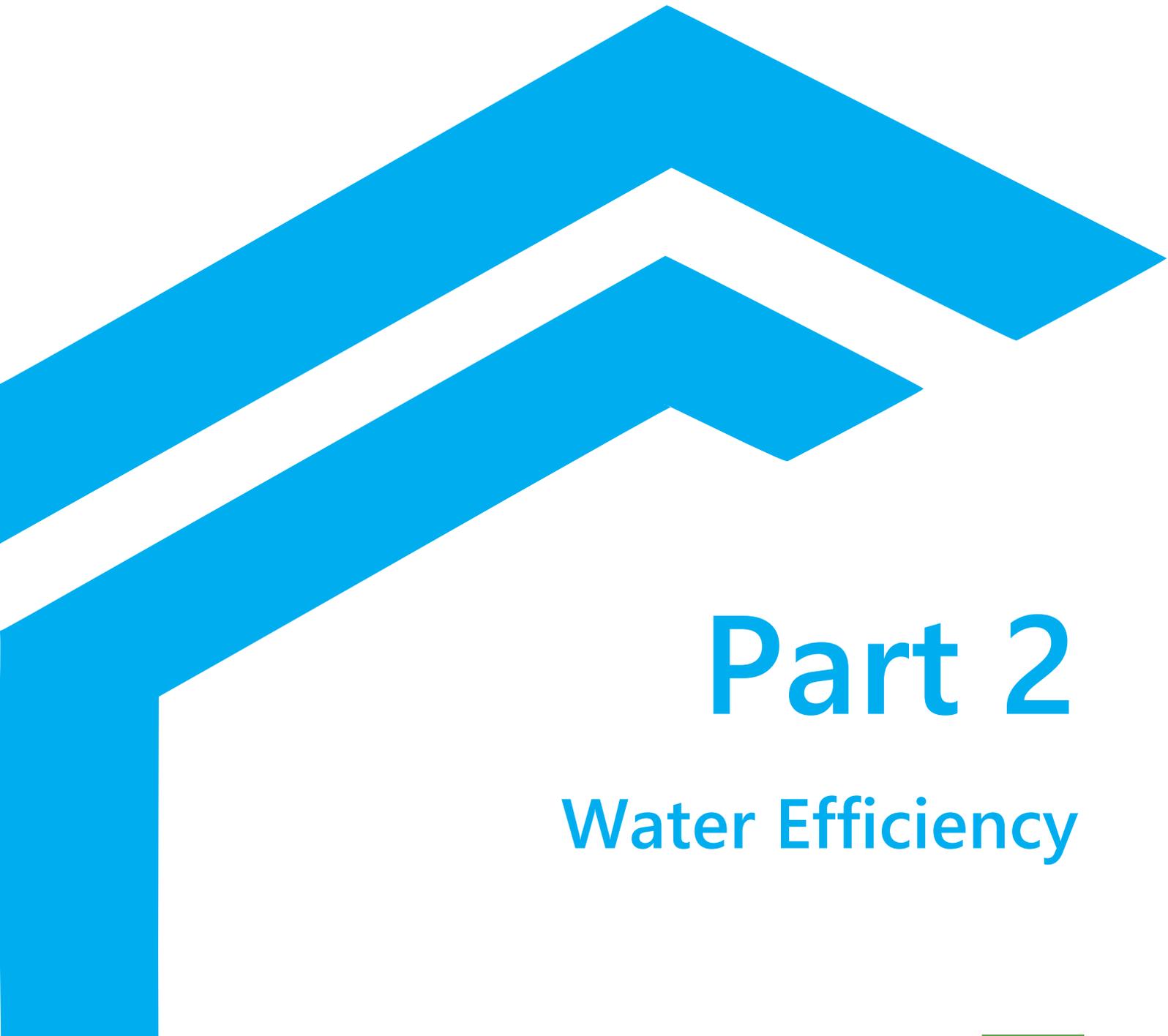
Encourage the use of active receptacle load control strategies to minimise energy usage during operation.

- Active receptacle load management based on operation schedule (automatic cut-off switches with user override)
- Overnight equipment management system
- Other strategies/systems

1 credit each

(Up to 2 credits)

INT 1-7 ENERGY EFFICIENT FEATURES	GREENRE CREDITS
<p>Encourage the use of energy efficient features which are innovative and/or have positive environmental impact.</p> <p>Examples:</p>	
<p>a. Computation of the energy consumption in the form of Building Energy Intensity (BEI)</p>	<p>1 credit</p>
<p>b. Use of energy efficient features</p> <p>Example:</p> <ul style="list-style-type: none"> • Solar panel to replace electricity • Heat recovery system • Sun pipes • Light shelves • Motion sensor/photo sensors 	<p>2 credits for every 1% energy saving over the total office energy consumption.</p> <p>(Up to 8 credits)</p>
<p>PART 1 – ENERGY EFFICIENCY CATEGORY SCORE:</p>	<p>Sum of GreenRE credits obtained from INT 1-1 to INT 1-7</p>



Part 2

Water Efficiency



Part 2 – Water Efficiency

INT 2-1 WATER EFFICIENT FITTINGS

Encourage the use of water efficient fittings that are certified under the Water Efficiency Products Labelling Scheme (WEPLS) or adopt equivalent water efficient flow-rate/flush volume for water fittings:

- Basin taps and mixers
- Flushing Cistern
- Shower mixer and Shower taps
- Sink/Bib Taps and Mixers
- All other water fittings

GREENRE CREDITS

Weightage Scoring Based on Water Efficiency Products Labelling Scheme (WEPLS)

Efficient*	Highly Efficient**	Most Efficient***
2 credits	4 credits	6 credits

Credits can be scored based on the number and water efficiency rating of the fitting type used.

(Up to 6 credits)

INT 2-2 WATER USAGE

Facilitate continual monitoring of water use within the development through the provision of water meters for major water uses.

- Provision of local private meters for all major water uses in the office.
- Provision of leak detection system with alert features.
- Provision of smart meters for remote monitoring.
- Provision of water usage portal, dashboard or other equivalent forms that display metered data, trending of water consumption and relevant parameters which facilitate better management of water consumption during building operation.

GREENRE CREDITS

1 credit each

(Up to 2 credits)

INT 2-3 WATER EFFICIENCY IMPROVEMENT PLANS	GREENRE CREDITS
<p>Targets to improve office water performance should be set. To show intent, measures and implementation strategies of water efficiency improvement plans over the next three years.</p> <p>Committed water savings accrued from proposed measures should be quantified.</p>	<p>1 credit</p>
<p>PART 2 – WATER EFFICIENCY CATEGORY SCORE:</p>	<p>Sum of GreenRE credits obtained from INT 2-1 to INT 2-3</p>



Part 3

Sustainable Management
& Operation



Part 3 – Sustainable Management & Operation

INT 3-1 SUSTAINABLE OFFICE DESIGN

GREENRE CREDITS

Encourage the selection of more sustainable base building and the adoption of office designs and materials that are environmentally friendly and sustainable.

a. Office renovation conserves at least 25% (by area) of existing finishing for walls, flooring and ceilings

Note: Excludes painting or touching up to paint work arising from office renovation.

Credits based on extent of retention of base building provisions

(Up to 2 credits)

Extent of conservation	Credit
≥25%	1 credit
≥50%	2 credits

b. To encourage design of open, flexible and reconfigurable layouts for maximum space usage.

- Provision of open and flexible layout with minimum enclosed space for ≥ 50% of office area
- Provision of space savers, compactors, mobile stations, etc.
- Agile working facilities (e.g. hot desking, touchdown areas, lockers for staff with no assigned desks, etc.)
- Multi-functional spaces such as pantry areas for townhall sessions, small meetings, health promoting activities (e.g. physical activity, health workshops, health screening).

1 credit each

(Up to 3 credits)

INT 3-2 SUSTAINABLE MATERIAL SELECTIONS

GREENRE CREDITS

Encourage the adoption of office materials that are environmentally friendly and sustainable.

a. Retain and reuse of at least 25% (by number/volume) of the existing furniture or use of furniture with an end-of-life take back services

Points based on extent of office furniture that is retained and/ or reused
(Up to 2 credits)

Extent of conversation	Credit
≥25%	1 credit
≥50%	2 credits

b. Use of environmentally friendly products that are certified by approved local certification body.

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

Credits scored will be based on the extent of use of environmentally friendly product.

(Up to 10 credits)

Note: High impact is for products whereby quantities used by percentage is more than 50% of quantities used for same intended purpose.

INT 3-3 OFFICE OPERATION

GREENRE CREDITS

a. Commitment from tenant – environmental policy

1 credit

b. A green guide for office occupants should be disseminated. Best practices pertaining to reduction of energy use, water use and maintenance of a good indoor environment should be documented in this green guide. Evidence of office occupants' involvement in environmental sustainability should also be demonstrated.

1 credit

c. Usage of sustainable fit-out materials as stipulated in the green fit-out guidelines

1 credit

INT 3-4 POST OCCUPANCY EVALUATION

GREENRE CREDITS

a. Conduct yearly post occupancy evaluation to assess occupant's satisfaction with the indoor environmental conditions.

2 credits

b. List of corrective actions taken following the post occupancy evaluation.

1 credit

INT 3-5 WASTE MANAGEMENT

GREENRE CREDITS

Encourage recycling facilities within office to reduce waste going to landfill.

Provision of recycling facilities (for recycling glass, paper, metal as well as one for non-recyclable waste)

- At a central location

0.5 credit

- At every floor or strategic locations to encourage recycling

1 credit

- To Promote and encourage waste reduction and recycling among occupants, tenants, and visitors.

a. Reduce

- Follow-me printing or secure printing, with printing options set to default greyscale and duplex printing

- Digitalising internal processes (e.g. HR/ administrative processes, approval, claims, payments to suppliers, etc.).

0.5 credit each

- Dissemination of information and circulars through emails, intranet, share point, staff notice board, etc.

(up to 2 points)

- Encouraging staff to bring their own electronic devices to meetings instead of printing

- Others

<p>b. Reuse</p> <ul style="list-style-type: none"> • Use of non-disposable cups for meetings and by staff • Use of non-disposable cutlery and crockery • Use of erroneous single sided print outs • Ordering of office supplies 	<p>0.5 credit (Up to 1.5 credits)</p>
<p>INT 3-6 PUBLIC TRANSPORT ACCESSIBILITY</p>	<p>GREENRE CREDITS</p>
<p>Promote the use of public transport or bicycles to reduce pollution from individual car use.</p>	
<p>a. Good access to nearest MRT/LRT or bus stops. (<800m)</p>	<p>1 credit</p>
<p>b. Adequate bicycles parking lots.</p>	<p>1 credit</p>
<p>INT 3-7 PROFESSIONAL CONSULTANTS</p>	<p>GREENRE CREDITS</p>
<p>a. Selection of a qualified design team apart from the Interiors Designers, representing the other interior fit out trades and shall consist of either of the following:</p> <ul style="list-style-type: none"> • MEP Engineers • C&S Engineer • Sustainability Consultants • Quantity Surveyors 	<p>1 credit</p>
<p>b. Project team comprises one of Certified GreenRE Accredited Professional (GreenREAP)</p>	<p>1 credit</p>
<p>PART 3 – SUSTAINABLE MANAGEMENT & OPERATION CATEGORY SCORE:</p>	<p>Sum of GreenRE credits obtained from INT 3-1 to 3-7</p>



Part 4

Indoor Environmental Quality



Part 4 – Indoor Environmental Quality

INT 4-1 IAQ PERFORMANCE	GREENRE CREDITS
<p>Encourage and recognize good indoor air quality (IAQ) to ensure the comfort and well-being of office occupants.</p>	
<p>a. IAQ Audit - to conduct a full IAQ audit that complies with Code of Practice on Indoor Air Quality, Department of Occupational Safety and Health, Ministry of Human Resources Malaysia (2010) including "Guidance Note on Ventilation and Indoor Air Quality for Non-Residential setting during Covid-19 Pandemic"</p>	<p>4 credits</p>
<p>b. Develop an active IAQ management Programme and Good Practice Guide</p>	<p>1 credit</p>
<p>c. CO₂ display and monitoring to ensure delivery of sufficient/minimum outside air requirements. Indoor carbon dioxide acceptable range ≤700 ppm above outdoor concentration.</p>	<p>2 credits</p>
<p>d. Ensure compliance to "Guidance Note on Ventilation and Indoor Air Quality for Non-Residential setting during Covid-19 Pandemic" for fresh air intake requirement</p>	<p>2 credits</p>
INT 4-2 INDOOR AIR POLLUTANTS	GREENRE CREDITS
<p>Minimise airborne contaminants, mainly from inside sources to promote a healthy indoor environment.</p>	

a. Use and purchase of low VOC and low toxicity products recognised by an approved local certification body.

Example include:

- Adhesives and sealants (including tile grouting)
- Floor coverings such as carpets, laminates and vinyl flooring (excluding tiles)
- Ceiling coverings such as ceiling boards
- Wall coverings (excluding tiles)
- Varnish, stains lacquers or other trims (including doors and furniture)

Credit scored based on % of applicable areas with such provision by category:

(Up to 3 credits)

Category (for > 80% of applicable area)	Credit
Internal Walls	1
Floors	1
Ceilings	1
Doors	0.5
Fixed furniture or system furniture	1

b. Setting of sustainable and environmentally friendly procurement and purchasing policy.

1 credit

INT 4-3 LIGHTING QUALITY

GREENRE CREDITS

To encourage good workplace lighting quality to promote productivity and comfort of occupants.

a. Design for proper lighting level.

Baseline: Luminance level stated in MS 1525:2014

1 credit

b. High frequency ballasts OR use of driver with output frequency < 200Hz and < 30% flicker for LED lighting.

1 credit

c. 2 credits can be scored to encourage effective daylighting to enter occupied spaces whilst minimising heat gain and visual discomfort arising from potential glare.

- Enclosed rooms located away from windows
- Low workstation partition heights $\leq 1.2\text{m}$ from finished floor level or $\leq 0.5\text{m}$ from the desk plane
- Perimeter lighting along windows to be interlocked with photocell sensors
- Light shelf to draw daylighting deeper into the open office area
- Others

0.5 credit each
(Up to 2 credits)

d. Glare Control Potential Glare Mitigation

Provision of any of the following strategies to reduce glare from windows and artificial lighting

- Diffused overhead lighting
- Use of light colour and matte finishes
- Operable window blinds and screens
- Glazing treatments/ Solar films
- Workstation design to avoid glare (e.g. reduced reflective surfaces, adjustable height for monitor screens, anti-glare filters etc.)

0.5 credit each

(Up to 1 credit)

INT 4-4 THERMAL COMFORT

GREENRE CREDITS

Ensure thermal comfort of office occupants

a. Comfort level

- Indoor operative temperature between 23°C to 26°C
- Relative Humidity 50% - 70%

1 credit

b. Occupants are able to control the indoor temperature by zones according to their preference and thermostat set-point does not go below 23°C

0.5 credit

c. 0.5 credits if occupants have access to devices to enhance individual thermal comfort (e.g. fans)

0.5 credit

INT 4-5 INTERNAL NOISE LEVEL

GREENRE CREDITS

Occupied spaces in office are designed with good ambient sound level as follows:

Low dBA	Average dBA	High dBA
40	45	50

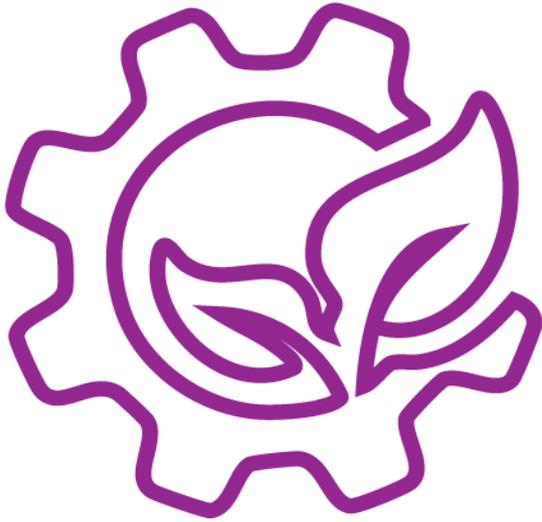
1 credit

INT 4-6 WORKPLACE HEALTH AND WELLBEING	GREENRE CREDITS
<p>To improve the nutritional value of food made available to employees on day-to-day basis.</p> <p>a. Offer healthier options for catering i.e.</p> <ul style="list-style-type: none"> • Include whole-grains in all staple options • Offer plain water as default beverage option • Fresh fruits as an option for desserts • Coffee and tea offered must have syrup/sugar served on the side, not pre-added • Limit deep fried items (less than 10% of catered food items) <p>b. Pantries and vending machines offer healthier snacks and drinks</p> <ul style="list-style-type: none"> • Healthier Choice Symbol products • Unsweetened drinks 	<p>1 credit if all 5 criteria are met for at least one event in the last 3 months</p> <p>1 credit</p>
INT 4-7 UNIVERSALLY ACCESSIBLE OFFICE DESIGN	GREENRE CREDITS
<p>Office design must cater to the needs of general users as well as special user groups who could visit or work there (e.g. Expectant Mothers, Mature workers, physically challenged employees).</p> <p>Incorporating universal design concepts within office space such as:</p> <ul style="list-style-type: none"> • At least one automated door at accessible entrance for ease of access to office space • Stable, firm and slip-resistant walking surfaces at areas with high usage (e.g. walkways, toilets, pantries, staircases) • Main circulation routes and corridors with minimum width of 1800mm to allow one wheelchair and one person to pass each other comfortably 	<p>0.5 credit each</p> <p>(Up to 2 credits)</p>

- Provision of wheelchair-friendly toilets equipped with grab bars and emergency call bells
- Provision of Nursing Rooms equipped with seating, power socket, countertop with wash basin and refrigerator
- Access to assistive technology (mobility, visual, hearing)

**PART 4 – INDOOR ENVIRONMENTAL
QUALITY CATEGORY SCORE:**

Sum of GreenRE credits obtained from
INT 4-1 to 4-7



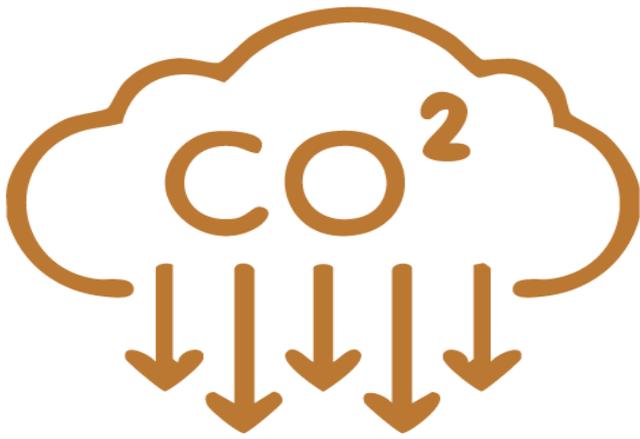
Part 5

Other Green Features



Part 5 – Other Green Features

INT 5-1 GREEN FEATURES & INNOVATIONS	GREENRE CREDITS
<p>Encourage the use of other green features which are innovative and/or have positive environmental impact.</p> <p>Examples:</p> <ul style="list-style-type: none"> • Use of printing access through swipe access card to help minimize unnecessary printing. • Provision of internal staircase to discourage usage of lifts. • Use of non-disposable cups for meetings and staff. • Provision of green walls. • Use of tele-conferencing to reduce travelling needs. • Promotion of green & health-related activities • Green and Health Education 	<p>2 credits for high impact</p> <p>1 credit for low impact</p> <p>(Up to 8 credits)</p>
<p>PART 5 – OTHER GREEN FEATURES CATEGORY SCORE:</p>	<p>Sum of GreenRE credits obtained from INT 5-1</p>



Part 6

Carbon Emission
of Development



Part 6 – Carbon Emission of Development

INT 6-1 CARBON EMISSION OF DEVELOPMENT	GREENRE CREDITS
a. Recognise the carbon emission based on operational carbon footprint computation of the building comprising energy and water consumption	1 credit
b. To identify carbon debt and quantify environmental impact and embodied energy.	0.25 credits for every material declared up to 2 credits (Finishes, raw renovation material).
Part 6 – CARBON EMISSION OF DEVELOPMENT CATEGORY SCORE:	Sum of GreenRE credits obtained from INT 6-1

GreenRE Score (Office Interior)

GreenRE Score (INT) = \sum Category score [(Part 1-Energy Efficiency) + (Part 2-Water Efficiency) + (Part 3-Sustainable Management & Operation) + (Part 4-Indoor Environmental Quality) + (Part 5-Other Green Features) + (Part 6-Carbon Emission of Development)]

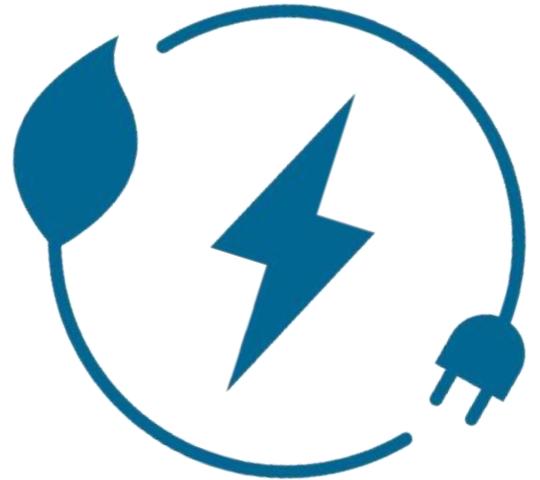
Where:

Category Score for Part 1 \geq 20 credits and

\sum Category score for Part 2 to Part 6 \geq 20 credits

Energy Related Requirements

Part 1 – Energy Efficiency



INT 1-1 Energy Efficiency

INT 1-2 Electricity Usage

INT 1-3 Air-Conditioning

INT 1-4 Lighting

INT 1-5 Office Equipment

INT 1-6 Energy Efficient Features

INT 1-1 ENERGY EFFICIENCY



OBJECTIVES

Encourage selection of energy efficient base building.



REQUIREMENTS

1-1 (a)

Up to 3 credits for Interior office located in the GreenRE Gold/Platinum building **OR** the base building needs to demonstrate 25% -30% energy saving trend over last three year.

All major load (Mechanical, Lighting, receptacle load, etc) need to be broke down through the submeter reading.

Any green building certification equivalent rating:

Gold base building	2 credits
Platinum base building	3 credits

1-1(b)

1 credit for encouraging office with energy efficiency improvement plan

Note: Setting target to improve office energy performance. To show intent, measures and implementation strategies of energy efficiency improvement plans over the next three years. Committed energy savings accrued from proposed measures should be quantified.



DOCUMENTARY EVIDENCES

For 1-1 (a)

- Copy of certificate of the base building showing the base building is certified as Gold/Platinum and the certification is still valid to the date of submission.
- Copy of rental/ tenancy document of the office unit from building owner/management. (If applicable)
- Energy monitoring report showing base building achieving 25%-30% energy saving trends for the past 3 years.



For 1-1 (b)

- Draft of improvement plans showing the calculation of energy saving that can be achieved over the next three years.
- Energy policy showing energy saving intent, measures and implementation commitments from the management.

INT 1-2 ELECTRICITY USAGE



OBJECTIVES

To encourage tracking of the office's energy use with data presented in a relevant manner to make occupants aware of what they are consuming and engage them to be involved in managing end-use energy consumption.



APPLICABILITY

Applicable to all major energy consumption within office interior.



REQUIREMENTS

Provision of private sub-meters to monitor the major energy use system in the office such as but not limited to:

- Air-conditioning / FCUs
- Lighting
- Plug loads



DOCUMENTARY EVIDENCES

- Provision of separate energy meter with wiring circuit for energy consumption loads for each major energy use such as air-conditioning, lightings and receptacles usage monitoring
- Wiring circuit showing the location of the energy meter

INT 1-3 AIR-CONDITIONING SYSTEM



OBJECTIVES

Encourage the use of more efficient air-conditioning to minimize energy consumption



BASELINE STANDARD

MS 1525:2019 – Energy Efficiency and Use of Renewable Energy for Non-Residential Building – Code of Practice



REQUIREMENTS

1-3 (a) A/C system efficiency

For centralized air-conditioning systems:

Use of centralized air-conditioning system which meet the efficiency requirement as per NRB v3.3. Central plant efficiency as per below table:

Air cooled Chilled Water Plant

Cooling Load (RT)		Credit
< 500	≥ 500	
Efficiency (kW/RT)		
0.85	0.75	1
0.80	0.70	2
0.75	0.68	3
0.70	0.65	4

Air cooled Chilled Water Plant

Building Cooling Load (RT)		Credit
< 500	≥ 500	
Efficiency (kW/RT)		
1.1	1.0	1
1.0	Not Applicable	2
0.85		3
0.78		4

And air-side efficiency to meet fan power limitations stated.

Note: For base building using district cooling can score full credit if air-side efficiency to meet fan power limitations stated.

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

For unitary air conditioning system;

Energy Efficiency Rating	Credit
4 Star	3
5 Star	4

Efficiency of air-conditioning system to be as per Suruhanjaya Tenaga or equivalent.

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

1-3 (b) Zoning & Control

Up to 5 credits for encouraging 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:

- 1 credit for provision of zoning of air-conditioning system to serve areas with different usage occupancy needs.
- 2 credits for scheduling control to switch on and/or off the air-conditioning with some localized override control where air conditioning is needed beyond the scheduled period.
- 1 credit for Meeting rooms, pantry, etc with specialty occupancies having controls capable of sensing space use and responding to space demand. (Active sensor. Thermostat not acceptable)
- 1 credit for provision of room temperature and humidity display in applicable areas.



DOCUMENTARY EVIDENCES

For 1-3(a)

- Detailed calculations of the overall improvement in equipment/system efficiency of the air-conditioning plants / showing the design cooling system capacity and the system efficiency (including individual equipment efficiency).
- Calculation and technical data of the designed system efficiency of chillers at part load condition.
- Technical product information of all air-conditioning and system which included chillers, chilled water pumps, condenser water pumps, cooling towers.
- Extracts of the tender specification showing the provision of the energy efficient with 3 or 4 stars rated as per Suruhanjaya Tenaga (or equivalent) for all air-conditioning unit.
- Technical specification and information of the air-conditioning system.
- Schematic drawings showing the air-conditioning system

For 1-3(b)(i)

- Schedules of the zoning area with its usage and occupancy needs.
- AHUs and FCUs or unitary air conditioning system schedule and schematic drawing
- Building layout with demarcation of each zoning and all spaces covered.

For 1-3(b)(ii)

- Extracts of the tender specification showing the provision of timer or any other schedule control system with override control installed for all air-conditioning areas.
- Extract of the tender specification showing the provision of alternative cooling modes for after office hour (auxiliary air-conditioning, fans, etc).
- Schematic drawing showing the schedule control system for the air-conditioning system.
- Building layout with demarcation of areas with schedule controlling system.
- Building layout with location demarcation of the alternative cooling modes
- Technical specification and catalogue of the schedule control system
- Technical specification and catalogue of the alternative cooling modes

For 1-3(b)(iii)

- Extracts of the tender specification showing the provision of sensor for all areas.
- Schematic drawing showing the sensor for the air-conditioning system.
- Building layout with demarcation of areas with sensor.
- Technical specification and catalogue of the sensor.



For 1-3(b)(iv)

- Extracts of the tender specification showing the requirements to provide the room temperature and humidity display.
- Plan layout showing the location of the room temperature and humidity display.

INT 1-4 LIGHTING



OBJECTIVES

Encourage the use of better efficient lighting to minimise energy consumption from lighting usage while maintaining proper lighting level.



APPLICABILITY

Applicable to lighting provisions that designed in accordance to the luminance level as recommended in MS 1525:2019.



BASELINE STANDARD

Luminance level stated in MS 1525:2019 – Energy Efficiency and Use of Renewable Energy for Non-Residential Building – Code of Practice

ASHRAE Standard 90.1-2010



REQUIREMENTS

1-4(a)

Up to 12 credits can be scored for the improvement in the lighting power budget in office area and common areas.

0.3 credits for every percentage improvement in the lighting power budget over the baseline standard. That is:

Credits scored = $0.3 \times (\% \text{ improvement})$

Please refer to Table 15 in MS 1525:2019 for maximum lighting power budget (intensity) according to type of usage. Below are some examples:

Type of Usage	Maximum Lighting Power Budget (W/m ²)
Stairs	5
Inquiry desk/Waiting area	5
Corridors	5
Lobbies	5
Toilets	6
Gymnasium (Exercise area)	10.8
General Offices	12

1-4(b)

- 1 credit for zoning of lighting for different usage/locations.
- 2 credits for scheduling control to switch on and/or off the lightings with some localized override control where lighting is needed beyond the scheduled period.



DOCUMENTARY EVIDENCES

For 1-4(a)

- Lighting layout plan.
- Lighting schedules showing the numbers, locations and types of luminaries used.
- Calculation of the proposed lighting power budget and the percentage of improvement in the prescribed tabulated format shown in NRB Table 1-6-1 and 2.
- Extract tender specification of lighting fittings used.
- Technical product information of the lighting luminaries used.
- Lux simulation result for all the spaces showing compliance with illuminance level in table 10, MS1525:2019

For 1-4(b)(i)

- Schedules of the zoning area with its usage and occupancy needs.
- Lighting schedules showing the numbers, locations and types of luminaries used for each zoning.
- Building layout with demarcation of each zoning and the spaces covered.



For 1-4(b)(ii)

- Extracts of the tender specification showing the provision of timer or any other schedule control system with override control installed for all lighting zones applicable.
- Schematic drawing showing the schedule control system for the lighting zones applicable.
- Building layout with demarcation of areas with schedule controlling system.
- Technical specification and catalogue of the schedule control system



REFERENCES

MS 1525:2019 – Energy Efficiency and Use of Renewable Energy for Non-Residential Building - Code of Practice

ASHRAE Standard 90.1-2010

INT 1-5 RECEPTACLE LOAD EFFICIENCY



OBJECTIVES

Encourage the selection and use of energy efficient labelled office equipment to reduce the overall energy consumption.



APPLICABILITY

Applicable to all office equipment



REQUIREMENTS

Up to 10 credits credit for the use of energy efficient office equipment or products that are certified by approved local/international certification body for at least 90% of each equipment by type or products

- Computer
- Monitor
- Printer
- Photocopier
- TV, Projector
- Microwave, Mechanical fans, fridge, etc

Credits awarded based on the number (type of equipment) and energy efficiency rating (highest rating for applicable labelling scheme) of the equipment used



DOCUMENTARY EVIDENCES

- Extracts of the tender specification showing the provision of the proposed energy efficient office equipment and the extent of implementation where applicable.
- Technical product information on the energy efficient products used.
- List of energy efficient office equipment showing the quantities and types of equipment
- Drawing showing the location for the provision of all intended devices
- Energy efficiency certificate for all equipment



REFERENCES

Energy Star, Suruhanjaya Tenaga (ST)

INT 1-6 RECEPTACLE LOAD MANAGEMENT AND OPERATION



OBJECTIVES

Encourage the use of active receptacle load control strategies to minimise energy usage during operation.



APPLICABILITY

Applicable to all plug load within the office boundary.



REQUIREMENTS

Up to 2 credits are credited for the use of active plug load control strategies to minimise energy usage during operation.

- Active plug load management based on operation schedule (automatic cut-off switches with user override)
- Overnight equipment management system
- Other strategies/systems



DOCUMENTARY EVIDENCES

- Extracts of the tender specification showing the provision of active plug load control strategies with user override
- Technical product information on the active plug load control
- List of application area and mode of control
- Drawing showing the location for the provision of all intended devices
- Write up details on how the active plug load control system works and input in the office user guideline for occupant reference.

INT 1-7 ENERGY EFFICIENT FEATURES



OBJECTIVES

Encourage the use of energy efficient features which are innovative and/or have positive environmental impact



APPLICABILITY

Applicable to office interior



REQUIREMENTS

1-7(a)

1 credit can be scored for the practice of using Building Energy Intensity (BEI) as an office performance indicator to measure the office's unit area energy consumption for future monitoring and improvements.

Calculation of BEI:

$$BEI = [(TBEC - CPEC) / (GFA \text{ excluding carpark} - GLA \times FVR) \times (NF/OH)]$$

Where:

TBEC = Total building energy consumption (kWh/year)

CPEC = Car Park Energy Consumption in (kWh/year)

GFA = Gross Floor Area (exclude car park area) (m²)

GLA = Gross Lettable Area (m²)

FVR = Floor Vacancy Rate (NLA) (m²)

NF = Normalizing factor based on a typical weekly operating hour that is 52 Hrs/week [only for office category]

OH = Weighted weekly operating hours (hrs/week) [only for office category]

Note:

- BEI is based on 100% occupancy rate for consistency.
- All major energy consumption equipment's are to be included in the estimation of total office energy consumption.

1-7(b)

Up to 8 credits can be scored for the use of the following approved energy efficient features depending on the potential energy saving.

- Solar panel to replace electricity
- Heat recovery system
- Sun pipes
- Light shelves
- Motion sensor/photo sensors

Extent of coverage: 2 credits for every 1% energy saving over the total office energy consumption

Note: For features that are not listed INT 1-7 above, the QP is required to submit the details showing the positive environmental impacts and potential energy savings of the proposed features to GreenRE assessment



DOCUMENTARY EVIDENCES

- Extracts of the tender specification showing the provision of the proposed energy efficient features and the extent of implementation where applicable.
- Technical product information and related drawing on the energy efficient features used.
- Calculation of the percentage energy saving that could be reaped from the use of these features.
- Calculation for itemized major energy consumption item for the office area.
- Technical specification of each itemized major energy consumption items



WORK EXAMPLE

For 1-7 (a)

- Determine the total annual office electricity consumption based on the estimated electricity consumption and usage pattern in term of operation hours of all major energy consumption systems and equipment.
- Compute the BEI of the office

Background info:

Assume a proposed office unit with GFA of 5000 m², operational hours per week is 45 hours at 100% occupancy rate.

System/Equipment	Total Annual Electricity Consumption (kWh/year)
Lighting	18554.2
Exterior Lighting (signboard)	145.52
Unitary Air Conditioning System	267636
Receptacle Equipment	80
Total	286415.72

Table 1-7.1: Total Office Electricity Consumption per year

*For specialised area within the office, the nominal values shown in the following table can be adopted.

Receptacle Loads	Nominal Values
Computer intensive offices	22 W/m ²
General office	16 W/m ²
Large conference area	11 W/m ²
Server/Computer rooms	540 W/m ²

Source: ASHRAE Standard 90.1:2010

Total annual office electricity consumption (TOEC) = 286,415.72 kWh/year

Therefore, the BEI of the office is as follows:

$$\begin{aligned}
 \text{BEI} &= (\text{TOEC} / \text{GFA}) \times (55 / \text{WOH}) \\
 &= (286,415.72 / 5000) \times (55 / 45) \\
 &= \underline{70 \text{ kWh/m}^2/\text{year}}
 \end{aligned}$$

Credit scored for 1-7 (a) = 1 credit

For 1-7 (b)

The same proposed office has included the use of motion sensors for pantry and meeting/discussion rooms.

i. Pantry

Total light fittings to be controlled by motion sensors = 2 x 10 nos.

Power consumption by light fitting = 2 x 10 x 12 W = 240 W

Assume 5 hours per day that the light fittings are off when it is not occupied.

Electricity saving = 240 W x 5 hours = 1.2 kWh

Annual electricity saving = 1.2 x 365 = 438 kWh

ii. Meeting/Discussion Rooms

Total light fittings to be controlled by motion sensors = 2 x 100 nos.

Power consumption by light fitting = 2 x 100 x 24 W = 4800 W

Assume 2 hours per day that the light fittings are off when it is not used

Electricity saving = 4800 W x 2 hours = 9.6 kWh

Annual electricity saving = 9.6 x 365 = 3504 kWh

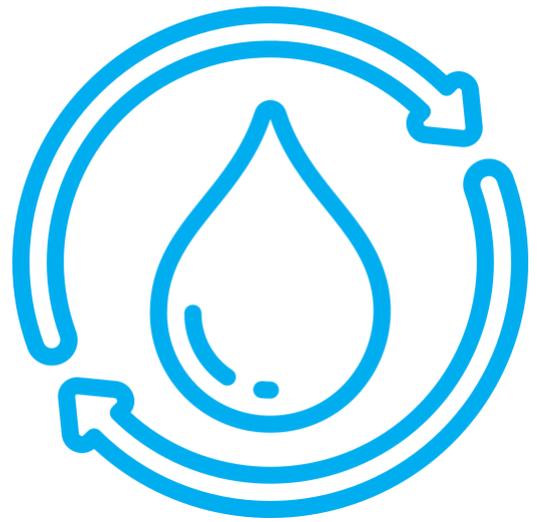
Total annual electricity saving using motion sensors = 438+3054
= 3942 kWh

% Energy savings = 3942/18554.2 = 21%

Credits scored for 1-7(b) = 2 credits for every 1% energy saving
= 2 x 21% = 42, *capped at 8 credits

Other Green Requirements

Part 2 – Water Efficiency



INT 2-1 Water Efficient Fittings

INT 2-2 Water Usage

INT 2-3 Water Efficiency Improvement Plan

INT 2-1 WATER EFFICIENT FITTINGS



OBJECTIVES

Reduce to use of potable water by using water efficient fittings covered under the Water Efficiency Products Labelling Scheme (WEPLS)



APPLICABILITY

Applicable if the area such as pantry and toilets be part of the office owner responsibility for future monitoring and maintenance purposes



BASELINE STANDARD

As specified under Water Efficiency Products Labelling Scheme (WEPLS) to all water fittings as follows:

- Basin taps and mixers
- Sink/taps and mixers
- Dual Flush Low-Capacity Flushing Cisterns
- Showerheads, Shower taps and mixers
- Urinals and Flush Valves



REQUIREMENTS

Up to 6 credits can be scored based on the number and water efficiency rating of the fitting type used.

Rating Based on Water Efficiency Products Labelling Scheme (WEPLS)		
Efficient *	Highly Efficient **	Most Efficient ***
2 credits	4 credits	6 credits



DOCUMENTARY EVIDENCES

- Extracts of the tender specification showing all the water fitting provisions for the development.
- Water fitting schedules showing the numbers, types and the approved rating of the proposed fittings in the prescribed tabulated format shown in the Table 2-1.1.
- Schematic drawing of cold water and sanitary plumbing.
- WEPLS product specification or certificate. In the event no product recognition from WEPLS, product catalogue and test report from local or international body that equivalent to the SIRIM standard of testing is required.



REFERENCES

For more information about WEPLS, refer to

http://www.span.gov.my/index.php?option=com_content&view=article&id=580%3Aabout-us1&catid=175%3Awepls&Itemid=457&lang=en



WORK EXAMPLE

Example of a water fitting schedule showing the numbers, types and the approved rating of the proposed fitting for an office interior as in Table 2-1.1

Ref.	Water Fitting Type	WEPLS rating			Not Rated	Total
		Efficient	Highly Efficient	Most Efficient		
1	Shower taps and mixers	0	45	0	0	45
2	Basin taps and mixers	0	0	55	0	55
3	Sink/bib taps and mixers	0	70	0	0	70
4	Flushing cisterns	0	0	50	0	50
5	Others - Urinals	0	0	0	5	5
Total no. based on rating (A)		0	115	105	5	$\sum A = 225$
Weightage (B)		2	4	6	0	
Total (A x B)		0	460	630	0	$\sum(A \times B) = 1090$

Table 2-1.1: Computation of the percentage of water fittings

$$\begin{aligned}
 \text{Credits scored} &= \frac{\sum(A \times B)}{\sum A} \\
 &= 1090 / 225 \\
 &= 4.84 \text{ credits}
 \end{aligned}$$

INT 2-2 WATER USAGE



OBJECTIVES

Promote continual monitoring of water use within the development through the provision of water meters for major water uses.



APPLICABILITY

Applicable to sub-metering provisions for major water uses for office



REQUIREMENTS

1 credit can be scored and up to 2 credits can be scored if:

- Provision of local private meters for all major water uses in the office.
- Provision of leak detection system with alert features.
- Provision of smart meters for remote monitoring.
- Provision of water usage portal, dashboard or other equivalent forms that display metered data, trending of water consumption and relevant parameters which facilitate better management of water consumption during building operation.



DOCUMENTARY EVIDENCES

- Extracts from the tender specification stating the locations and provision of sub meters for all major water uses.
- List of a submeter and its location.
- Schematic drawings of cold-water distribution system showing the location of the sub meters provided.
- Extract of tender specification showing the provision of leak detection system with alert features
- Schematic drawing of the system tapping
- Technical spec and catalogue of the leak detection system
- Extracts from the tender specification showing the requirement of water usage portal, dashboard or other equivalent forms that display metered data, trending water consumption and relevant parameter.
- Sample screenshot of the portal showing all the parameters

INT 2-3 WATER EFFICIENCY IMPROVEMENT PLAN



OBJECTIVES

To show intent, measures and implementation strategies of water efficiency improvement plans over the next three years



APPLICABILITY

Generally applicable for water consumption and its cycle for non-domestic used



REQUIREMENTS

1 credit can be scored for the commitment to plan water savings accrued from proposed measures should be quantified.

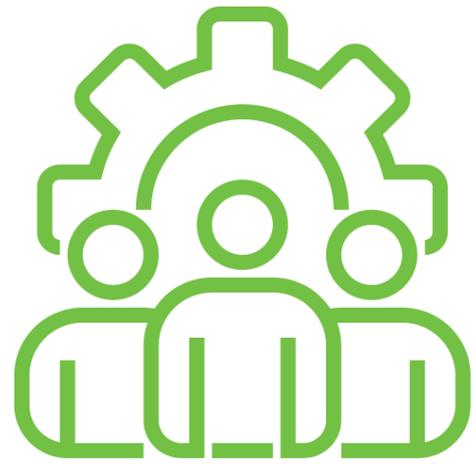


DOCUMENTARY EVIDENCES

- Improvement plans showing the calculation of water saving that can be achieved.
- Water efficiency management plan report

Other Green Requirements

Part 3 – Sustainable Management & Operation



INT 3-1 Sustainable Office Design

INT 3-2 Sustainable Material Selection

INT 3-3 Office Operation

INT 3-4 Post Occupancy Evaluation

INT 3-5 Waste Management

INT 3-6 Public Transport Accessibility

INT 3-8 Professional Consultant

INT 3-1 SUSTAINABLE OFFICE DESIGN



OBJECTIVES

Encourage the selection of more sustainable base building and the adoption of office designs and materials that are environmentally friendly and sustainable



APPLICABILITY

Applicable for office building layout



REQUIREMENTS

3-1(a)

2 credits for the office renovation conserves at least 50% (by area) of the existing finishing for walls, flooring and ceilings

Note: Excludes painting or touching up to paint work arising from office renovation.

3-1(b)

Up to 3 credits for the office layout design encourages open, flexible and maximal space usage such as follow:

- 1 credit for the provision of open and flexible layout with minimum enclosed space. (Overall office layout)
- 1 credit for the provision of space saver, mobile station (Furniture & Fittings), etc.
- 1 credit for the layout encourages external views. Demonstrate that $\geq 75\%$ of all working spaces have a direct line of sight through vision indoor and outdoor glazing at a height of 1.2m from floor level



DOCUMENTARY EVIDENCES

For 3-1(a)

- Architectural base-building floor plan showing the existing walls, flooring and ceiling area
- Approved internal design or drawing of renovation works with conservation area for at least 50% of the existing finishing for walls, flooring and ceilings

For 3-1(b)

- Extract of tender specification showing the requirements to adopt flexible layout and maximum space usage.
- Relevant drawings showing the space setting including partition and furniture.

INT 3-2 SUSTAINABLE MATERIAL SELECTION



OBJECTIVES

Encourage the adoption of office materials that are environmentally friendly and sustainable



APPLICABILITY

Applicable to non-structural material and functional space in the office interior



REQUIREMENTS

3-2(a)

2 credits for maintaining at least 50% (by volume) of the existing furniture

3-2(b)

Up to 10 credits are allocated to encourage the use of environmentally friendly products that are certified by approved local/international certification body. The criterion is only applicable for non-structural building components and functional spaces. Credits scored will be based on the extent of use of environmentally friendly product.

The environmentally friendly product proposed must be approved by a valid international or local certification body and is subject to GreenRE's evaluation.

Extent of use of environmentally friendly product	Weightage for Credits Allocation
Low impact	1.0
High Impact	2.0

Table 3-2.1: Weightage for credits allocation

The use of environmentally friendly products or recycled materials used for all main office space will be considered as high impact (2 credits) on condition that quantities used by percentage are more than 50% (i.e. extent of coverage as compared to total quantities used for same intended purpose.) If less than 50% it will be considered as low impact 1 credit.



Notes:

- Same type of the product not allowed to be double claimed for different area of application
- The credit allocated for low VOC paints, adhesives, cleaning products and flooring/carpeting certified by approved local certification body can be found in INT 4-2 and hence shall not be included in the scoring for INT 3-2



DOCUMENTARY EVIDENCES

- Extracts from the tender specification and drawings showing the requirements to incorporate the environmentally friendly products that are certified and approved by local/international certification body.
- Certification details from approved local/international certification body such as the material certification standards and rating within validity period.
- Technical product information on the sustainable products.
- Calculation of products and application area
- Finishing schedule or material approval for the product use



REFERENCES

SGLS, SGBC, SIRIM, myHijau



WORK EXAMPLE

Determine if the environmentally friendly products selected are certified with approved local/international certification body. Check if can be considered high impact or low impact based on the percentage of coverage

Note: Certain products can have more environmentally friendly features than others. Other than recycled materials, they may have features like low VOC assembly or manufactured with resource efficient processes, durability etc that will render the products more environmentally friendly than others. If the certified products selected are more environmentally friendly and are given a better rating by the approved local/international certification body, a higher weightage can be considered in credit scoring.

Example of a proposed development with the following provisions:

- a. Use of panel boards as internal partitions for more than 50% of the office spaces and the product is rated by an approved certification body.
- b. Use of lightweight gypsum plasterboard for internal office ceiling. Product is rated by approved by international certification body.

- c. Use of blackout curtain wellness and gym rooms. Product is rated by approved international certification body.
- d. Use of wooden doors for CEO and training rooms. Product is rated by approved local certification body.

Products and application area		With approved certification	Impact	Credits scored
a.	Internal partition for more than 50% of office spaces	Yes	High	2
b.	Lightweight gypsum plasterboard installed for office ceiling	Yes	High	2
c.	Blackout curtain in wellness & gym rooms	Yes	Low	1
d.	Wooden doors for CEO & training rooms only	Yes	Low	1

Therefore, credits scored for 3-2 = 2 + 2 + 1+1 = **6.0 credits**



INT 3-3 OFFICE OPERATION



OBJECTIVES

Encourage the adoption of environmentally friendly practices during building operation



APPLICABILITY

Applicable within office interior building



REQUIREMENTS

3-3(a)

1 credit can be scored for the provision of environmental policy that reflects the sustainable goals set

3-3(b)

1 credit for the provision of office green guide (OGG) for office occupants should be disseminated.

The provision of office green guide must detail out the environmentally friendly facilities and features within the building/office and their uses in achieving the intended environment performance during building operation

3-3(c)

Provision of building user guidelines by building owner.



DOCUMENTARY EVIDENCES

For 3-3 (a)

- Copy of Environmental policy from tenant showing the commitment towards environmental sustainability
- Documentation related to the building environmental policy



For 3-3 (b)

- Evidence of office occupants' involvement in environmental sustainability should be demonstrated.
- Draft of office green guide (OGG) or equivalent green document for office tenant/occupier

For 3-3 (c)

- Copy of building user guideline from building owner

INT 3-4 POST OCCUPANCY EVALUATION



OBJECTIVES

To receive feedback from occupants of the building



APPLICABILITY

Generally applicable to office building developments.



REQUIREMENTS

3-4(a)

2 credits allocated for yearly post occupancy evaluation survey to assess occupant's satisfaction with the indoor environmental conditions.

Required number of people surveyed shall be:

- 10% of total occupancy and up to 100 maximums.
- Minimum 5 people shall be surveyed if total occupancy is less than 50.

3-4(b)

1 credit can be scored for the list of corrective actions taken following the post evaluation.



DOCUMENTARY EVIDENCES

For 3-4(a)

- Draft of survey form indicating indoor quality parameter such as noise level, thermal comfort, lighting, daylight provision etc
- Letter of commitment to conduct the survey.

For 3-4(b)

- List of corrective action that can be taken if the feedback of the survey is not satisfying.
- Evidence from past feedback that could be improved were implemented or justification of measures to be taken to improve the current situation.

INT 3-5 WASTE MANAGEMENT



OBJECTIVES

Encourage recycling facilities and waste minimisation within the occupants of the office



APPLICABILITY

Generally applicable to office interior developments.



REQUIREMENTS

Provision of recycling facilities or recycling bins within office boundary for collection and storage of different recyclable waste such as paper, glass, plastic etc as well as one for non-recyclable waste

3-5(a)

1 credit at a central location with proper storage area for recyclable waste by the base building

3-5(b)

1 credit at every floor or strategic locations to encourage recycling activity

3-5(c)

2 credits for the preparation and implementation of waste management improvement plan and setting targets for waste reduction.



DOCUMENTARY EVIDENCES

For 3-5(a) and (b)

- Extracts of the tender specification showing the requirements for the provision of recycling facilities at central location or recyclable bins at strategic location
- Plan layout showing the location of the recycling bins for collection and storage of different recyclable waste.
- Product catalogue.

For 3-5(c)

- Waste management plan which highlighted the promotion and encouragement plan for minimization and recycling among occupants with setting target to reduce the waste

INT 3-6 PUBLIC TRANSPORT ACCESSIBILITY



OBJECTIVES

Promote environmentally friendly transport options and facilities to reduce pollution from individual car use.



APPLICABILITY

Generally applicable to all building developments.



REQUIREMENTS

3-6(a)

1 credit can be scored for design that provides good access (<800m walking distance) to public transport networks such as MRT/LRT stations or bus stops

3-6(b)

Up to 1 credit can be scored for the provision of covered/sheltered bicycles parking lots with rack / locking bar.

Extent of Coverage:

Bicycles parking lot: minimum 10 number and maximum 50 numbers of bicycle parking lot.



DOCUMENTARY EVIDENCES

For 3-6(a)

- Site layout plan in the context of the surrounding area showing the location of the development site and walking path to the location of the MRT/LRT stations and bus stops not more than 800m.
- Proposed bus-stop details drawing.



For 3-6(b)

- Extracts of the tender specification showing the requirement to provide covered/sheltered bicycles parking lots for the development and the total quantity of bicycles lots provided.
- Base-building plan layout showing the location of the covered/sheltered bicycle parking lots and rack/locking bar.

INT 3-7 PROFESSIONAL CONSULTANTS



OBJECTIVES

Selection of a qualified design team apart from the Interiors Designers, representing the other interior fit out trades



REQUIREMENTS

3-7(a)

1 credit for selection of a qualified design team apart from the Interiors Designers, representing the other interior fit out trades and shall consist of either of the following:

- MEP Engineers
- C&S Engineer
- Sustainability Consultants
- Quantity Surveyors

3-7(b)

1 credit if the project team comprises Certified GreenRE Accredited Professional (GreenRE AP)



DOCUMENTARY EVIDENCES

For 3-7(a)

- Confirmation of their involvement performance in a project development such as minutes of meeting etc

For 3-7(b)

- A certified true copy of the certificate of GreenRE AP
- Confirmation of their involvement performance in a project development such as minutes of meeting etc

Other Green Requirements

Part 4 – Indoor Environmental Quality



INT 4-1 Indoor Air Quality (IAQ) Performance

INT 4-2 Indoor Air Pollutants

INT 4-3 Lighting Quality

INT 4-4 Thermal Comfort

INT 4-5 Internal Noise Level

INT 4-6 Work Place Health and Wellbeing

INT 4-7 Universally Accessible Office Design

INT 4-1 INDOOR AIR QUALITY (IAQ) PERFORMANCE



OBJECTIVES

To promote a healthy indoor environment for occupant



APPLICABILITY

Generally applicable to all building developments (air-conditioned areas only)



BASELINE STANDARD

Indoor Air Contaminants Parameters:

Physical Parameters	Acceptable Range		
Air Temperature	23-26 °C		
Relative Humidity	50-70%		
Air Movement	0.15-0.5 m/s		
Chemical Contaminants	Acceptable Limits		
	ppm	mg/m ³	Cfu/m ³
Carbon Monoxide	10	-	-
Formaldehyde	0.1	-	-
Ozone	0.05	-	-
Respirable particulates	-	0.15	-
Total volatile organic compounds (TVOC)	3	-	-
Biological Contaminants	Acceptable Limits		
	ppm	mg/m ³	Cfu/m ³
Total Bacteria Counts	-	-	500
Total Fungal Counts	-	-	1000
Ventilation Performance Indicator	Acceptable Limits		
	ppm	mg/m ³	Cfu/m ³
Carbon Dioxide	C1000	-	-



Notes:

- For chemical contaminants, the limits are eight-hour time-weighted average airborne concentrations.
- mg/m³ is milligrams per cubic meter of air at 25° Celsius and one atmosphere pressure.
- ppm is parts of vapour or gas per million parts of contaminated air by volume.
- cfu/m³ is colony forming units per cubic meter.
- C is the ceiling limit that shall not be exceeded at any time. Readings above 1000ppm are indication of inadequate ventilation.
- Excess of bacterial counts does not necessarily imply health risk but serve as an indicator for further investigation.



REQUIREMENTS

4-1(a)

Up to 5 credits will be given for conducting a full IAQ audit once every 3 years to comply with the Code of Practice on Indoor Air Quality Department of Occupational Safety and Health, Ministry of Human Resources Malaysia (2005).

Ventilation in the office Interior to comply with the requirement stipulated in the Code of Practice on Indoor Air Quality Department of Occupational Safety and Health, Ministry of Human Resources Malaysia (2005).

4-1(b)

1 credit for the implementation of effective IAQ management plan to ensure building ventilation systems are frequently maintained.

4-1(c)

1 credit for additional carbon dioxide (CO₂) sensor display (at least 1 unit per floor)



PREREQUISITE

A formal IAQ management plan must be established and implemented to ensure a healthy indoor environment for all occupants. The policy should outline procedures for maintaining acceptable indoor air quality, including ventilation, pollutant source control, and regular maintenance of HVAC systems. The policy should contain at least the following:

- **Ventilation Management:** Ensure adequate ventilation rates in accordance with recognized standards (e.g., ASHRAE 62.1 or local equivalents) to dilute indoor pollutants and maintain fresh air supply.
- **Pollutant Source Control:** Identify and minimize sources of indoor air contaminants, including volatile organic compounds (VOCs), particulate matter, and biological pollutants. This includes the selection of low-footprint materials and proper storage of chemicals.
- **HVAC System Maintenance:** Establish a routine inspection and maintenance schedule for HVAC systems to ensure optimal performance, cleanliness, and efficiency. Filters should be replaced regularly, and air ducts cleaned as needed.
- **Monitoring and Response:** Implement procedures for periodic IAQ monitoring and establish a response procedure for occupant complaints or IAQ-related incidents.
- **Occupant Awareness:** Promote awareness and education among building users regarding IAQ practices, including the importance of reporting issues and maintaining cleanliness.



DOCUMENTARY EVIDENCES

For 4-1(a):

- Most recent IAQ audit report highlighting the parameters that contribute to indoor air quality performance.
- Most recent IAQ assessment report with the results of the building air quality.
- Letter of commitment to conduct IAQ assessment IF the assessment not conduct previously.

For 4-1(b):

- Provision of IAQ Management Plan which evaluates overall building ventilation system using checklist and any comparable methods.

For 4-1(c):

- Extract tender specification for the requirement
- Layout plan for every floor showing the location of the carbon dioxide sensor display of the building.
- Technical product specification of carbon dioxide sensor.



REFERENCES

Code of Practice on Indoor Air Quality Department of Occupational Safety and Health, Ministry of Human Resources Malaysia

INT 4-2 INDOOR AIR POLLUTANTS



OBJECTIVES

Minimise airborne contaminants, mainly from inside sources to promote a healthy indoor environment.



APPLICABILITY

Generally applicable to all building developments.



REQUIREMENTS

4-2(a)

Up to 3 credits can be scored for the use of low VOC and low toxicity products recognised by approved local certification body or equivalent for at least 90% of the internal wall areas for:

- Cleaning products
- Carpeting/flooring
- Adhesives
- Paints

4-2(b)

1 credit can be scored for setting of sustainable environmental friendly procurement and purchasing policy



DOCUMENTARY EVIDENCES

For 4-2(a)

- Extracts of the tender specification showing the requirement to use low VOC and low toxicity products that are certified by approved local/ international certification body or equivalent.
- Product catalogue.
- Green certificate with validity expiry.

For 4-2(b)

- Copy of sustainable and environmental-friendly procurement and purchasing policy for the operation and maintenance of the base-building

INT 4-3 LIGHTING QUALITY



OBJECTIVES

Encourage good workplace lighting quality to promote productivity and comfort of occupants



APPLICABILITY

Generally applicable to workplace such as offices, classrooms and training rooms.



BASELINE STANDARD

The minimum illuminance level for day lighting shall be in accordance with MS1525:2019



REQUIREMENTS

4-3(a)

1 credit is allocated if the lighting level comply with MS 1525:2019

4-3(b)

1 credit can be scored for the use of high frequency ballasts in the fluorescent luminaries if it is adopted in at least 90% of the applicable areas that are served by fluorescent luminaries; OR

1 credit can be scored for the use of LED driver with output frequency < 200Hz and < 30% flicker for LED lighting in at least 90% of the applicable areas served by LED lighting.

4-3(c)

3 credits can be scored to encourage effective daylighting to enter occupied spaces whilst minimising heat gain and visual discomfort arising from potential glare. *(0.5 credit each up to 2 credits)*

- Enclosed rooms located away from windows
- Low workstation partition heights $\leq 1.2\text{m}$ from finished floor level or $\leq 0.5\text{m}$ from the desk plane
- Perimeter lighting along windows to be interlocked with photocell sensors
- Light shelf to draw daylighting deeper into the open office area
- Others



4-3(d)

Up to 1 credit Provision of any of the following strategies to reduce glare from windows and artificial lighting (0.5 credit up to 1 credit)

- Diffused overhead lighting
- Use of light colour and matte finishes
- Operable window blinds and screens
- Glazing treatments/ Solar films
- Workstation design to avoid glare (e.g. reduced reflective surfaces, adjustable height for monitor screens, anti-glare filters etc.)



DOCUMENTARY EVIDENCES

For 4-3(a)

- Current lighting schedule showing lighting levels in various building areas.
- Lighting layout plan.
- Lux simulation showing the lighting level comply with MS1525:2019.
- Technical product information of the lighting luminaries used

For 4-3(b)

- Extracts of the tender specification showing the requirement to have high frequency ballasts or LED driver.
- A summary sheet listing all fluorescent and LED luminaries used for the developments.
- Electrical lighting layout indicating all the fittings with high frequency ballasts or LED lighting.
- Product catalogue specifying high frequency ballast for fluorescent luminaries. (if applicable)
- Product catalogue specifying the LED driver with output frequency <200 Hz and <30% flicker for LED lighting. (if applicable)
- Calculation showing at least 90% of the applicable areas that are served by high frequency ballast or LED lighting.

For 4-3(c)

- Architectural base-building plan layout showing glazing/window area for each habitable space.
- Glaring control system that will be applied such curtain blind, tinted glazing blind etc.

INT 4-4 THERMAL COMFORT



OBJECTIVES

Recognise offices that are designed with good thermal comfort



APPLICABILITY

Generally applicable to office building developments with air-conditioning systems



BASELINE STANDARD

Indoor dry-bulb temperature between 23°C to 26°C

Relative Humidity between 50% - 70%



REQUIREMENTS

4-4 (a)

1 credit can be scored if the air-conditioning systems are designed to allow for cooling load variations due to fluctuations in ambient air temperature to ensure consistent indoor conditions for thermal comfort.

4-4 (b)

0.5 credits can be scored occupants are able to control the indoor temperature by zones according to their preference and thermostat set-point does not go below 23°C

4.4 (c)

0.5 credits if occupants have access to devices to enhance individual thermal comfort (e.g. fans)



DOCUMENTARY EVIDENCES

For 4-4 (a)

- Extracts of Building User Guide (BUG) by the base building specification showing the requirement to design the air-conditioning systems which would provide consistent indoor conditions for thermal comfort.
- Design brief of the air-conditioning system highlighted room temperature and humidity requirement.

For 4-4 (b)

- Extracts of the tender specification showing the requirements to provide the room temperature and humidity display.
- Plan layout showing the location of the room temperature and humidity display.
- Product catalogue of temperature-RH control device



REFERENCES

"Code of Practice on Indoor Air Quality" (2005), Department of Occupational Safety and Health, Ministry of Human Resources Malaysia

INT 4-5 INTERNAL NOISE LEVEL



OBJECTIVES

Recognise buildings that are designed to consider the potential noise levels within the dwelling units are maintained at an appropriate level. All building partitions shall be in accordance with required STC ratings.



APPLICABILITY

Generally applicable to office building developments



BASELINE STANDARD

ASTEM E413 or equivalent



REQUIREMENTS

1 credit can be scored if the building is designed to achieve ambient internal noise level as specified:

- 55dB (6am – 10pm) L_{Aeq}
- 45dB (10pm – 6 am) L_{Aeq}

This can be achieved by adhering to the following STC values for building partitions:

Description	Sound Transmission Class (STC)
Separation between functional spaces within dwelling units and in-between adjacent dwelling units.	40 - 50
Spaces between mechanical and equipment spaces and occupied spaces	50 - 60



DOCUMENTARY EVIDENCES

- Extracts of the design specification showing the requirement for the occupied space with partitions meeting the required STC ratings as per table below:

Location	STC rating of partitions
Between General Office Space	40 - 50
Hotel Rooms, Classrooms, Lecture Theatres, Meeting Rooms, Conference Rooms and spaces where confidential speech is required	50 - 60
Between Mechanical / Equipment spaces and occupied spaces	50 - 60

- Architectural & structural plan layout, elevation and sectional plans showing types of wall system used, dimensions and size of all building and structural elements with STC ratings.

OR

- A report of detail analysis and recommendations from acoustic consultant (if applicable).

INT 4-6 WORK PLACE HEALTH AND WELLBEING



OBJECTIVES

To improve the nutritional value of food made available to employees on day-to-day basis.



APPLICABILITY

Generally applicable to cafeteria, canteens, food stalls, catering engage with the office development.



BASELINE STANDARD

ASTEM Malaysian Dietary Guidelines, 2010.

Panduan Penyediaan Hidangan Sihat (Operator Kantin, Katerer dan Penyedia Makanan), 2005.



REQUIREMENTS

1 point if all 5 criteria are met for at least one event in the last 3 months



DOCUMENTARY EVIDENCES

- Catering tender documents showing food provided to be healthy and high nutritional value.
- List of menus and its nutrient index.

INT 4-7 UNIVERSALLY ACCESSIBLE OFFICE DESIGN



OBJECTIVES

To cater to the needs of general users as well as special user groups who could visit or work there (e.g. Expectant Mothers, Mature workers, physically challenged employees)



APPLICABILITY

Generally applicable to office building developments



BASELINE STANDARD

MS 1184:2014



REQUIREMENTS

Incorporating universal design concepts within office space such as:

- At least one automated door at accessible entrance for ease of access to office space
- Stable, firm and slip-resistant walking surfaces at areas with high usage (e.g. walkways, toilets, pantries, staircases)
- Main circulation routes and corridors with minimum width of 1800mm to allow one wheelchair and one person to pass each other comfortably
- Provision of wheelchair-friendly toilets equipped with grab bars and emergency call bells
- Provision of Nursing Rooms equipped with seating, power socket, countertop with wash basin and refrigerator
- Access to assistive technology (mobility, visual, hearing)



DOCUMENTARY EVIDENCES

- Detail drawing of universal design features
- Material selection and its benefits
- Technical product details of all the universal design concept incorporated.

Other Green Requirements

Part 5 – Green Features & Innovations



INT 5-1 GREEN FEATURES & INNOVATIONS



OBJECTIVES

Encourage the use of green features which are innovative and have positive environmental impact on water efficiency, environmental protection and indoor environmental quality of the buildings.



APPLICABILITY

Generally applicable to interior office developments.



REQUIREMENTS

Up to 8 credits are awarded for the use of the following green features depending on their potential environmental benefits or reduced environmental impacts.

Extent of use	Credits Allocation
Low Impact	0.5
Medium Impact	1.0
High Impact	2.0

Table 5-1.1: Weightage for credits allocation

Examples:

- Use of printing access through swipe access card to help minimize unnecessary printing.
- Provision of internal staircase to discourage usage of lifts.
- Use of non-disposable cups for meetings and staff.
- Provision of green walls.
- Use of tele-conferencing to reduce travelling needs etc
- Follow-me printing or secure printing, with printing options set to default greyscale and duplex printing
- Digitalising internal processes e.g. HR/ administrative processes, approval, claims, payments to suppliers, etc.
- Dissemination of information and circulars through emails, intranet, share point, staff notice board, etc.
- Encouraging staff to bring their own electronic devices to meetings instead of printing

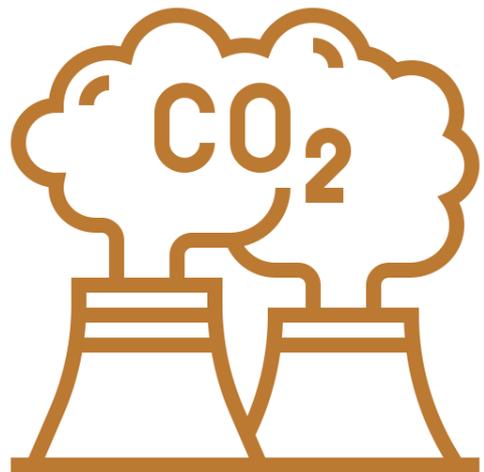


DOCUMENTARY EVIDENCES

- Extracts of the tender specification showing the provision of the specific green features used and the extent of implementation where applicable.
- Technical product information (including drawings and supporting documents) of the green features.
- Quantified evidences on the potential environmental benefits that are features can bring to the development.

Other Green Requirements

Part 6 – Carbon Emission of Development



INT 6-1 CARBON EMISSION OF DEVELOPMENT



OBJECTIVES

To calculate the carbon emission resulted from the associated energy used during renovation works and operational phase of a development.



APPLICABILITY

Generally applicable to all interior building development.



REQUIREMENTS

6-1 (a)

1 credit can be scored for the calculation of the carbon emission report of the building comprising of energy and water consumption savings with comparison of the baseline parameters.

6-1 (b)

0.25 credits for every material declared up to 2 credits (Finishes, raw renovation material)



DOCUMENTARY EVIDENCES

For 6-1 (a)

- Detail calculation for the estimated energy load for each component in the building e.g.: lighting, air-conditioning system, pump, receptacle load.
- Details calculation for estimated water consumption of the building e.g.: water fittings, landscape, water features.
- Technical product information on the energy efficient features and water efficient features used.
- Summary tabulation of estimated total energy savings and total water savings of the development for the year.
- Carbon emission calculation.

For 6-1 (b)

- Embodied carbon footprint calculation



WORK EXAMPLE

Energy Consumption:

Type of usage	Design	Baseline
	(kWh/yr)	(kWh/yr)
Lighting	819,498	1,151,575
Air-Conditioning	860,589	1,406,899
M/V System	25,550	25,550
Total Energy Usage	1,705,637	2,584,024

Water Consumption:

(Please refer GreenRE Water Calculator)

Type of fixtures	Design	Baseline
	(m ³ /yr)	(m ³ /yr)
Flow Fixtures	2,402	6,899
Flush Fixtures	5,366	5,161
Total Water Usage	7,768	12,060

Carbon Emission:

Type of usage	Design	Baseline
	kgCO ₂ e/yr	kgCO ₂ e/yr
Energy	1,226,619	1,860,497
Water	3,254.79	5,053.14
Total Annual Carbon Emission	1,229,874	1,865,550

Exam Energy CO₂ Footprint Reduction (ktCO₂e/annum, based on electricity energy reduction only @ 1kWh =

- 0.639 kg CO₂- Peninsular
- 0.512 kg CO₂- Sarawak
- 0.512 kg CO₂- Sabah

Water CO₂ footprint Reduction / m³ = 0.419 kg CO₂

Credits scored for 6-1 (a) = 1 credit

Embodied carbon calculation

No	Material	Description	tCO ₂ e		Quantity	Total tCO ₂ e
			Value	Unit		
1	Concrete (G30)	Slab	0.309	m ³	9876.19	3051.74
2	Glass	10mm of Glass (Single Glass excluding Frame)	0.035	m ²	4500.00	157.50
3	Steel	Rebar	1.2	kg	5000.00	6000.00
	Total					9209.24

Credits scored for 6-1 (b) = 0.75 credit

The project entitled = 1.75 credits