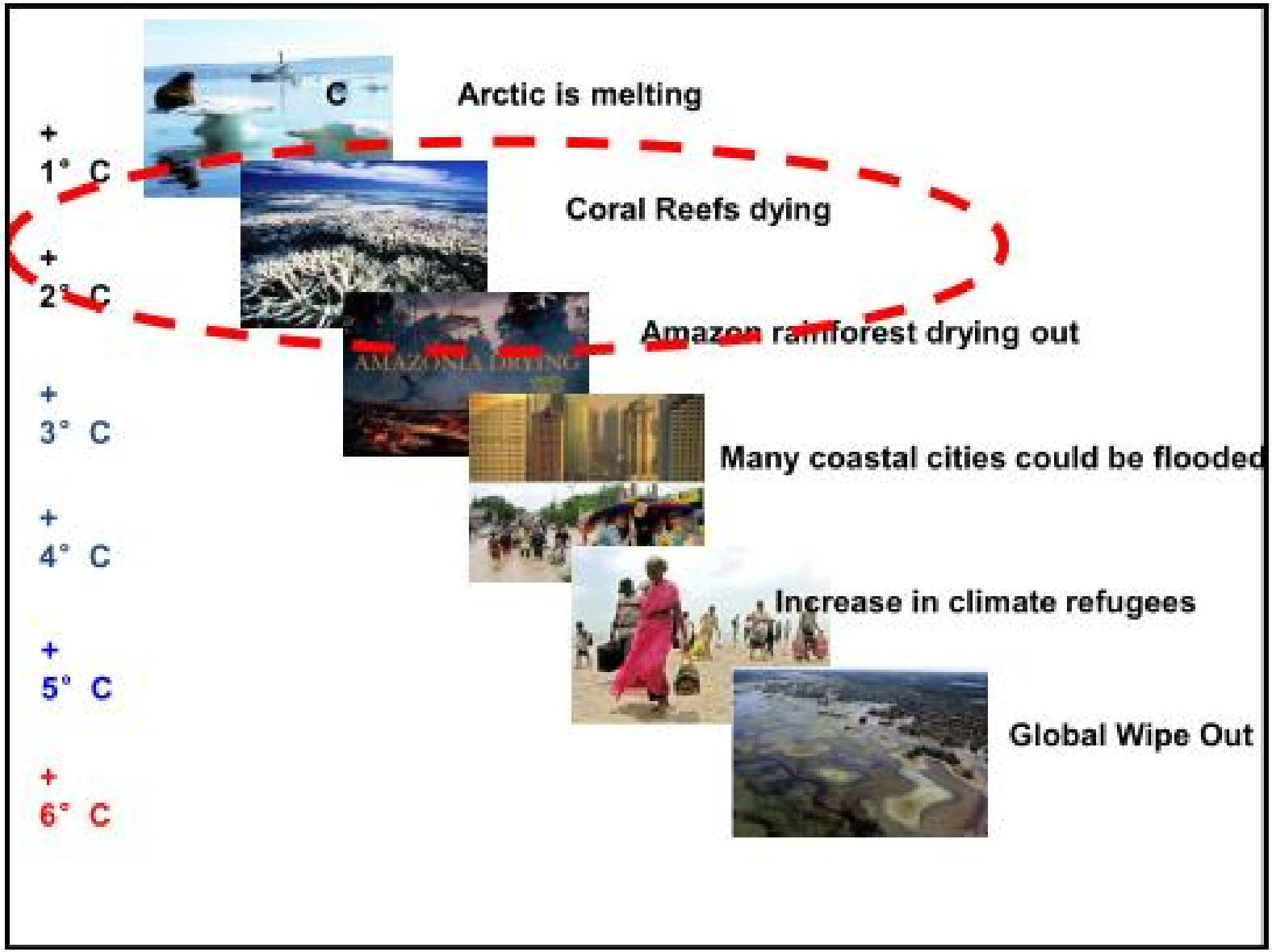
# Malaysian Paint Manufacturers Association

## Green Building Index Tools and Updates on GBI

# Climate Change



# THE IMPACT OF THE BUILT ENVIRONMENT




# WHAT IS THE GREEN BUILDING INDEX?

- The Green Building Index (GBI) is Malaysia's industry recognised green rating tool for buildings to promote sustainability in the built environment and raise awareness among Developers, Architects, Engineers, Planners, Designers, Contractors and the Public about environmental issues and our responsibility to the future generations.

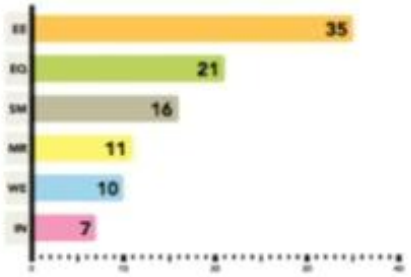
- The GBI rating tool provides an opportunity for developers and building owners to design and construct green, sustainable buildings that can provide energy savings, water savings, a healthier indoor environment, better connectivity to public transport and the adoption of recycling and greenery for their projects and reduce our impact on the environment.

# Green Building Index

# THE GBI RATING TOOLS

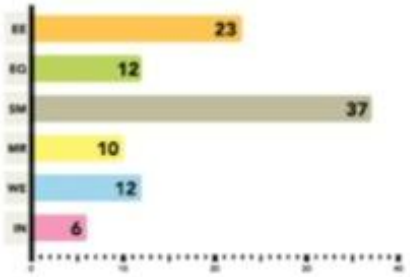
## NON-RESIDENTIAL NEW CONSTRUCTION (NRNC)

GBI NRNC POINTS ALLOCATION CHART



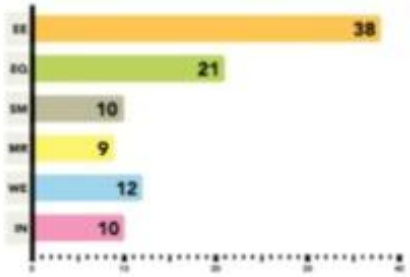

## RESIDENTIAL NEW CONSTRUCTION (RNC)

GBI RNC POINTS ALLOCATION CHART




## NON-RESIDENTIAL EXISTING BUILDING (NREB)

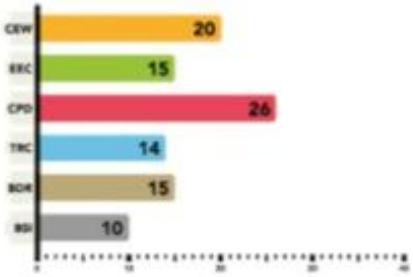
GBI NREB POINTS ALLOCATION CHART




## TOWNSHIP

With Local Authorities

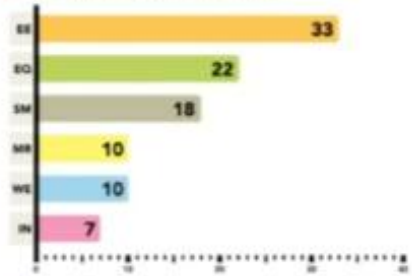
GBI TOWNSHIP POINTS ALLOCATION CHART




## INDUSTRIAL NEW CONSTRUCTION (INC)

with FMM

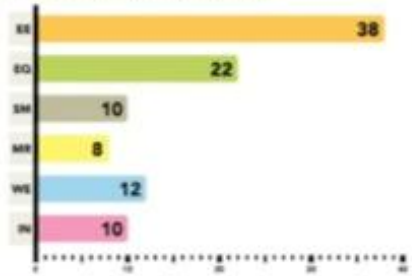
GBI INC POINTS ALLOCATION CHART




## INDUSTRIAL EXISTING BUILDING (IEB)

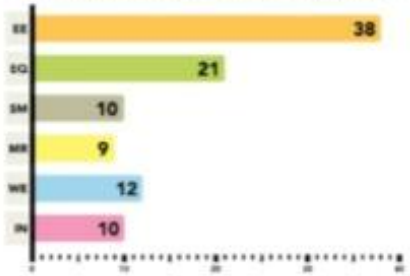
with FMM

GBI IEB POINTS ALLOCATION CHART



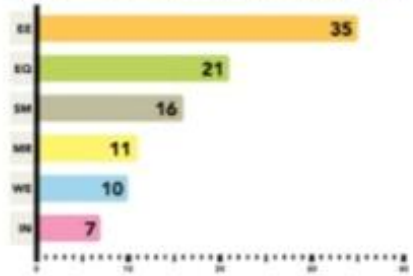

## NREB: DATA CENTRE

GBI NREB-DATA CENTRE POINTS ALLOCATION CHART




## NRNC: DATA CENTRE

GBI NRNC-DATA CENTRE POINTS ALLOCATION CHART




## GBI BUILDING RATING CRITERIA

1. ENERGY EFFICIENCY (EE)
2. INDOOR ENVIRONMENTAL QUALITY (EQ)
3. SUSTAINABLE SITE PLANNING & MANAGEMENT (SM)
4. MATERIALS & RESOURCES (MR)
5. WATER EFFICIENCY (WE)
6. INNOVATION (IN)

## GBI TOWNSHIP RATING CRITERIA

1. CLIMATE, ENERGY & WATER (CEW)
2. ECOLOGY & ENVIRONMENT (EEC)
3. COMMUNITY PLANNING & DESIGN (CPD)
4. TRANSPORTATION & CONNECTIVITY (TRC)
5. BUILDING & RESOURCES (BDR)
6. BUSINESS & INNOVATION (BSI)

# Green Building Index
# Green Township Criteria

# Green Building Index
# Green Building Criteria

# GBI Township, Residential and Interiors

- GBI Township Tool Version 1.01
- GBI Residential New Construction (RNC) Tool V3.0
- GBI Interiors (ID) Tool V1.0

# GBI Non Residential New Construction Tool

GBI Non-Residential New Construction (NRNC) Tool

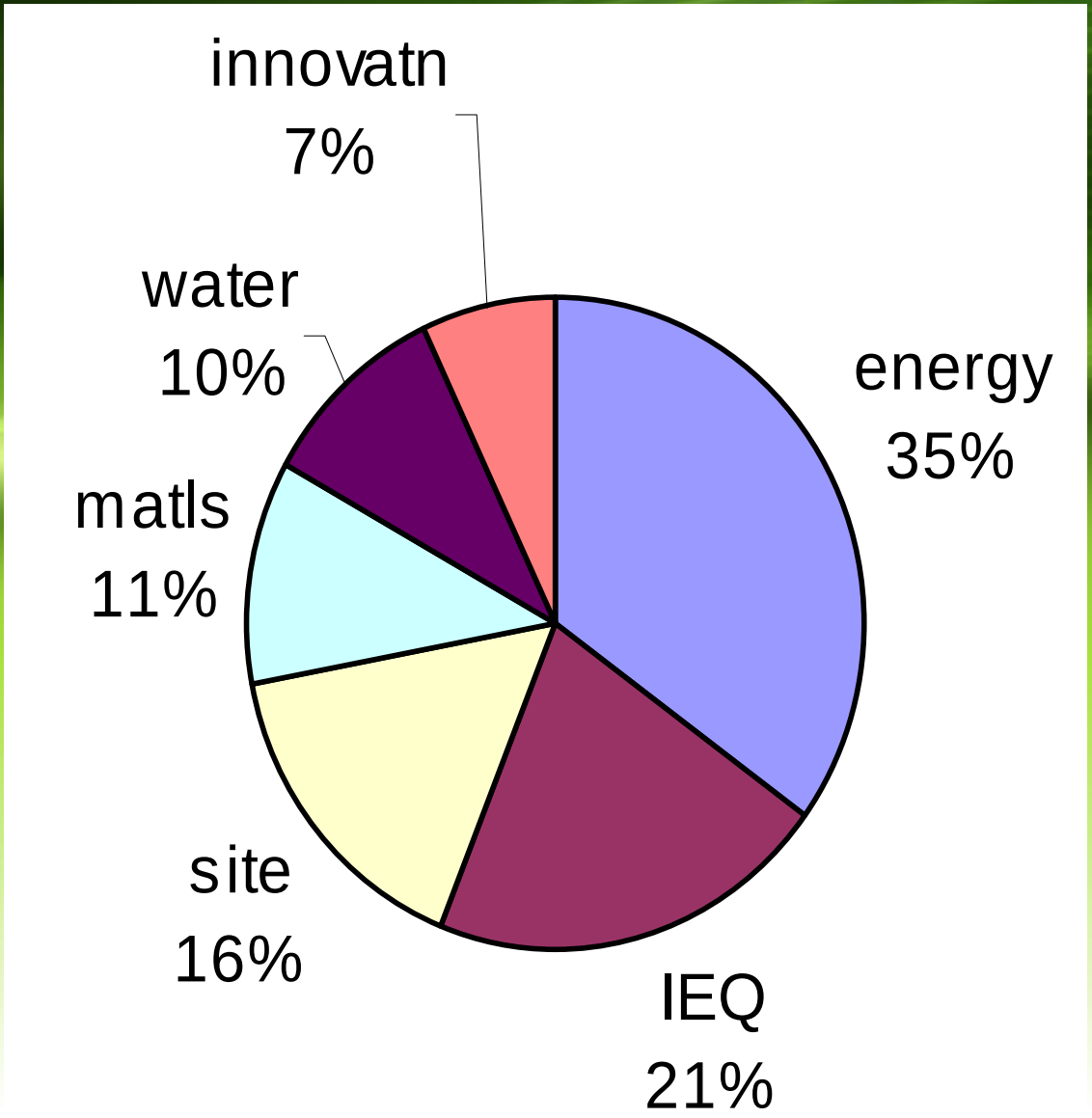
- GBI NRNC:Data Centre Tool V1.0
- GBI NRNC: Retail Tool V1.0
- GBI Non-Residential New Construction (NRNC): Hotel Tool V1.0
- GBI Non-Residential New Construction (NRNC): Resort Tool V1.0
- GBI Industrial New Construction (INC) Tool V1.0
- GBI Non-Residential New Construction (NRNC): Hospital Tool V1.0

# GBI Non Residential Existing Building Tool

GBI Non-Residential Existing Building (NREB) Tool

- GBI NREB:Data Centre Tool V1.0
- GBI NREB: Retail Tool V1.0
- GBI Non-Residential Existing Building (NREB): Hotel Tool V1.0
- GBI Non-Residential Existing Building (NREB): Resort Tool V1.0 GBI Industrial Existing Building (IEB) Tool V1.0
- GBI Non-Residential Existing Building (NREB): Hospital Tool V1.0

# Green Building Index (NRNC)



# 1) Energy Efficiency 35

| | |
|---|---|
| ***Design*** | |
| ***EE1Minimum EE Performance*** | ***1*** |
| ***EE2Lighting Zoning*** | ***3*** |
| ***EE3Electrical Sub-Metering*** | ***1*** |
| ***EE4Renewable Energy*** | ***5*** |
| ***EE5Advanced Energy Performance - BEI*** | ***15*** |
| ***Commissioning*** | |
| ***EE6Enhanced Commissioning*** | ***3*** |
| ***EE7Post Occupancy Commissioning*** | ***2*** |
| ***Verification*** | |
| ***EE8EE Verification*** | ***2*** |
| ***EE9Sustainable Maintenance*** | ***3*** |

# 2) Indoor Environmental Quality 21 pts

| | |
|---|---|
| ***Air Quality*** | |
| ***EQ1Minimum IAQ Performance*** | ***1*** |
| ***EQ2Environmental Tobacco Control*** | ***1*** |
| ***EQ3Carbon Dioxide Monitoring & Control*** | ***1*** |
| ***EQ4Indoor Air Pollutants*** | ***2*** |
| ***EQ5Mould Prevention*** | ***1*** |
| ***Thermal Comfort*** | |
| ***EQ6Thermal Comfort Control*** | ***2*** |
| ***EQ7Air Change Effectiveness*** | ***1*** |

| | |
|---|---|
| ***Lighting, Visual & Acoustic Comfort*** | |
| ***EQ8Daylighting*** | ***2*** |
| ***EQ9Daylight Glare Control*** | ***1*** |
| ***EQ10Electric Lighting Levels*** | ***1*** |
| ***EQ11High Frequency Ballasts*** | ***1*** |
| ***EQ12External Views*** | ***2*** |
| ***EQ13Internal Noise Levels*** | ***1*** |
| ***Verification*** | |
| ***EQ14IAQ Before & During Occupancy*** | ***2*** |
| ***EQ15Post Occupancy Comfort Survey*** | ***2*** |

# 3. Sustainable Site & Management 16 pts

| | |
|---|---|
| ***Site Planning*** | |
| ***SM1Site Selection*** | ***1*** |
| ***SM2Brownfield Redevelopment*** | ***1*** |
| ***SM3Development Density & Community Connectivity*** | ***2*** |
| ***SM4Environment Management*** | ***2*** |
| ***Construction Management*** | |
| ***SM5Earthworks, Pollution Control*** | ***1*** |
| ***SM6QLASSIC Construction*** | ***1*** |
| ***SM7Workers' Site Amenities*** | ***1*** |

| | |
|---|---|
| ***Transportation*** | |
| ***SM8Public Transport Accessibility*** | ***1*** |
| ***SM9Green Vehicles Priority*** | ***1*** |
| ***SM10 Parking Capacity*** | ***1*** |
| ***Design*** | |
| ***SM11Stormwater Control*** | ***1*** |
| ***SM12Greenery & Roof*** | ***2*** |
| ***SM13Building User Manual*** | ***1*** |

# 4) Materials & Resources 11pts

| | |
|---|---|
| ***Reused & Recycled Materials*** | |
| ***MR1Material reuse and selection*** | ***2*** |
| ***MR2Recycled Content Materials*** | ***2*** |
| ***Sustainable Resources*** | |
| ***MR3Regional Materials*** | ***1*** |
| ***MR4Sustainable Timber*** | ***1*** |
| ***Waste Management*** | |
| ***MR5Storage and Collection of Recyclables*** | ***1*** |
| ***MR6Construction Waste Management*** | ***2*** |
| ***Green Products*** | |
| ***MR7Refrigerants & Clean Agents*** | ***2*** |

# 5) Water Efficiency 10 points

| | |
|---|---|
| ***Water Harvesting & Recycling*** | |
| ***WE1Rainwater Harvesting*** | ***2*** |
| ***WE2Water Recycling*** | ***2*** |
| ***Increased Efficiency*** | |
| ***WE3Water Efficient Irrigation*** | ***2*** |
| ***WE4Water Efficient Fittings*** | ***2*** |
| ***WE5Metering and Leak Detection System*** | ***2*** |

| ***IN1Innovation in Design & Environment Design Initiatives cont'd*** | ***6*** |
|---|---|
| ***Mixed mode / low energy ventilation system;***<br>***Advanced air filtration technology (serving at least 50% of the NLA);***<br>***Waterless urinals (fitted to all male toilets);***<br>***Central vacuum system (serving at least 50% of NLA);***<br>***Central Pneumatic Waste Collection system;***<br>***Self-cleaning façade;***<br>***Electrochromic glazed façade;***<br>***Refrigerant leakage detection and recycling & storage facilities;***<br>***Recycling of all fire system water during regular testing;*** | ***6*** |

| ***IN2Green Building Index Facilitator*** | ***1*** |
|---|---|

Encourage and promote green technology service providers.

| ***To support and encourage the design integration required for Green Building Index rated buildings and to streamline the application and certification process:-*** | |
|---|---|
| ***At least one principal participant of the project team shall be a Green Building Index Facilitator who is engaged at the onset of the design process until completion of construction and Green Building Index certification is obtained*** | ***1*** |

| POINTS | GBI RATING | INFERENCE |
|---|---|---|
| 50 to 65 | GBI CERTIFIED | Good Practice |
| 66 to 75 | GBI SILVER | Excellent Practice |
| 76 to 85 | GBI GOLD | National Excellence |
| 86 to 100 | GBI PLATINUM | Global Excellence |

# Indoor Environmental Quality

# Indoor Environmental Quality
# How Can Paint Assist?

- Ventilation (Indoor air quality)
- Environmental tobacco smoke control
- Carbon dioxide monitoring
- Indoor contaminant
- Thermal comfort
- Odour
- Daylighting
- Visual comfort
- Acoustics

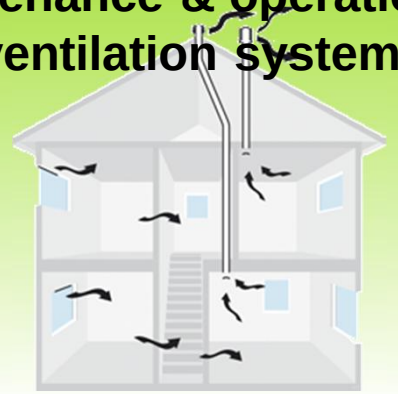
# Indoor Air Quality
# Air Contaminants

FACTORS CONTRIBUTE TO INDOOR AIR QUALITY

•*Biological of contaminants*
•*Chemical pollutants*
•*Particles*

**Source of pollutants/odors**

**Design, maintenance & operation of building ventilation systems**



•*Ventilation system design*
•*Outdoor air quality*
•*Space planning*
•*Equipment maintenance*
•*Controlling other pollutant pathways*

**Moisture & humidity**

**VOC & Formaldehyde**


**Occupant perceptions & susceptibilities**

# Indoor Environmental Quality
# Air Contaminants

Products used for buildings emit more than 11,000 individual chemicals

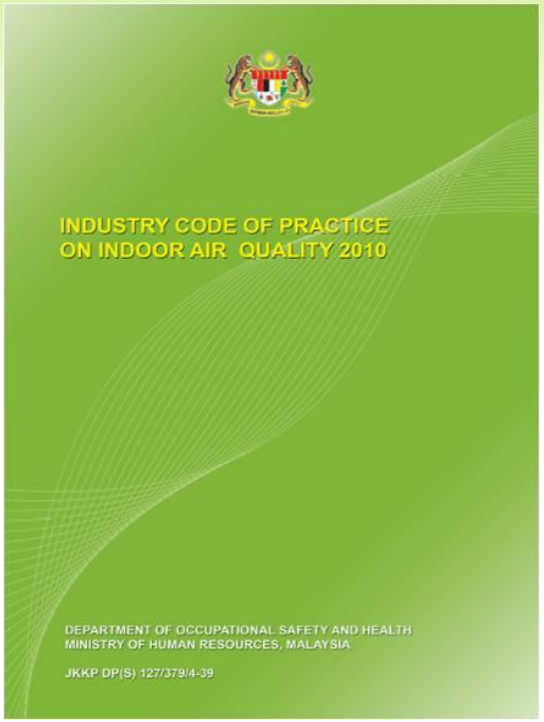
Use of low VOC and formaldehyde free products minimize exposure of occupants to indoor contaminants



# Indoor Air Quality
# How Can Paint Assist

Occupancy in buildings fluctuates

Implemented to modulate fresh air intake




| *Indoor Air Contaminants* | *Eight-hours time-weighted average airborne concentration* | | |
|---|---|---|---|
| | **ppm** | **mg/m³** | **cfu/m³** |
| ***Chemical contaminants*** | | | |
| *(a) Carbon dioxide* | *C1000* | - | - |
| *(b) Carbon monoxide* | *10* | - | - |
| *(c) Formaldehyde* | *0.1* | - | - |
| *(d) Ozone* | *0.05* | - | - |
| *(e) Respirable particulates* | - | *0.15* | - |
| *(f) Total volatile organic compounds (TVOC)* | *3* | - | - |
| ***Biological contaminants*** | | | |
| *(a) Total bacterial counts* | - | - | *500* |
| *(b) Total fungal counts* | - | - | *1000* |

## GBI Certified Projects by Categories

| Update on Green Building Index | TOTAL as of 15 AUGUST 2016 | NRNC Non Residential New Construction | RNC Residential New Construction | INC Industrial New Construction | NREB Non Residential Existing Building | IEB Industrial Existing Building | T Township |
|---|---|---|---|---|---|---|---|
| Applied | 754 | 393 | 295 | 21 | 22 | 4 | 19 |
| Registered | 705 | 364 | 280 | 19 | 20 | 3 | 19 |
| Total Certified | 364 (100%) | 181 (50%) | 150 (41%) | 9 (3%) | 13 (3%) | 3 (1%) | 8 (2%) |
| Provisional Certification after DA | 300 | 147 | 130 | 5 | 9 | 1 | 8 |
| Final Certification after CVA | 62 | 32 | 20 | 4 | 4 | 2 | - |
| Renewal Certification after RVA | 2 | 2 | - | - | - | - | - |

DA - Design Assessment, CVA - Completion & Verification Assessment.

## GBI Projects by States/Territories

| GBI Projects by State/Territory | Registered Projects | Certified Projects |
|---|---|---|
| Kuala Lumpur | 219 | 131 |
| Selangor | 255 | 127 |
| Penang | 67 | 34 |
| Putrajaya | 36 | 23 |
| Johor | 59 | 24 |
| Melaka | 17 | 8 |
| Sarawak | 12 | 4 |
| Sabah | 12 | 2 |

| GBI Projects by State/Territory | Registered Projects | Certified Projects |
|---|---|---|
| Perak | 6 | 3 |
| Pahang | 10 | 3 |
| Negeri Sembilan | 7 | 4 |
| Kelantan | 1 | - |
| Kedah | 4 | 1 |
| Perlis | - | - |
| Terengganu | - | - |
| Labuan | - | - |

## GBI Certified Projects by Rating Categories

| RATING | TOTAL as of 15 AUGUST 2016 | NRNC Non Residential New Construction | RNC Residential New Construction | INC Industrial New Construction | NREB Non Residential Existing Building | IEB Industrial Existing Building | T Township |
|---|---|---|---|---|---|---|---|
| PLATINUM 86 to 100 points | 16 (4%) | 10 | 4 | - | 1 | - | 1 |
| GOLD 76 to 85 points | 84 (23%) | 49 | 30 | 1 | 1 | 1 | 2 |
| SILVER 66 to 75 points | 42 (12%) | 21 | 14 | 2 | 2 | - | 3 |
| Certified 50 to 65 points | 222 (61%) | 101 | 102 | 6 | 9 | 2 | 2 |
| Total Certified | 364 | 181 | 150 | 9 | 13 | 3 | 8 |

## Total Gross Floor Area (GFA) of GBI Certified Projects

| | TOTAL as of 15 AUGUST 2016 | NRNC Non Residential New Construction | RNC Residential New Construction | NREB Non Residential Existing Building | INC Industrial New Construction | IEB Industrial Existing Building |
|---|---|---|---|---|---|---|
| Gross Floor Area, sqm (As Submitted) | 15,672,675.23 (168,699,272.19sqft) | 6,203,552.26 (39.58%) | 8,253,256.63 (52.66%) | 956,535.49 (6.10%) | 230,810.73 (1.47%) | 28,520.12 (0.18%) |

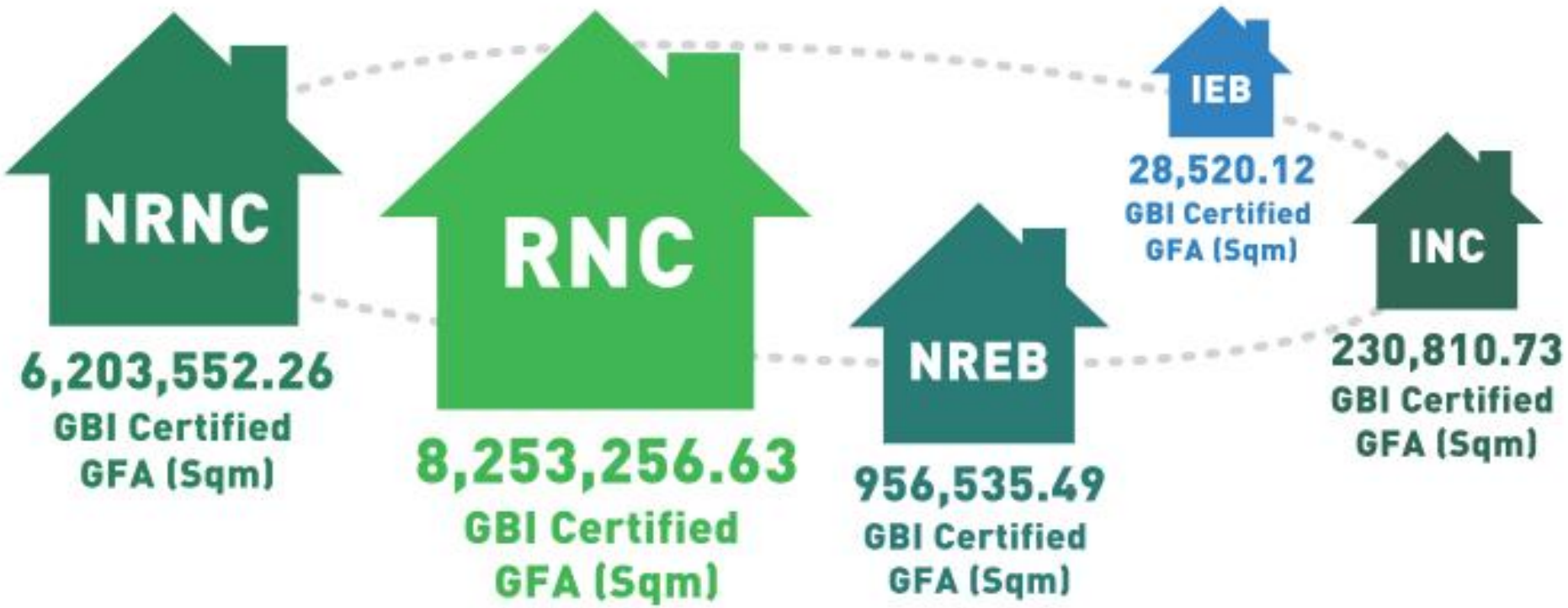
## Carbon Dioxide (C02) Emission Reduction of GBI Certified Buildings

| CO2 REDUCTION PROJECTION | TOTAL as of 15 AUGUST 2016 | NRNC Non Residential New Construction | RNC Residential New Construction | NREB Non Residential Existing Building | INC Industrial New Construction | IEB Industrial Existing Building |
|---|---|---|---|---|---|---|
| CO2 Emission Reduction (ktCO2e/annum, based on electricity energy reduction only @ 1kWh = 0.694 kg CO2- Peninsular 0.699 kg CO2- Sarawak 0.536 kg CO2- Sabah) | 739.4 | 454.0 (61.41%) | 196.2 (26.54%) | 75.2 (10.16%) | 11.6 (1.57%) | 2.3 (0.31%) |

# GBI CERTIFIED PROJECTS BY CATEGORY

| Update on Green Building Index | Applied | Registered | Total Certified | Provisional Certification after DA | Final Certification after CVA | Renewal Certification after RVA |
|---|---|---|---|---|---|---|
| NRNC | 393 | 364 | 181(50%) | 147 | 32 | 2 |
| RNC | 295 | 280 | 150 (41%) | 130 | 20 | 0 |
| INC | 21 | 19 | 9 (3%) | 5 | 4 | 0 |
| NREB | 22 | 20 | 13 (3%) | 9 | 4 | 0 |
| IEB | 4 | 3 | 3 (1%) | 1 | 2 | 0 |
| T | 19 | 19 | 8 (2%) | 8 | 0 | 0 |
| **TOTAL AS OF** 15 AUGUST 2016 | 754 | 705 | 364 (100%) | 300 | 62 | 2 |

# GROSS FLOOR AREA (GFA) OF GBI CERTIFIED BUILDINGS

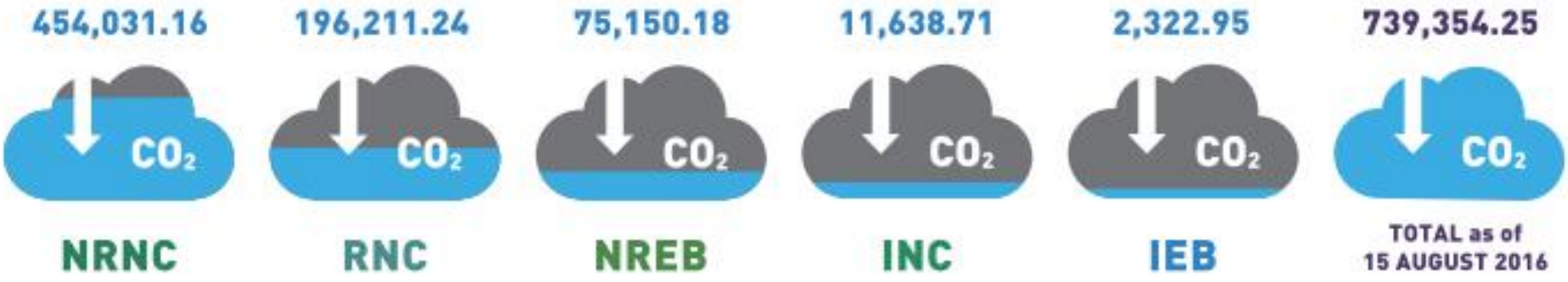



**TOTAL as of 15 AUGUST 2016 : 15,672,675.23 (168,699,272.19sqft)**

# GBI CERTIFIED PROJECTS BY RATING CATEGORIES

| RATING | NRNC | RNC | INC | NREB | IEB | T | TOTAL AS OF 15 AUGUST 2016 |
|---|---|---|---|---|---|---|---|
| PLATINUM ABOVE 86 POINTS | 10 | 4 | - | 1 | - | 1 | 16 (4%) |
| GOLD 76 - 85 POINTS | 49 | 30 | 1 | 1 | 1 | 2 | 84 (23%) |
| SILVER 66 - 75 POINTS | 21 | 14 | 2 | 2 | - | 3 | 42 (12%) |
| CERTIFIED 50 - 65 POINTS | 101 | 102 | 6 | 9 | 2 | 2 | 222 (61%) |
| TOTAL CERTIFIED | 181 | 150 | 9 | 13 | 3 | 8 | 364 |

## CARBON DIOXIDE (CO2) EMISSION REDUCTION OF GBI CERTIFIED BUIILDINGS




**CO2 Emission Reduction : (tCO2e/annum, based on electricity energy reduction only @ 1kWh = 0.694 kg CO2 - Peninsular / 0.699 kg CO2- Sarawak / 0.536 kg CO2 - Sabah )**

| Incremental Green Costs for GBI 'Certified': | |
|---|---|
| Non-Residential [NRNC Tool] | Residential [RNC Tool] |
| 0 - 2 % | 0 - 1 % |

Source: Green Cost Submissions to Inland Revenue Board (2012 – 2015)

| Green Cost Breakdown by GBI Category [NRNC] | | | | | |
|---|---|---|---|---|---|
| Energy Efficiency (EE) | Indoor Environmental Quality (EQ) | Sustainable Site Planning & Management (SM) | Material & Resources (MR) | Water Efficiency (WE) | Innovation (IN) |
| 63.4% | 15.3% | 2.6% | 1.4% | 2.4% | 15.0% |

Source: Green Cost Submissions to Inland Revenue Board (2012 – 2015)

| Green Cost Breakdown by GBI Category [RNC] | | | | | |
|---|---|---|---|---|---|
| Energy Efficiency (EE) | Indoor Environmental Quality (EQ) | Sustainable Site Planning & Management (SM) | Material & Resources (MR) | Water Efficiency (WE) | Innovation (IN) |
| 44.5% | 9.6% | 5.6% | 12.0% | 11.9% | 16.4% |

Source: Green Cost Submissions to Inland Revenue Board (2012 – 2015)

GB

| Average Approved Green Tax Exemption per Project: | |
|---|---|
| Non-Residential [NRNC Tool] | Residential [RNC Tool] |
| **RM 9,933,000** | **RM 1,510,000** |

Source: Green Cost Submissions to Inland Revenue Board (2012 – 2015)

| Average Incremental Green Cost per GBI Rating: | | | |
|---|---|---|---|
| Certified | Silver | Gold | Platinum |
| **1.1%** (range: 0 - 2%) | **1.8%** (range: 1 - 3%) | **3.8%** (range: 2 - 6%) | **6.1%** (insufficient data) |

Source: Green Cost Submissions to Inland Revenue Board (2012 – 2015)