

Singapore Schools Green Mark Scheme on Indoor Air Quality



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22 mai 2014

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Green Building Master Plan



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Green Building Master Plan



New public sector buildings to achieve Green Mark Platinum rating

Under the 1st Green Building Masterplan, all new Public sector buildings and those undergoing major retrofitting works had to meet minimum standards of environmental sustainability equivalent to the Green Mark Certified level. Under the 2nd Green Building Masterplan, the government plans to demonstrate its continued commitment towards realizing a sustainable built environment by requiring all larger new air-conditioned public sector buildings to achieve the highest Green Mark accolade, the Green Mark Platinum Award.

Land sales conditions in key growth areas to achieve higher Green Mark ratings

To further encourage private developers to achieve outstanding design, quality and sustainability objectives in their projects, the government will set higher Green Mark standards, such as the Green Mark Platinum or Green Mark GoldPlus Award as land sales conditions for selected new growth areas. This will ensure that these new developments are outstanding green buildings projects, excellent in quality and distinctive.

Existing public sector buildings to achieve Green Mark GoldPlus Award by 2020

The government will lead the movement to 'green' existing building stock on the island by requiring that all existing buildings owned by government agencies meet Green Mark GoldPlus standard by 2020.

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Green Building Master Plan



Bonus to further encourage developers to achieve higher-tier Green Mark ratings

Heartened by the strong response from private developers to the existing S\$20 million Green Mark Incentive Scheme for New Buildings, or GMIS(NB), BCA and URA have launched a new scheme called the Green Mark Gross Floor Area (GM GFA) Incentive Scheme. This scheme awards additional gross floor area to developers that earn higher-tier Green Mark awards for their new buildings and reconstruction projects.

S\$100 million scheme for building owners to retrofit

BCA recognizes that financial considerations can be a key concern for building owners considering the upgrading of the energy performance of their building. To jump-start the 'greening' of existing buildings in the private sector, BCA is introducing a bold scheme called the S\$100 million Green Mark incentive Scheme for Existing Building (GMIS-EB). This cash incentive scheme aims to encourage private building owners of existing building to undertake retrofits to achieve significant improvement in energy efficiency.



Green Building Master Plan

Strategic Thrust

3

Furthering The Development Of Green Building Technology

It is essential to step up developmental and collaborative efforts to build up capabilities and expertise in green building design and technologies. This will eventually lead the way to more viable and cost-effective applications of green building designs and technologies. The upcoming Zero Energy Building project will be a useful platform to test bed and showcase new technologies and designs for the built environment. In addition, BCA will also be collaborating with suitable partners to embark on R&D and pilot projects that can lead to even greater energy savings of 50% or more.



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Green Building Master Plan

Strategic Thrust

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Building Industry Capabilities Through Training

To meet the expected strong demand for green buildings, it is important to develop the industry's capabilities and ensure an adequate supply of green building professionals. BCA has worked out a comprehensive training framework to train some 18,000 green specialists at the PMET (Professional, Manager, Executive and Technician) level over the next 10 years in the development, design, construction, operation and maintenance of green buildings. Existing personnel will need to be upgraded and new entrants recruited, creating a highly skilled 'green collar' workforce.



Green Building Master Plan

It is important to elevate awareness of green buildings, energy efficiency and the need for a sustainable built environment within the industry and the community.

We will be profiling Singapore as a hub for green building development in the region. The Singapore Green Building Week to be launched in October 2009 will feature the International Green Building Conference, to showcase Singapore's achievements in shaping a sustainable built environment. It will draw foreign and local experts to share their experiences in green building science. We will also officially launch our Zero Energy Building and generate greater international awareness of Singapore's iconic Green Mark projects with the Green Mark Tours.

Strategic Thrust

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Profiling Singapore
And Raising
Awareness

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Green Building Master Plan

The sixth strategic thrust focuses on the need for regulation. After studying the approaches to implementation taken by countries such as Germany, Denmark and the United Kingdom, BCA has mapped out a phased approach to tackle the challenge of "greening" existing buildings. We will start by exploring the feasibility of requiring energy consumption disclosure by building owners. This will help establish energy benchmarks for various categories of buildings



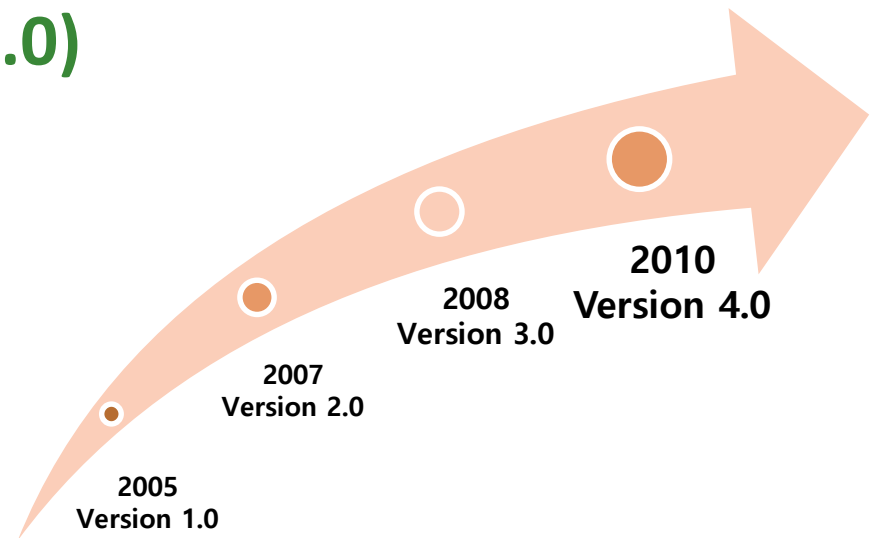
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BCA Green Mark (version 4.0)



Area of improvements

- **Greater emphasis on Passive Design**
 - ✓ Natural Ventilation
 - ✓ Daylighting
- **Further enhancing building energy efficiency standard**
- **Promote Sustainable Construction**
- **Greater Emphasis on Greenery**
- **Enhanced pre-requisites for higher GM rating**

http://www.bca.gov.sg/EnvSusLegislation/others/GM_Certification_Std2010.pdf



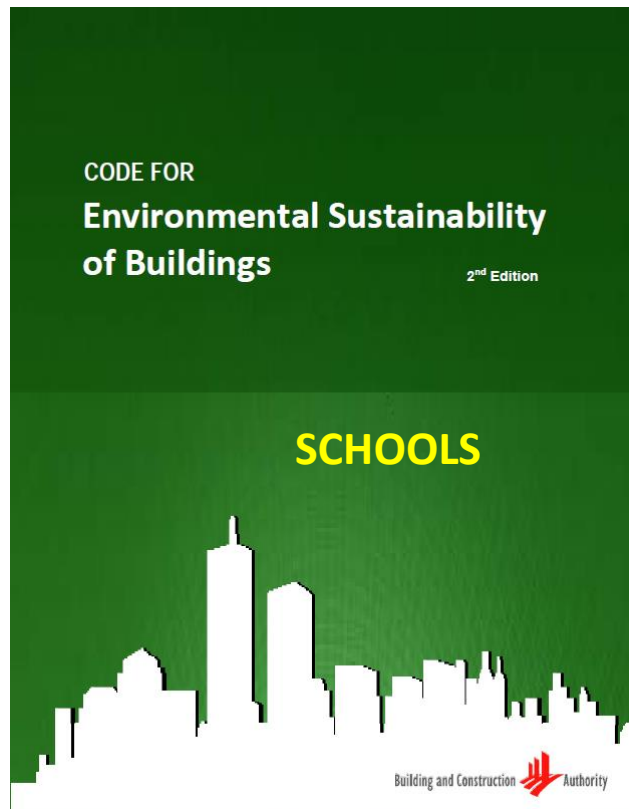
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BCA Green Mark (version 4.0)



CODE FOR ENVIRONMENTAL SUSTAINABILITY OF BUILDINGS	Introduction			
	1. Scope			
	2. Definitions			
	3. Statutory Requirements	3.1 Act and Regulations		
		3.2 Referenced Codes and Standards		
3.3 Responsibility				
3.4 Minimum Environmental Sustainability Standard				
4. Statutory Requirements	4.1 Environmental Sustainability Standard		Part 1 – Energy Efficiency	
			Part 2 – Water Efficiency	
			Part 3 – Environmental Protection	
			Part 4 – Indoor Environmental Quality	
			Part 5 – Other Green Features	
5. Submission Procedures	5.1 General			
	5.2 Submission at BP Stage			
	5.3 Submission before TOP or CSC Stage (if there is no TOP application)			
	5.4 Documentary Evidences			
ANNEX	A. Areas of Responsibility	Table A-1 : Areas of Responsibility under Residential Building Criteria	Part 1 – Energy Efficiency Part 2 – Water Efficiency Part 3 – Environmental Protection Part 4 – Indoor Environmental Quality Part 5 – Other Green Features	
		Table A-2 : Areas of Responsibility under Non-Residential Building Criteria	Part 1 – Energy Efficiency Part 2 – Water Efficiency Part 3 – Environmental Protection Part 4 – Indoor Environmental Quality Part 5 – Other Green Features	
ANNEX	B. Scoring Methodology & Documentation	(Non-) Residential Building Criteria	(I) Energy Related Requirements	Part 1 – Energy Efficiency
			(II) Other Green Requirements	Part 2 – Water Efficiency Part 3 – Environmental Protection Part 4 – Indoor Environmental Quality Part 5 – Other Green Features
ANNEX	C. Ventilation Simulation Methodology & Requirements	C1 General		
		C2 Simulation Software		
		C3 Ventilation Simulation Methodology		
		C4 Documentation Requirements		
ANNEX	D. Daylighting & Glare Simulation Methodology and Requirements	D1 General		
		D2 Simulation Software		
		D3 Daylighting and Glare Simulation Methodology		
		D4 Documentation Requirements		

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BCA GREEN MARK ASSESSMENT CRITERIA AND ONLINE APPLICATION



To achieve Green Mark Award



Pre-requisite Requirement

All relevant pre-requisite requirements for the specific Green Mark Rating are to be complied with



Energy Related Requirements
Minimum 30 points

Other Green Requirements
Minimum 20 points

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

Part 1 - Energy Efficiency

- Air-con { 1-1 Thermal Performance of Building Envelope - ETTV
- Air-con { 1-2 Air-Conditioning System
- Non Air-con { 1-3 Building Envelope – Design/Thermal Parameter
- Non Air-con { 1-4 Natural Ventilation / Mechanical Ventilation
- General { 1-5 Daylighting
- General { 1-6 Artificial Lighting
- General { 1-7 Ventilation in Carparks
- General { 1-8 Ventilation in Common Areas
- General { 1-9 Lifts and Escalators
- General { 1-10 Energy Efficient Practices & Features
- General { 1-11 Renewable Energy

Elective Requirement from Other Areas
(Combination of the following items to meet 20 points)

Part 2 - Water Efficiency

- 2-1 Water Efficient Fittings
- 2-2 Water Usage and Leak Detection
- 2-3 Irrigation System and Landscaping
- 2-4 Water Consumption of Cooling Towers

Part 3 – Environmental Protection

- 3-1 Sustainable Construction
- 3-2 Sustainable Products
- 3-3 Greenery Provision
- 3-4 Environmental Management Practice
- 3-5 Green Transport
- 3-6 Refrigerants
- 3-7 Stormwater Management

Part 4 - Indoor Environmental Quality

- 4-1 Thermal Comfort
- 4-2 Noise Level
- 4-3 Indoor Air Pollutants
- 4-4 Indoor Air Quality (IAQ) Management
- 4-5 High Frequency Ballasts

Part 5 – Other Green Features

- 5-1 Green Features and Innovations

BCA Green Mark for New Non-Residential Buildings
Version NRB/4.0
(SCHOOLS)



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Point Allocations – BCA Green Mark for New Non-Residential Buildings (SCHOOLS) (Version NRB/4.0)

Category		Point Allocations	
Minimum 30 points	(I) Energy Related Requirements		
	Part 1 : Energy Efficiency		
	NRB 1-1 Thermal Performance of Building Envelope - ETTV	Section (A) Applicable to air-con areas	12
	NRB 1-2 Air-Conditioning System		30
	Sub-Total (A) – NRB 1-1 to 1-2		42
	NRB 1-3 Building Envelope – Design/Thermal Parameter	Section (B) Applicable to non air-con areas excluding carparks and common areas	35
	NRB 1-4 Natural Ventilation / Mechanical Ventilation		20
	Sub-Total (B) – NRB 1-3 to 1-4		55
	NRB 1-5 Daylighting	Section (C) Generally applicable to all areas	6
	NRB 1-6 Artificial Lighting		12
	NRB 1-7 Ventilation in Carparks		4
	NRB 1-8 Ventilation in Common Areas		5
	NRB 1-9 Lifts and Escalators		2
	NRB 1-10 Energy Efficient Practices & Features		12
NRB 1-11 Renewable Energy	20		
Sub-Total (C) – NRB 1-5 to 1-11		61	
Category Score for Part 1 – Energy Efficiency		116 (Max)	
Prorate Subtotal (A) + Prorate Subtotal (B) + Prorate Subtotal (C)			

(II) Other Green Requirements		
Part 2 : Water Efficiency		
NRB 2-1 Water Efficient Fittings	10	
NRB 2-2 Water Usage and Leak Detection	2	
NRB 2-3 Irrigation System and Landscaping	3	
NRB 2-4 Water Consumption of Cooling Towers	2	
Category Score for Part 2 – Water Efficiency		17
Part 3 : Environmental Protection		
NRB 3-1 Sustainable Construction	10	
NRB 3-2 Sustainable Products	8	
NRB 3-3 Greenery Provision	8	
NRB 3-4 Environmental Management Practice	7	
NRB 3-5 Green Transport	4	
NRB 3-6 Refrigerants	2	
NRB 3-7 Stormwater Management	3	
Category Score for Part 3 – Environmental Protection		42
Part 4 : Indoor Environmental Quality		
NRB 4-1 Thermal Comfort	1	
NRB 4-2 Noise Level	1	
NRB 4-3 Indoor Air Pollutants	2	
NRB 4-4 Indoor Air Quality (IAQ) Management	2	
NRB 4-5 High Frequency Ballasts	2	
Category Score for Part 4 – Indoor Environmental Quality		8
Part 5 : Other Green Features		
NRB 5-1 Green Features & Innovations	7	
Category Score for Part 5 – Other Green Features		7
Green Mark Score :		190 (Max)

Green Mark Score (Non-Residential)

$$\text{Green Mark Score (Non-Res)} = \sum \text{Category Score [(Part 1 – Energy Efficiency) + (Part 2 – Water Efficiency) + (Part 3 – Environmental Protection) + (Part 4 – Indoor Environmental Quality) + (Part 5 – Other Green Features)]}$$

where Category Score for Part 1 \geq 30 points and
 \sum Category Score for Part 2, 3, 4 & 5 \geq 20 points

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Go Green by Going Paperless
for a better tomorrow

Useful Links

Account Registration

Login with SingPass ID

Login with GM ID



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Within BCA Website

The BCA Green Mark Scheme was launched in January 2005 as an initiative to drive Singapore's construction industry towards more environment-friendly buildings. It is intended to promote sustainability in the built environment and raise environmental awareness among developers, designers and builders when they start project conceptualisation and design, as well as during construction.

This online portal is designed to facilitate your application submission and certification process.

For more info/clarification, please email to greenmark@bca.gov.sg.

BCA Green Mark
Application →



BCA Green Mark
Online

Non-Residential
New Buildings

Residential
New Buildings



BCA Green Mark
Online

Existing
Non-Residential
Buildings

Existing
Residential
Buildings

Existing School

Office Interior



BCA Green Mark
Online

Landed
House

Infrastructure

District

Restaurants



BCA Green Mark
Online

Supermarket

Retail

ONLINE APPLICATION

<http://www.bca.gov.sg/GreenMarkOnline/>

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BCA GREEN MARK ASSESSMENT CRITERIA AND ONLINE APPLICATION

VERIFICATION AUDIT FOR GREEN MARK CERTIFICATION PROJECTS – STAGE 1 COMPLIANCE REQUIREMENTS FOR NON-RESIDENTIAL BUILDING (SCHOOLS)

Part 4 Indoor Environmental Quality	
Criteria	Compliance requirement
NRB 4-1 Thermal Comfort	Site Requirements <ul style="list-style-type: none"> Determine the thermal comfort of the applicable air-conditioning spaces using measured and/or monitored operation data and demonstrate compliance with the committed design specifications.
NRB 4-2 Noise Level	Site Requirements <ul style="list-style-type: none"> Determine the noise level of the applicable spaces using measured and/or monitored operation data and demonstrate compliance with the committed design specifications.
NRB 4-3 Indoor Air Pollutants	Documentary Evidences <ul style="list-style-type: none"> Purchase orders/ delivery orders of low VOC paints and/or adhesive certified under SGLS to demonstrate compliance with the committed design specifications.
NRB 4-4 Indoor Air Quality Management	Documentary Evidences <ul style="list-style-type: none"> Purchase orders/ delivery orders of filtration media to demonstrate compliance with the committed design specifications and SS 554: Clause 4.3.4.5 & Annex E. IAQ management plan test report to demonstrate compliance with guidelines in SS554: Clause 4.6 & Annex F. Site Requirements <ul style="list-style-type: none"> Determine the differential pressure sensor installations and the functionality of the control strategies implemented for the air distribution systems and demonstrate compliance with the design specifications via the BMS.
NRB 4-5 High Frequency Ballast	Documentary Evidences <ul style="list-style-type: none"> Purchase orders/ delivery orders of high frequency ballast to demonstrate compliance with the committed design specifications.

Part 4 Indoor Environmental Quality	
Criteria	Compliance requirement
RB 4-1 Noise Level	Site Requirements <ul style="list-style-type: none"> Determine the noise level of the applicable spaces using measured and/or monitored operation data and demonstrate compliance with the committed design specifications.
RB 4-2 Indoor Air Pollutants	Documentary Evidences <ul style="list-style-type: none"> Purchase orders/ delivery orders of low VOC paints and/or adhesive certified under SGLS to demonstrate compliance with the committed design specifications. Product catalogue as supplementary documents to PO/DO for making reference of the SGLS products specifications.
RB 4-3 Waste Disposal	Site Requirements <ul style="list-style-type: none"> Demonstrate compliance with the committed design specifications making reference to the as-built drawings.



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2014

Thank You

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