Green Mark Criteria for Existing Building

GREEN MARK FACILITIES MANAGER COURSE

BCA GREEN MARK

Green Mark Criteria for Non-residential Existing Building (Version 3.0)

Links for Green Mark for Non-residential Existing Buildings Criteria (Ver. 3.0) :

- *http://www.bca.gov.sg/GreenMark/green_mark_criteria.html*
- *http://www.bca.gov.sg/EnvSusLegislation/others/Code_Env_Sus_Measures_Exit_Building_final.pdf*

Building and Construction Authority
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BCA GREEN MARK SCHEME

BCA GREEN MARK

Launched in Jan 2005 – a rating system for the tropics

BCA GREEN MARK

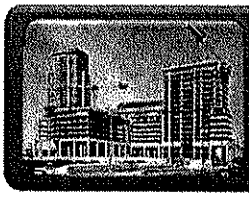
A green building rating system to evaluate building for its environmental impact and performance

Objectives

- Recognize the efforts made by developers & building owners and design teams in creating environmentally sustainable buildings
- Benchmark and identify good practices in development, design, construction, management and maintenance of green buildings

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BCA GREEN MARK SCHEMES



BCA Green Mark Schemes for New Buildings

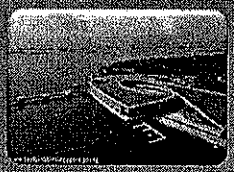
- Green Mark for Non-Residential Buildings
- Green Mark for Residential Buildings
- Green Mark for Landed Houses



BCA Green Mark Schemes for Existing Buildings

- Green Mark for Non-Residential Buildings
- Green Mark for Residential Buildings
- Green Mark for Existing Schools
- Green Mark for Supermarkets
- Green Mark for Retail

BCA Green Mark Schemes – Beyond Buildings



- Green Mark for Existing Parks
- Green Mark for New Parks Design & Development
- Green Mark for Infrastructures
- Green Mark for Office Interiors
- Green Mark for District
- Green Mark for Rapid Transit System
- Green Mark for Restaurant
- Green Mark for Data Centres

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Green Mark Assessment Process

Application Received	Briefings and Consultations	Pre-consultation
	Pre-assessment briefing	
Assessment Stage	Actual Assessment	2 days
	Clarification & Request for Further Info	
2-4 weeks	Finalise Score for Mgt Approval	2nd presentation for Goldplus and Platinum
	Issue Green Mark Certificate	
Award	BCA Awards Nite (May)	
	Triennial Assessment	

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Green Mark for EXISTING Buildings – Points Allocation

Part 1 – Energy Efficiency		Pts
1-1	Thermal Performance of Building Envelope	5
1-2	Air Conditioning System	37
1-3	Natural Ventilation / Mechanical Ventilation	
1-4	Artificial Lighting	13
1-5	Ventilation in Carparks	4
1-6	Ventilation in Common Areas	5
1-7	Lifts and Escalators	2
1-8	Energy Efficient Practices & Feature	12
1-9	Energy Policy & Management	1
1-10	Renewable Energy	15
	Sub-total for Part 1	**89**
Part 2 – Water Efficiency		
2-1	Water Monitoring	4
2-2	Water Efficient Fittings	12
2-3	Alternative Water Sources	3
2-4	Water Efficiency Improvement Plans	1
2-5	Irrigation System and Landscaping	2
2-6	Cooling Towers	2
	Sub-total for Part 2	**24**

Part 3 – Sustainable Operation & Management		Pts
3-1	Building Operation & Maintenance	4
3-2	Post Occupancy Evaluation	3
3-3	Waste Management	7
3-4	Sustainable Products	8
3-5	Greenery	10
3-6	Environmental Protection	3
3-7	Green Transport	4
	Sub-total for Part 3	**39**
Part 4 – Indoor Environmental Quality		
4-1	Indoor Air Quality Performance	8
4-2	Indoor Air Pollutants	2
4-3	Lighting Quality	5
4-4	Thermal Comfort	2
4-5	Internal Noise Level	1
	Sub-total for Part 4	**18**
Part 5 – Other Green Features		
5-1	Green Features & Innovations	10
	Sub-total for Part 5	**10**

GRAND TOTAL = 180 points

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GREEN MARK AWARD RATING

BCA GREEN MARK

Green Mark Rating	Green Mark Points
Platinum	90 & above
Goldplus	85 to <90
Gold	75 to <85
Certified	50 to <75

	Aspiring		Certified		Gold	Gold Plus	Platinum
Score	0	49	50	74	75	84	85	89	90 and above

MINIMUM REQUIREMENTS TO ACHIEVE GM CERTIFIED

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

ctive Requirement for Energy Improvement
mbination of the following items to meet 30 points)

rt 1 - Energy Efficiency

:NRB 1-1 Thermal Performance of Building Envelope
:NRB 1-2 Air Conditioning System
:NRB 1-3Natural Ventilation / Mechanical Ventilation
:NRB 1-4 Artificial Lighting
:NRB 1-5 Ventilation in Carparks
:NRB 1-6 Ventilation in Common Areas
:NRB 1-7 Lifts and Escalators
:NRB 1-8 Energy Efficient Practices & Feature
:NRB 1-9 Energy Policy & Management
:NRB 1-10 Renewable Energy

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

Part 2 - Water Efficiency

ENRB 2-1 Water Monitoring
ENRB 2-2 Water Efficient Fittings
ENRB 2-3 Alternative Water Sources
ENRB 2-4 Water Efficiency Improvement Plans
ENRB 2-5 Irrigation System and Landscaping
ENRB 2-6 Cooling Towers

Part 3 – Sustainable Operation & Managemer

ENRB 3-1 Building Operation & Maintenance

PRE-REQUISITE REQUIREMENTS

(1) ENERGY EFFICIENCY

Green Mark Rating	Minimum points achievement from Part 1 – Energy Efficiency
Green Mark Certified	30 points
Green Mark Gold	35 points
Green Mark Gold^{Plus}	40 points
Green Mark Platinum	45 points

PRE-REQUISITE REQUIREMENTS

BCA GREEN MARK

(2) MINIMUM SYSTEMS' EFFICIENCY

For buildings using **Water-Cooled Chilled-Water Plant**

Green Mark Rating	Building Cooling Load (RT)	
	< 500	≥ 500
	Efficiency (kW/RT)	
Certified	0.85	0.75
Gold	0.80	0.70
Gold^{Plus}	0.75	0.68
Platinum	0.70	0.65

For buildings using **Air Cooled Chilled-water Plant or Unitary Air-Conditioner**

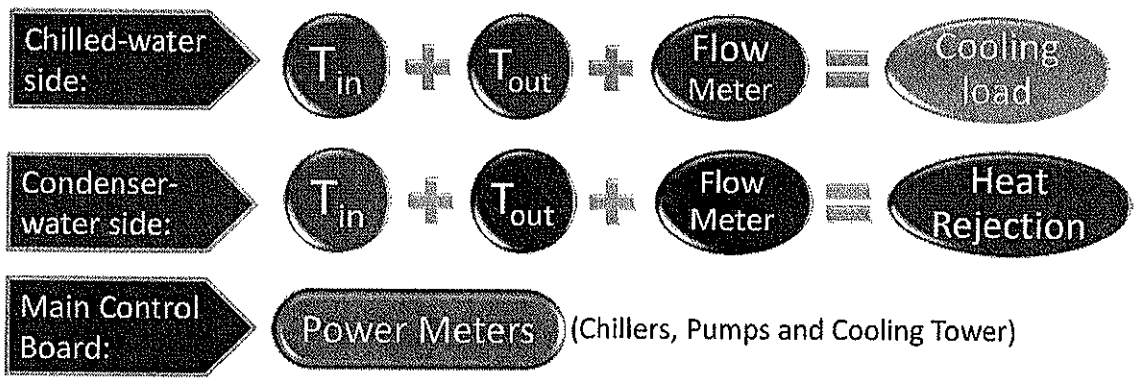
Green Mark Rating	Building Cooling Load (RT)	
	<500	≥ 500
	Efficiency (kW/RT)	
Certified	1.1	1.0
Gold	1.0	Not applicable
Gold^{Plus}	0.85	
Platinum	0.78	

For buildings with cooling load of 500 RT or more, the use of air cooled central chilled-water plant or other unitary air-conditioners are not applicable for Gold and higher ratings.

PRE-REQUISITE REQUIREMENTS

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(3) CHILLER PLANT M&V INSTRUMENTATION



- Provision of permanent measuring instruments for monitoring the performance of the Operating System Efficiency (OSE)
- Heat Balance test for verification of the accuracy of M&V instrumentation

PRE-REQUISITE REQUIREMENTS

(4) INDOOR ENVIRONMENTAL QUALITY

- To conduct full IAQ audit 3 yearly
- IAQ audit to be performed by an accredited laboratory under Singapore Accreditation Council
- IAQ audit to comply with NEA's Guidelines for Good Indoor Air Quality in Office Premises or SS554:2009 Code of Practice for `Indoor air quality for air-conditioned buildings'

PRE-REQUISITE REQUIREMENTS

(5) NATURAL VENTILATION

- Only apply for GM Platinum projects
- Only applicable to occupied areas (i.e. excluding circulations, plant rooms and transit areas)

At least 75% of natural ventilated areas with effective cross ventilation (i.e. true North & South facing window opening)

PART 1 ENERGY EFFICIENCY

BCA GREEN MARK

1-1 Thermal Performance Of Building

➢ Enhance the overall thermal performance of building envelope to minimize heat gain thus reducing the overall cooling load requirement

0.5 points for every reduction of 1 W/m2 in ETTV from the baseline of 50 W/m^2

Point scored = 0.5 x (50 – ETTV)

(Up to 5 points)

PART 1 ENERGY EFFICIENCY

BCA GREEN MARK

1-2 Air Conditioning System

(a) Water-Cooled Chilled Water Plant:

Peak Building Cooling Load	Prescribed Baseline Efficiency (kW/ton)	Points Awarded	
≥ 500 tons	0.75	14	14 + 0.35 x (% improvement)
< 500 tons	0.85	14	14 + 0.3 x (% improvement)

(b) Air-Cooled Chilled Water Plant / Unitary Air-Conditioners:

Peak Building Cooling Load	Prescribed Baseline Efficiency (kW/ton)	Points Awarded	
≥ 500 tons	1.0	14	14 + 0.25 x (% improvement)
< 500 tons	1.1	14	14 + 0.2 x (% improvement)

(Up to 20 points)

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PART 1 ENERGY EFFICIENCY

BCA GREEN MARK

1-2 Air Conditioning System

Example:

- Water cooled chiller water system is used
- Cooling tonnage = 750 ton
- Proposed chilled plant efficiency = 0.72 kW/ton

Base on criteria, baseline efficiency = 0.75 kW/ton

% improvement = (0.75 – 0.72)/0.75 = 4%

Point scored = 14 + 4 x 0.35 = 15.4 points

PART 1 ENERGY EFFICIENCY

BCA GREEN MARK

1-2 Air Conditioning System

1-2 (b) Air Distribution System

Baseline:

Constant Air Volume (CAV)	Variable Air Volume (VAV)
0.47 W/CMH	0.74 W/CMH

Point scored = 0.15 x (% improvement)
(Up to 8 points)



1-2 Air Conditioning System

1-2 (c) Air Distribution System

Example:

Table 1-2(c) : Equipment Efficiency (Air-Distribution System)				
Equipment Type	From Specs		CP 13 : Allowable nameplate motor power (W/CMH)	Power Required by the motor at design condition (W/CMH)
	Total air flow (CMH)	Nameplate motor power (W)		
1. AHUs (VAV)	500,000	300,000	0.74	0.60
2. AHUs (CAV)	200,000	80,000	0.47	0.40
3. FCUs	100,000	30,000	0.47	0.30
Total	800,000	410,000	0.639	0.513

Overall Baseline efficiency = [(0.74 x 500,000)+(0.47 x 200,000)
+(0.47 x 100,000)] /(800,000)
= 0.639 W/CMH

Overall equipment efficiency = 410,000/800,000 = 0.513 W/CMH
% improvement = (0.639 – 0.513)/0.639 = 19.7%
Point scored = 0.15 x 19.7 = 3 points

PART 1 ENERGY EFFICIENCY



1-2 Air Conditioning System

Buildings using District Cooling System

(Chilled water is supplied by 3rd parties servicer provider, thus buildings don't have own chiller plant)

- For buildings using district cooling system, there is no need to compute the plant efficiency under item 1-2(a) & (b).

- The points obtained will be pro-rated and based on the air distribution system efficiency under item 1-2(c).

PART 1 ENERGY EFFICIENCY

BCA GREEN MARK

1-2 Air Conditioning System

1-2(d) Permanent M&V instrumentation (1 point)

- Instrumentation for Monitoring of Central Water-Cooled Chilled-Water Plant Efficiency in accordance to ASHRAE Guideline 22 and AHRI 550/590

- The installed instrumentation shall be capable of calculating a resultant plant efficiency within 5% of its true value

PART 1 ENERGY EFFICIENCY

BCA GREEN MARK

1-2 Air Conditioning System

1-2(d) Permanent M&V instrumentation

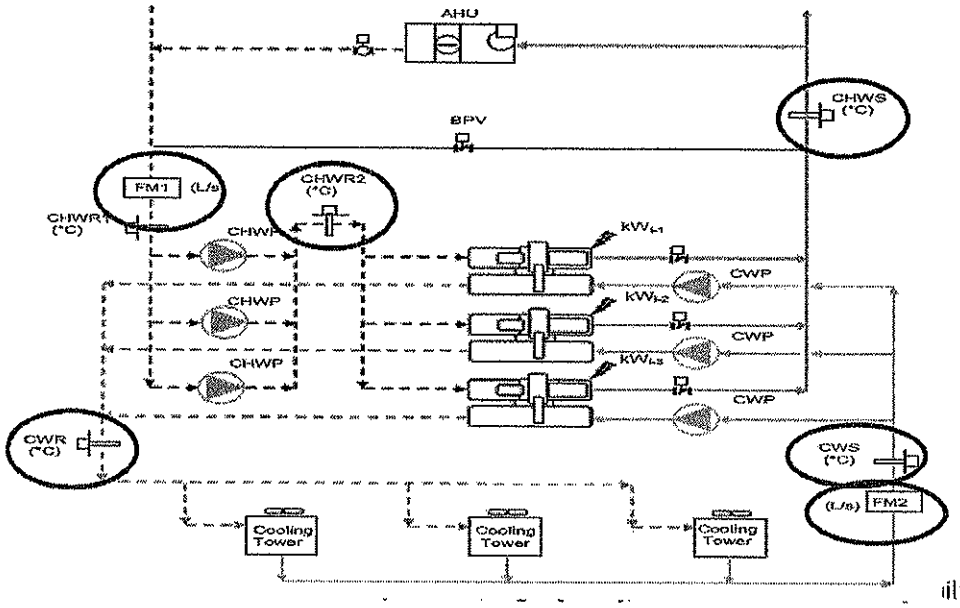
- Location and installation of the measuring devices to meet the manufacturer's recommendation.
- Data acquisition system shall have a minimum resolution of 16-bit. All Data should be trended at 1 minute sampling time interval.
- Dedicated digital power meters shall be provided for the following groups of equipment: chiller(s), chilled water pump(s), condenser water pump(s) and cooling tower(s)
- Flow meters for chilled- water and condenser water loop shall be ultrasonic / full bore magnetic type or equivalent.
- Temperature sensors with measurement uncertainty not exceeding ± 0.05 °C over entire measurement / calibration range.
- All thermo-wells shall be installed to ensure the sensors can be in direct contact with fluid flow.
- Provision of two spare thermo-wells located at both side of the temperature sensor for verification.

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PART 1 ENERGY EFFICIENCY

1-2 Air Conditioning System

1-2(d) Permanent M&V instrumentation



PART 1 ENERGY EFFICIENCY

1-2 Air Conditioning System

1-2(d) Permanent M&V instrumentation

Item	Description	Measurement Uncertainty
1	Temperature Sensors ▪ 10K/30K Thermistor ▪ Platinum Resistance Thermometers	± 0.03°C – 0.05°C over entire measurement range
2	Flow Sensor / Meter ▪ Ultrasonic ▪ Full bore magnetic	± 0.5 - 1% over entire measurement range
3	- Power Measurement	± 1%



1-2 Air Conditioning System

1-2(e) Heat Balancing

(substantiating test for water-cooled chilled-water plant) (1 point)

For a perfectly balanced chiller system, the heat balance is represented by the following equation:

$$q_{condenser} = q_{evaporator} + W_{input}$$

where $q_{condenser}$ = heat rejected
$q_{evaporator}$ = cooling load
W_{input} = power input to compressor

$$\text{Percent Heat Balance} = \left| \frac{(q_{evaporator} + W_{input}) - q_{condenser}}{q_{condenser}} \right| \times 100\% \leq 5\%$$

Actual heat balance shall be conducted over the entire normal operating hours with more than 80% of the computed heat balance within ±5% over one (1) week period.

PART 1 ENERGY EFFICIENCY



1-2 Air Conditioning System

1-2(f) Variable Speed Control

Provision of VSD controls for chilled-water and cooling tower fans to ensure better part-load plant efficiency
(1 point)

1-2(g) Sensor / Automatic Control Devices

Use of carbon dioxide sensors to regulate outdoor air flow rate to maintain the concentration of carbon dioxide
(1 point)

PART 1 ENERGY EFFICIENCY

1-2 Air Conditioning System

Buildings with Different Air-con system

Total Air-Conditioned areas (m^2)	25,000
Total Air-Conditioned areas (m^2) using chiller plant	90%
~~Total Air-Conditioned areas (m^2) using unitary air-conditioners~~	~~10%~~
Total Cooling Capacity (kW) of chiller plant	3517 kW
~~Total designed Cooling Capacity (kW) of unitary air-conditioners~~	~~200 kW~~

The computation for the points scored will be based on the air-con system with the larger aggregate capacity.

PART 1 ENERGY EFFICIENCY

1-3 Natural Ventilation / Mechanical ventilation

- Part 1-3 is applicable to non air-conditioned building whose aggregate non-air-conditioned areas is more than 10% of the total floor area excluding carpark and common areas.
- Where there is a combination of naturally ventilated and mechanical ventilated spaces, the points scored will only be based on the predominant ventilation modes of normally occupied spaces.

1-3(a) Natural Ventilation

20 base points can be scored for the use of natural ventilation

Points scored = 20 + 1.6 x (% of NV areas / 10)

(Up to 32 points)

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PART 1 ENERGY EFFICIENCY

BCA GREEN MARK

1-3 Natural Ventilation / Mechanical ventilation

1-3(b) Mechanical Ventilation

Baseline:

Constant Air Volume (CAV)	Variable Air Volume (VAV)
0.47 W/CMH	0.74 W/CMH

Points scored = 0.6 x (% improvement)

(Up to 32 points)

PART 1 ENERGY EFFICIENCY

BCA GREEN MARK

1-4 Artificial Lighting

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

Baseline: Please refer next slide.

Points scored = 0.3 x (% improvement)

(Up to 13 points)

PART 1 ENERGY EFFICIENCY

BCA GREEN MARK

1-4 Artificial Lighting : Maximum lighting power budget (including ballast loss)

Type of usage	Maximum lighting power budget (W/m2)
Offices	15
Classrooms	15
Hotel guest room	15
Lecture theatres	15
Auditoriums / Concert halls	10
Shops / Supermarkets / Departmental stores (including general & display lighting)	25
Restaurants	15
Lobbies / Atriums / Concourse	10
Stairs	10
Corridors	10
Car parks	5
Electronic manufacturing and fine detail / Assembly industries	20
Medium and heavy industries	15
Warehouses / Storage areas	10

PART 1 ENERGY EFFICIENCY

BCA GREEN MARK

1-4 Artificial Lighting

Example:

Description	Areas (m^2) (A)	Design Data		SS 530 Requirements	
		Total Power Consumption (by area)(W) (F)	Design Lighting Power Budget (W/m^2) (F/A)	Reference Lighting Power Budget (W/m^2) (H)	Reference Total Power Consumption (by area) (W) (H x A)
Office 1	1,500	15,190	10.13	15	22,500
Meeting Room	75	1,046	13.95	15	1,125
Corridors 1	150	1,240	8.27	10	1,500
Carparks	7,500	26,970	3.60	5	37,500
Staircase	100	440	4.4	10	1,000
Toilets	45	195	4.33	4.33	195
Total		**45,081**			**63,820**

% improvement = (63820 – 45081)/63820 = 29.4%

Point scored = 0.3 x 29.4 = 8.8 points

PART 1 ENERGY EFFICIENCY

1-5 Ventilation in Carparks

Encourage the use of energy efficient design and control of ventilation systems in carparks (Up to 4 points)

Ventilation Mode	Point scored
Natural Ventilation	4
Fume Extract System	2.5
MV system (w or w/o fresh air supply system)	2

Where there is a combination of different ventilation mode adopted for carpark design, the points scored under this requirement will be prorated accordingly.

PART 1 ENERGY EFFICIENCY

1-6 Ventilation in Common Areas

To encourage common areas to be designed for natural or mechanical ventilation – toilets, staircases, corridors, lift lobbies, atriums

Ventilation Mode	Point scored
Natural Ventilation	1.5 for each areas
Mechanical Ventilation	0.5 for each areas

(Up to 5 points)

Extent of coverage: at least 90% of the applicable areas

PART 1 ENERGY EFFICIENCY

1-7 Lifts And Escalators

To encourage the use of energy efficient lifts & escalators

Lifts with energy efficient features such as AC variable voltage and variable frequency (VVVF) motor drive and sleep mode features. (1point)

Escalators with energy efficient features such as motion sensors . (1point)

PART 1 ENERGY EFFICIENCY

1-8 Energy Efficient Features

To encourage other energy efficient green features not stated in the previous section which are innovative and have positive environmental impact.

1-8(a) Computation of energy efficiency index (EEI). (1 point)

$$EEI = [(TBEC - DCEC) / (GFA - DCA)] \times (NF / OH)$$

where:

TBEC : Total building energy consumption (kWh/year)
DCEC : Data centre energy consumption (kWh/year)
GFA : Gross floor area (exclude car park area) (m^2)
DCA : Data centre area (m^2)
NF : Normalising factor based on a typical weekly operating hours that is 55 hrs/week
OH : Weighted weekly operating hours (hrs/week)

PART 1 ENERGY EFFICIENCY

1-8 Energy Efficient Features

Example of EEI computation:

Month	Total Electricity Bill
Mar-11	756,730
Apr-11	819,278
May-11	819,538
Jun-11	742,540
Jul-11	806,854
Aug-11	847,571
Sep-11	865,244
Oct-11	834,212
Nov-11	872,959
Dec-11	847,652
Jan-12	935,965
Feb-12	767,112
TOTAL (kWh/yr)	**9,915,655**

Total GFA $_{\text{(excluding CP)}}$ = 25,000 m²

Area of Data Centre = 500 m²

Operating Hour = 65 hr / week

DCEC = **3216** x 500 = 1608000 kWh

EEI = (9915655-1608000)/(25000-500) x (55/65)

= 287 kWh/m²/yr

PART 1 ENERGY EFFICIENCY

1-8 Energy Efficient Features

1-8(b) Use of energy efficiency product that are certified by approved local certification body.

- 0.5 point for each product (up to 2 points)

1-8(c) Use of energy efficient features

- 3 points for every 1% reduction in the total energy consumption of the building (up to 9 points)

Example:

• Re-generative lift	• Sun pipes
• Heat recovery system	• Light shelves
• Motion sensors	• Photocell sensors to maximize the use of daylight

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PART 1 ENERGY EFFICIENCY

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1-9 Energy Policy and Management

To establish energy policy and targets for the better building energy efficiency

Criterion	Point scored
Establishing Energy Policy, energy targets and regular review with top management	0.5
Measures or strategies for energy improvement plans to achieve the energy target set over the next 3 years	0.5

PART 1 ENERGY EFFICIENCY

BCA GREEN MARK

1-10 Renewable Energy

To recognize and encourage the use of renewable or clean energy in order to reduce the needs of fossil fuel energy use (Up to 15 points)

Energy Efficiency Index (EEI)	Every 1% replacement of electricity (based on total electricity consumption) by renewable energy source	
	Include tenant's usage	Exclude tenant's usage
≥ 50 kWh/m²/yr	5 points	3 points
< 50 kWh/m²/yr	3 points	1.5 points

PART 1 ENERGY EFFICIENCY

Point Computation

$$Score = (Part1-1) + (Part1-2) \times \frac{a/c_floor_area}{Total_floor_area} + (Part1-3) \times \frac{non-a/c_area}{Total_floor_area} + \sum (Part1-4_to_Part1-10)$$

PART 2 WATER EFFICIENCY

2-1 Water Monitoring

Promote the use of private meters and leak detection system for better control and monitoring of water usage. (4 points)

	Criterion	Point scored
2-1(a)	Water consumption is monitored on monthly basis	1
2-1(b)	Private water meters are provided for major water uses (e.g. cooling tower, irrigation, tenant usage)	1
2-1(c)	Provision of automated / smart metering for monitoring and leak detection	2

PART 2 WATER EFFICIENCY

2-2 Water Efficient Fitting

Encourage the use of water efficient fittings under Water Efficiency Labelling Scheme (WELS) or adopt equivalent water efficient flow-rate/flush volumes for water fittings (Up to 12 points)

WELS Rating	Water Efficiency rating	Point Weightage
✓✓	Very Good	9
✓✓✓	Excellent	12

OR

To obtain PUB Water-Efficient Building Certificate (9 points)

PART 2 WATER EFFICIENCY

2-2 Water Efficient Fitting

Example:

Ref	Water Fitting Type	WELS rating		No rating	Total no. based on fitting type
		Excellent	Very Good		
1	Shower taps and mixers	0	30	0	30
2	Basin taps and mixers	150	10	0	160
3	Sink/bib taps and mixers	0	0	0	0
4	Dual-flush low capacity flushing cisterns	0	80	20	100
5	Urinals and urinal flush valves	50	0	0	50
Total no. based on rating (A)		200	120	20	ΣA = 340
Weightage (B)		12	9	0	-
Total (AXB)		2400	1080		Σ(AxB) = 3480

Point scored = $\Sigma(A \times B)/ \Sigma A$ = 10.2 points

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PART 2 WATER EFFICIENCY

2-3 Alternative Water Sources

Use of suitable systems that utilize alternative water sources for non-potable uses such as irrigation, washing, water features, toilet flushing, etc (excluding cooling tower make-up water) to reduce use of potable water. (Up to 3 points)

Alternative sources can be referred to rainwater, greywater, NEWater, AHU condensate and recycled water from approved sources.

Percentage reduction	Points
> 50 %	3 points
< 10 % to 50 %	2 points
< 10 %	1 point

PART 2 WATER EFFICIENCY

2-4 Water Efficiency Improvement Plans

Establish plans and strategies to reduce the dependency of potable water usage.

1 point can be scored if there are intent, measures and implementation strategies for water efficiency improvement plans over the next 3 years.

Committed water savings accrued from the proposed measures should be quantified.

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PART 2 WATER EFFICIENCY

2-5 Irrigation System and Landscaping

Provision of suitable control systems for irrigation system and use of plants that require minimal irrigation to reduce potable water consumption.

2-5(a) : At least 50% of the landscape areas served by water efficient irrigation system features such as rain sensor, soil moisture sensor or equivalent control system (1 point)

2-5(b) : The drought resistant plant species may be obtained from the online website: http://floraweb.nparks.gov.sg/ by searching the drought resistant plants as keyword (1 point)

PART 2 WATER EFFICIENCY

2-6 Cooling Towers

Reduce potable water consumption for cooling purpose

2-6(a) : Use of cooling tower water treatment system which can achieve 7 or better cycles of concentration. (1 point)

2-6(b) : Use of NEWater or on-site recycled water from approved sources. (1 point)

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PART 3 SUSTAINABLE OPERATION & MANAGEMENT

3-1 Building Operation & Maintenance

To encourage the adoption of green practices that is environmentally friendly and sustainable in the operation and maintenance.

3-1(a) : Environmental Policy that reflects sustainability goals set. (1 point)

3-1(b) : Green guide to tenants /end users. (1 point)

3-1(c) : In-house certified GMFM certified GMP and/or SCEM. (Up to 1 point)

3-1(d) : ISO 14000 or ISO 50001 certified. (1 point)

PART 3 SUSTAINABLE OPERATION & MANAGEMENT

3-2 Post Occupancy Evaluation

To conduct yearly post occupancy evaluation (POE) to assess building's occupants satisfaction with the indoor environment condition (e.g. lighting, temperature, cleanliness, etc)

3-2(a) : Conduct post occupancy survey to evaluate occupants' satisfaction on indoor environmental performance. (2 points)

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

3-2(b) : Corrective actions taken following the post occupancy evaluation. (1 point)

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PART 3 SUSTAINABLE OPERATION & MANAGEMENT

BCA GREEN MARK

3-3 Waste Management

To reduce waste consumption by recycling, monitoring and educating the building occupants

3-3(a) provision of facilities or recycling bins for collection and storage of different recyclable waste (2 points)

3-3(b) promotion of waste minimization and recycling among occupants, tenants and visitors (2 points)

3-3(c) provision of a proper storage area for recyclable wastes (1 point)

3-3(d) To quantify and monitor the recycling programme for continuous improvement (2 points)

PART 3 SUSTAINABLE OPERATION & MANAGEMENT

BCA GREEN MARK

3-4 Sustainable Products

Encourage the use of materials that are environmentally friendly and sustainable which are certified by approved local certification body (Up to 8 points)

Extent of Environmental Friendliness of products	Weightage for Point Allocation
Good	1
Very Good	1.5
Excellent	2

High Impact (1 point): extent of coverage → > 50%
Low Impact (0.5 point): extent of coverage → < 50%

PART 3 SUSTAINABLE OPERATION & MANAGEMENT

3-4 Sustainable Products

Example:

Products and Extent of coverage	With approved certification	Points allocated based on impact	Weightage based on rating	Points scored
(a) Carpets for all office spaces	Yes	1 (high impact)	1	1
(b) Panel boards as internal partition for more than 50% of office spaces	Yes	1 (high impact)	1.5	1.5
(c) Green concrete for external road	Yes	0.5 (low impact)	1.5	0.75

Point scored = Σ (High/Low impact) x (weightage)
= (1 x 1) + (1 x 1.5) + (0.5 x 1.5)
= 3.25 points

PART 3 SUSTAINABLE OPERATION & MANAGEMENT

3-5 Greenery Provision

Encourage greater use of greenery to reduce heat island effect

3-4(a) : Provision of greenery such as trees, palms, grass & other greeneries. (Up to 5 points)

GnP	Points Allocation
0.5 to < 1.0	1
1.0 to < 2.0	2
2.0 to < 3.0	3.5
≥ 3.0	5

3-4(b) : Use of compost recycled from horticulture waste (1 point)

We shape a **safe**, **high quality**, **sustainable** and **friendly** built environment.

PART 3 SUSTAINABLE OPERATION & MANAGEMENT

BCA GREEN MARK

3-5 Greenery Provision

Example:

Description	Qty (A)	Canopy area (B)	Radius (C)	Green Area Index GAI	Green Area (A)x(B)x(C^2)xGAI
Trees (Nos)	20	3.14	3.5	6	4615.8
Palms (Nos)	20	3.14	1	4	251.2
Shrubs (m^2)	20	NA	NA	3	60
grass + vertical greening (m^2)	100	NA	NA	1	100
				Total Green Area :	5027

Assume site area is 4000m^2

Greenery Provision (GnP) = Total Green Area / Total Site Area

= 5027 / 4000

= 1.26 (1.0 to <2.0)

Therefore, points scored for 3-5(a) = 2 points

PART 3 SUSTAINABLE OPERATION & MANAGEMENT

BCA GREEN MARK

3-5 Greenery Provision

Encourage greater use of greenery to reduce heat island effect

3-4(c) : Provision of Roof Top Greenery (Up to 2 points)

Useable Roof Areas	Points Allocation
≥20% and 50%	1
≥ 50%	2

3-4(d) : Provision of Vertical Greenery (Up to 2 points)

Vertical Greenery Areas	Points Allocation
≥10m^2 to <50m^2	1
≥ 50m^2	2

PART 3 SUSTAINABLE OPERATION & MANAGEMENT

3-6 Environmental Protection

To encourage the adoption of sustainable and environmental friendly procurement policy and the use of environmentally friendly refrigerant in the air-conditioning system

3-6(a) : Adoption of sustainable and environmental friendly procurement and purchasing policy (1 point)

3-6(b) : Use of refrigerant with zero ODP or GWP less than 100 (1 point)

3-6(c) : Provision of refrigerant leak detection system in the chiller plant room (1 point)

PART 3 SUSTAINABLE OPERATION & MANAGEMENT

3-7 Green Transport

Promote the use of public transport and environmental friendly transport options to reduce pollution from individual car use

3-7(a) : Good access (< 500m walking distance) to public transport networks (1 point)

3-7(b) : Provision of covered walkway to facilitate connectivity and use of public transport (1 point)

3-7(c) : Provision of adequate priority parking lots for hybrid/electric vehicle (1 point)

3-7(d) : Provision of covered/sheltered bicycles parking lots with adequate shower facilities (Up to 1 points)

*Minimum provision of **10** bicycle parking lots; cap at **30** bicycle parking lots where applicable*

No. of Bicycle Lots	Points Allocation
≥ 0.5% x (GFA/10)	0.5
≥ 1% x (GFA/10)	1

We shape a **safe**, **high quality**, **sustainable** and **friendly** built environment.

PART 4 INDOOR ENVIRONMENTAL QUALITY

BCA GREEN MARK

4-1 Indoor Air Quality Performance

Ensure building ventilation systems are designed and installed to provide acceptable IAQ under normal operating conditions

4-1(a) To conduct full IAQ audit 3 yearly (4 point)

4-1(b) Implement effective IAQ management plan (1 point)

4-1(c) Use of high efficiency air filter (at least MERV 13) in AHU (1 point)

4-1(d) Provision of Room Temperature display per floor (1 point)

4-1(e) Provision of Carbon Dioxide sensor display per floor (1 point)

PART 4 INDOOR ENVIRONMENTAL QUALITY

BCA GREEN MARK

4-2 Indoor Air Pollutants

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

4-2(a) Use of low volatile organic compounds (VOC) paints certified by approved local certification body (1 point)

4-2(b) Use of environmental friendly adhesives certified by approved local certification body (1 point)

PART 4 INDOOR ENVIRONMENTAL QUALITY

BCA GREEN MARK

4-3 Lighting Quality

To encourage good workplace lighting quality to promote productivity and occupant comfort

4-2(a) lighting lux level complies with SS531 or CP38 (1 point)

4-2(b) At least 90% of occupants are able to adjust lighting to suit their task needs and preference (Up to 2 points)

Control lighting by	Points Allocation
Switches	1
Task Lights	2

4-3(c) use of high frequency ballasts in the fluorescent luminaries (Up to 2 points)

% of HFB	Points Allocation
20% to < 40%	0.5
40% to < 60%	1
60% to < 80%	1.5
80% and above	2

PART 4 INDOOR ENVIRONMENTAL QUALITY

BCA GREEN MARK

4-4 Thermal Comfort

To encourage buildings to maintain good indoor conditions for thermal comfort

4-4(a) Achieve indoor dry-bulb temperature within 22.5 °C to 25.5 °C and relative humidity <70% (1 point)

4-4(b) Controllability of temperature by users (1 point)

4-5 Internal Noise Level

To control and keep the background noise in occupied spaces at levels appropriate to the intended use of the spaces

Internal noise level to comply with CP13:1999 or SS553:2009 (1 point)

PART 5 OTHER GREEN FEATURES

BCA GREEN MARK

5-1 Green Features and Innovations

To encourage other green features not stated in the previous section which are innovative and have positive environmental impact (Up to 10 points)

The adoption of other green features which are innovative and have positive environmental impact
0.5point for low impact item
1 points for medium impact item
2 points for high impact item

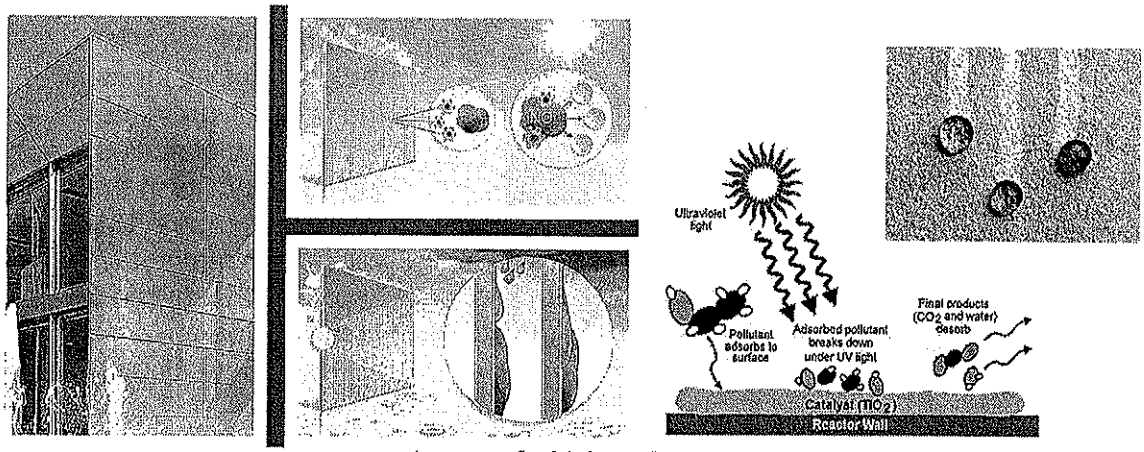
PART 5 OTHER GREEN FEATURES

BCA GREEN MARK

5-1 Green Features and Innovations

Examples:

Use of Self Cleaning Façade System in more than 75% of the applicable facade areas (2 points)



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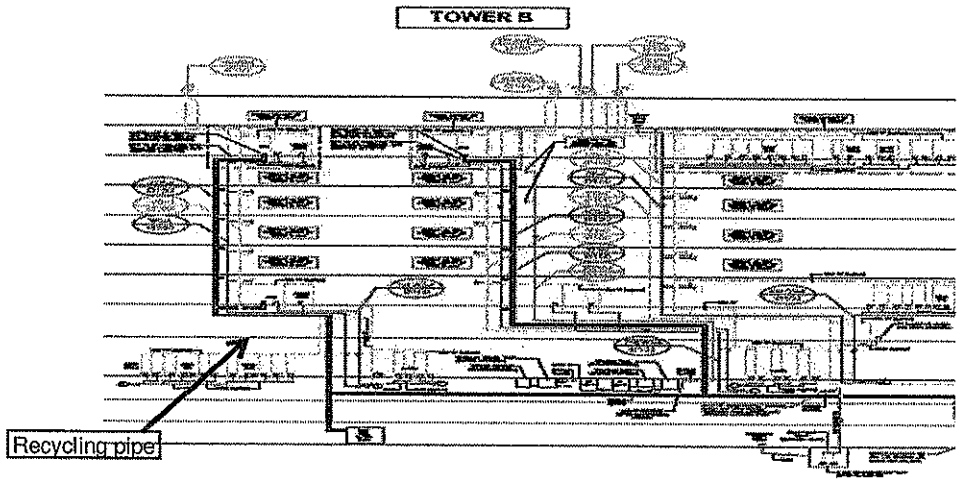
PART 5 OTHER GREEN FEATURES

5-1 Green Features and Innovations

Recycling of AHU condensate

1 point for more than 75% of the AHU condensate

0.5 point for at least 50% of the AHU condensate

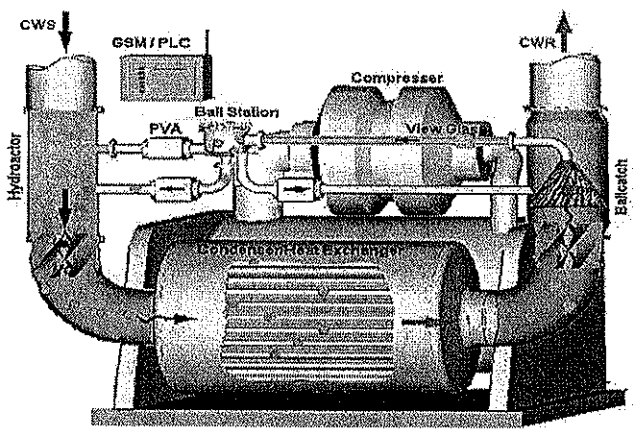


PART 5 OTHER GREEN FEATURES

5-1 Green Features and Innovations

Examples:

Automatic Condenser Tube Cleaning System (0.5 point)



This system automatically cleans the condensing pipes in the chiller & prevents the build up of scales & fouling deposits in the condenser tubes. This will help to maintain / improves the efficiency of the chiller.

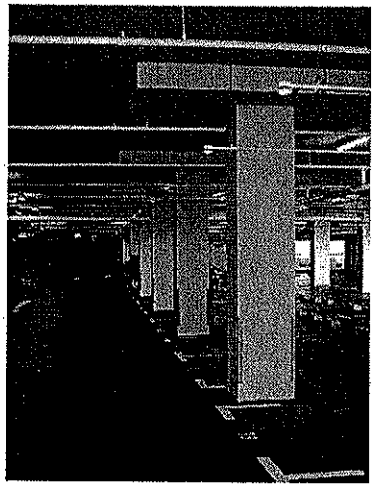
PART 5 OTHER GREEN FEATURES

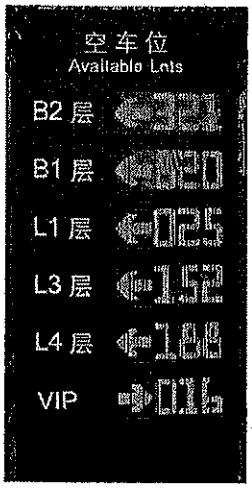
BCA GREEN MARK

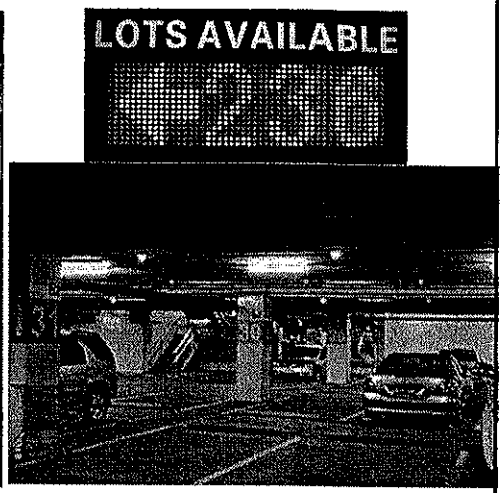
5-1 Green Features and Innovations

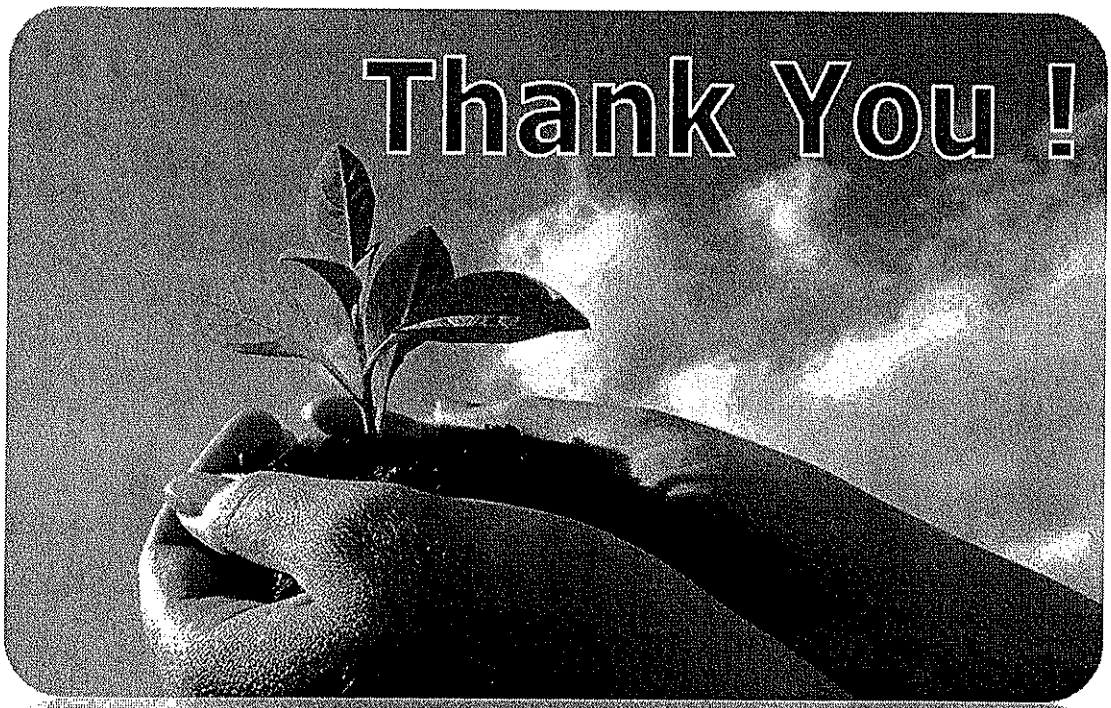
Examples:

Provision of Carpark Guidance System (0.5 point)



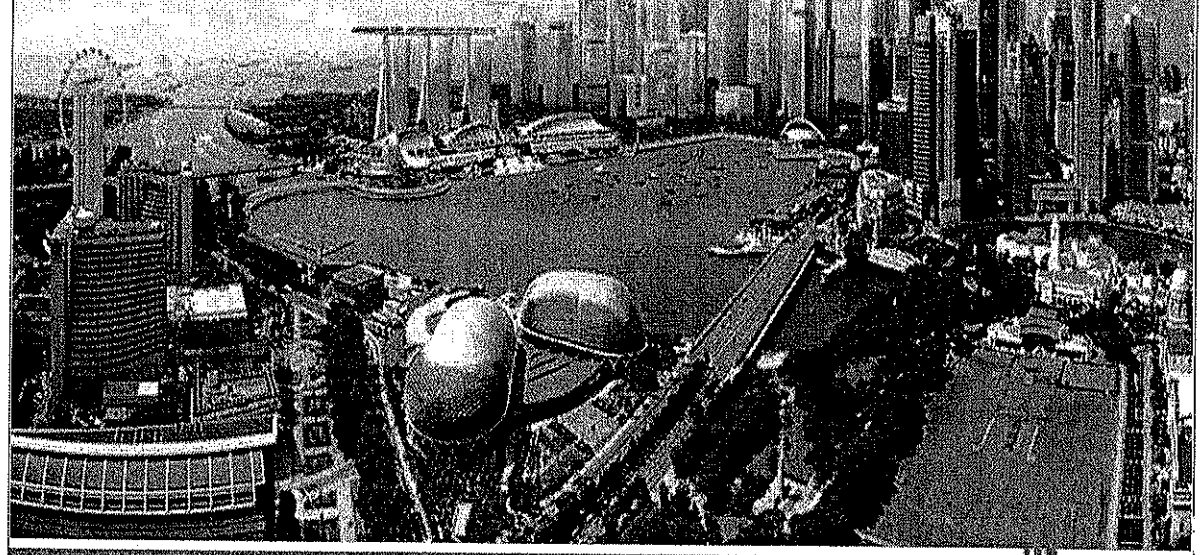






http://www.bca.gov.sg/GreenMark/green_mark_buildings.html

Regulatory Measures to Raise Environmental Sustainability Standards for Existing Buildings



Amendments to Building Control Act (Environmental Sustainability Measures for Existing Buildings) Regulations 2013

- (1) Minimum Environmental Sustainability Standard for Prescribed Buildings
- (2) Periodic Energy Audits of Building Cooling System
- (3) Annual Submission of Building Info & Energy Consumption Data

(1) Minimum Environmental Sustainability Standard for Prescribed Buildings

Owners of Existing Buildings are required to meet the minimum environmental sustainability standard (i.e. a Green Mark score of 50 points under GM ENRB version 3) when they install or replace their building cooling system.

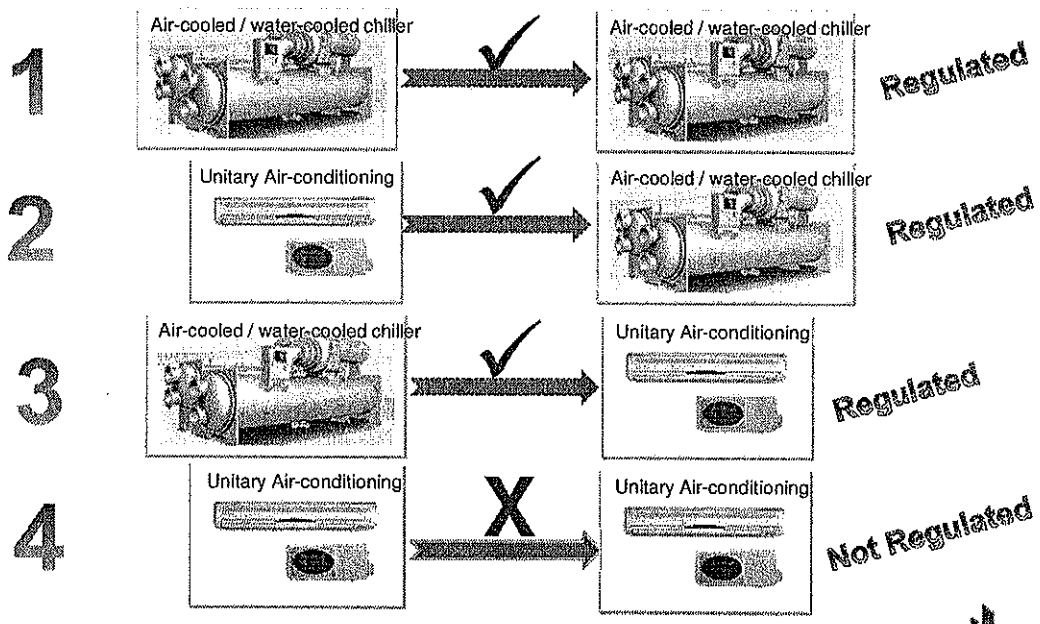
Prescribed buildings or buildings affected are :-

- Any hotel, retail or office building with GFA > 15,000m^2
- including mixed developments whose GFA of the commercial components, i.e. office, hotel, retail, is 15,000m^2 or more

Implementation date is from 2nd January 2014 onwards.

(1) Minimum Environmental Sustainability Standard for Prescribed Buildings

Prescribed Cooling System refers to central chiller plant i.e. (*a*) water-cooled chiller & (*b*) air-cooled chiller.



(1) Minimum Environmental Sustainability Standard for Prescribed Buildings

Planning / Design Stage

- Owner engages a **PE (Mech)**
- PE (Mech) looks into the overall building design and ensures that the building can achieve **at least Green Mark 50 points**.
- Owner / PE(Mech) to submit the Green Mark design score, retrofitted design, drawings, computations **for approval before commencement of energy improvement works. An application fee is required upon submission.**

Installation Stage

- Owner must complete the **energy improvement works within three years** from the date of approval of the design score by BCA.

As-built Stage

- PE(Mech) to assess and declare Green Mark as-built score meets the min Green Mark standards **(at least 50 points)**
- Owner to submit the Green Mark as-built score (including commissioning of the cooling system via submission of energy audit report).

(1) Minimum Environmental Sustainability Standard for Prescribed Buildings

Penalties for building owners / PE (Mech) who proceeds with the installation or replacements of the air-conditioning system without complying with the Regulations' requirements :

Building Owner

- Fine not exceeding **$100,000**
- Continuing offence: A further fine not exceeding **$1,000** for every day after conviction

PE (Mech)

- Fine not exceeding **$10,000**

(2) Periodic Energy Audit of Building Cooling System

- 3-yearly energy audit to ensure cooling systems continue to operate efficiently throughout its life cycle.
- Buildings which are required to comply with this legislative requirements are :-

EXISTING BUILDINGS

Existing buildings which have undergone chiller plant retrofitting on or after 2nd Jan 2014; and are required to comply with the minimum Green Mark standard for Existing Buildings (GM ENRB Version 3).

NEW BUILDINGS

New hotels, retail and office buildings with centralised chilled water cooling system which are required to comply with the enhanced Green Mark standards for New Buildings implemented on 1 December 2010 (GM NRB Version 4).

More details on Code on periodic Energy Audits :
http://www.bca.gov.sg/EnvSusLegislation/others/Code_Periodic_Energy_Audit_Bldg_Cool_Sys.pdf

(2) Periodic Energy Audit of Building Cooling System

For EXISTING Buildings, BCA will serve Notice to the building owner to carry out energy audit.

WHEN ? :
- 3 years after date of approved as-built score; and
- 3 years after date of last served notice thereafter

Building owner engages PE(Mech) or Energy Auditor to carry out energy audit and comply with requirements.

Building owner to submit complying energy audit results to BCA by deadline stipulated in Notice.

NOTICE

Existing Buildings

(2) Periodic Energy Audit of Building Cooling System

For NEW Buildings, BCA will serve Notice to the building owner to carry out energy audit.

WHEN ? :
- **any time after TOP or CSC, whichever is earlier; and**
- **3 years after date of last served notice thereafter**

NOTICE

NEW Buildings

Building owner engages PE(Mech) or Energy Auditor to carry out energy audit and comply with requirements.

Building owner to submit complying energy audit results to BCA by deadline stipulated in Notice.

(2) Periodic Energy Audit of Building Cooling System

Building Owner
(for failing to comply with Notice)

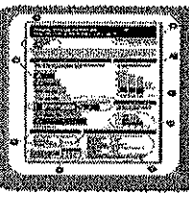
- Fine not exceeding **$20,000**
- For continuing offence, a further fine not exceeding **$500 for every day** after conviction

PE (Mech)
(for failing to conduct audit in accordance with Code)

- Fine not exceeding **$10,000**

(3) Annual Submission of Building Info and Energy Consumption Data

For the purpose of monitoring the energy efficiency and environmental sustainability of any building, building owners are required to submit their building information and energy consumption data annually to BCA.



Submission of electricity consumption data

- Information obtained primarily from **utility suppliers**



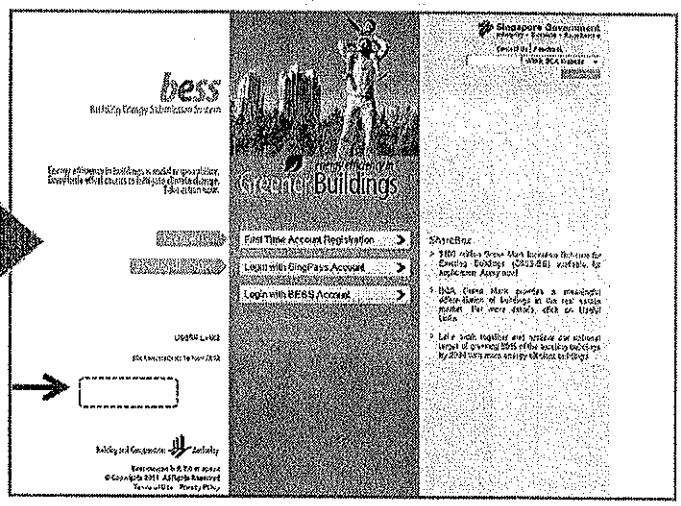
Submission of building information

- Information obtained from **building owners** e.g. tenancy composition, air-conditioning system and lighting system
- Conducted in phases starting with **office, hotel and retail buildings**
- About **1,000** buildings involved in **Phase 1**

(3) Annual Submission of Building Info and Energy Consumption Data

Building owners can enter their information through BCA's new Building Energy Submission System (BESS) using the BESS ID or SingPass.

Submit to BCA through ***Building Energy Submission System*** (BESS)

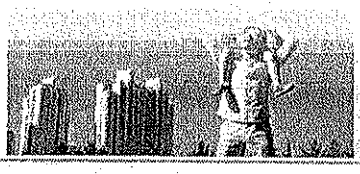


Useful links

- ✓ user submission manual
- ✓ technical guide
- ✓ demo-video

BESS URL: https://www.bca-bess.gov.sg

bess
Building Energy Submission System



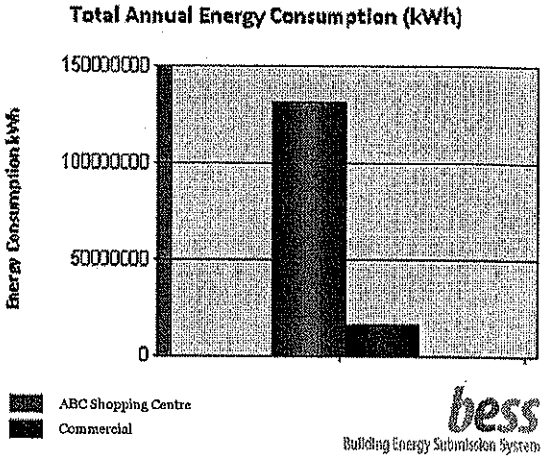
ABC Shopping Centre

Total Annual Energy Consumption Comparison

The building has a gross floor area (GFA) of **98000** sqm.

The building's total electricity consumption is **131628498.00** kwh, or **1343.15** kwh/ sqm.

The bar chart illustrates the building's annual total electricity consumption as compared to similar building activity type.



bess
Building Energy Submission System

Building and Construction Authority

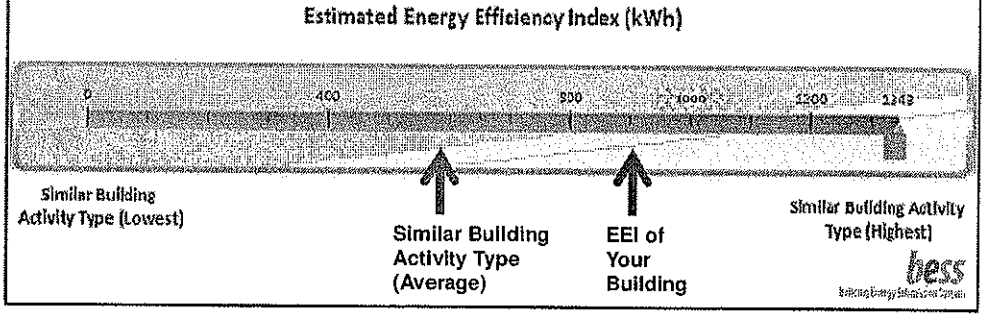
(3) Annual Submission of Building Info and Energy Consumption Data

Estimated Energy Efficiency Index

The building has a gross floor area (GFA) of **98000** sqm and its estimated EEI is **1000**
The energy efficiency index is a general efficiency indicator of the building's electricity usage level.

The indicator bar below shows the building's estimated **energy efficiency index* (EEI)** as compared to similar building activity type.

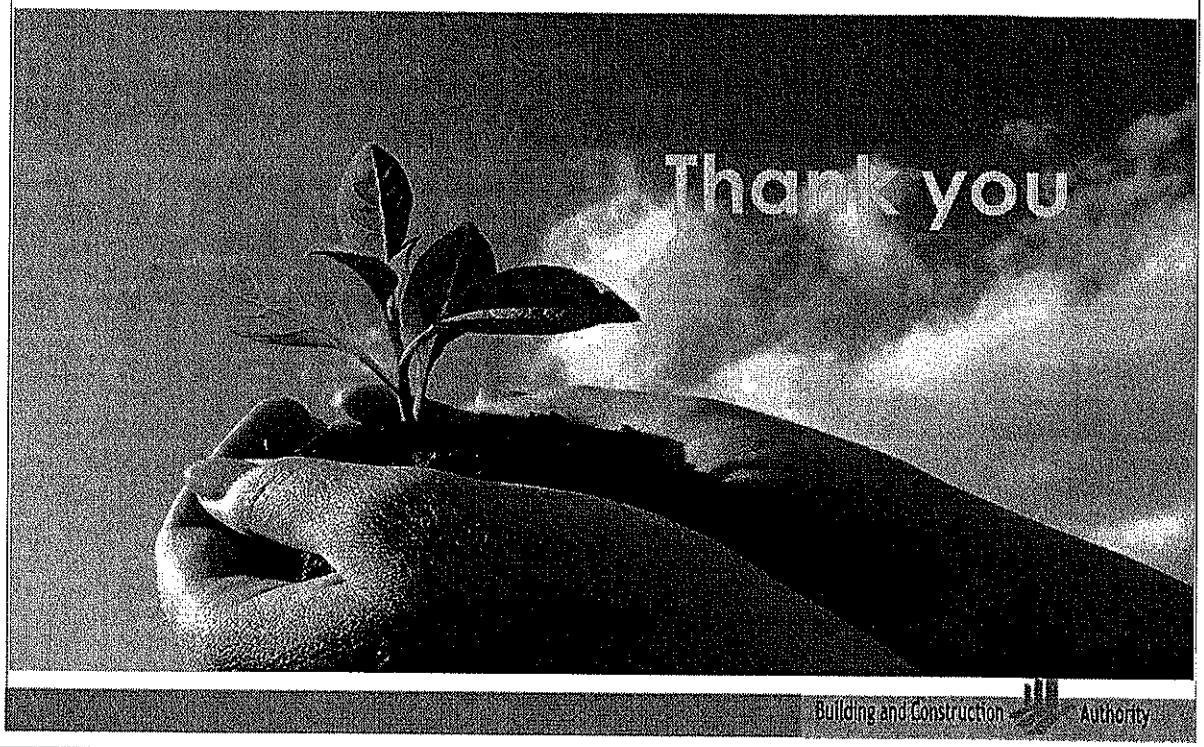
*EEI = Total Electricity Consumption/ GFA



bess

Building and Construction Authority

For further details on the legislation for Existing Buildings, refer to this link :
http://www.bca.gov.sg/EnvSusLegislation/Existing_Building_Legislation.html



Certification Course for
GREEN MARK FOR FACILITIES MANAGER (GMFM)

INCENTIVES & FINANCING SCHEMES FOR EXISTING BUILDINGS

Incentive & Financing Schemes

GMIS-EBP — Green Mark Incentive Scheme for Existing Buildings & Premises (GMIS-EBP)

HEALTH CHECK — Energy Audit for Chiller Plant

BREEF — Building Retrofit Energy Efficiency Financing (BREEF) Scheme

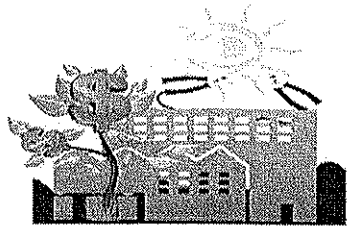
We shape a safe, high quality, sustainable and friendly built environment.

$50 million Green Mark Incentive Scheme for Existing Buildings & Premises

What is GMIS-EBP?

The S$50 million GMIS-EBP is an incentive scheme aimed to encourage and incentivise building owners, occupants and tenants to undertake and adopt energy efficiency improvements and measures within their buildings and premises.

The GMIS-EBP scheme will be effective since 3rd October 2014 till 30 April 2019 or when the GMIS-EB fund is fully disbursed, whichever earlier.

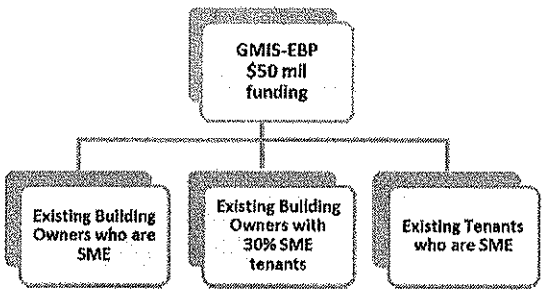


Eligible Buildings and Premises Category

- Buildings shall be existing private commercial development such as hotel, office building and retail building. Industrial buildings and residential buildings are not eligible.
- Tenanted premises shall be office, retail, restaurant and supermarket within the existing private commercial development such as hotel, office building and retail building.

The application must be lodged before the start of the energy-related retrofitting works.

$50 million Green Mark Incentive Scheme for Existing Buildings & Premises



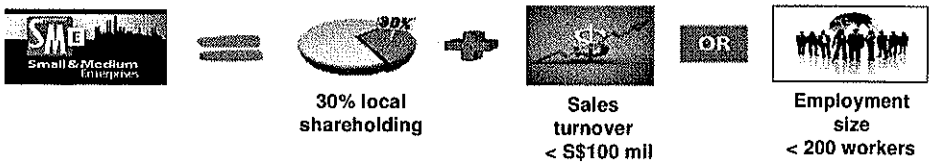
Who can apply?

The incentive applies to the following groups:

- Existing Small & Medium Enterprise (SME) building owners.
- Existing building owners with at least 30% (by numbers) of its tenants who are SMEs.
- Existing SME tenants.

Definition of Small & Medium Enterprise (SME)

- Companies with minimum 30% local shareholding; AND
- Company's Group annual sales turnover not more than S$100 million; OR
- Company's Group employment size not more than 200 workerS



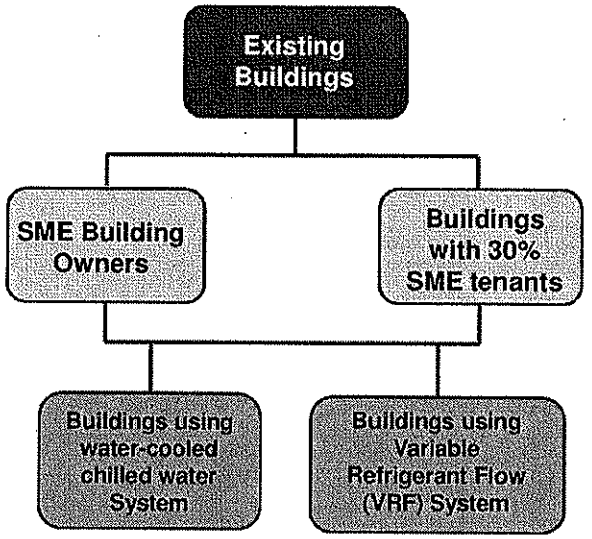
30% local shareholding

Sales turnover < S$100 mil

Employment size < 200 workers

We shape a safe, high quality, sustainable and friendly built environment.

GMIS-EBP INCENTIVE SCHEME - Buildings



For these building owners, they shall either engage their SME tenants by:-

- carrying out Energy Improvement Works in each unit of at least 30% of the SME tenants in the building; OR
- applying Green Mark certification through Green Mark Portfolio Programme.

BCA GREEN MARK

Green Mark for Existing Non-Residential Buildings (Version 3)

GMIS-EBP INCENTIVE SCHEME - Buildings

For buildings using **water-cooled chilled water system**

Green Mark Requirement		Air-con System Efficiency (kW/RT)	Co-funding Rate	Cap Amount
Gold or better	+	0.7 or better	35%	$1,500,000
Gold^{plus} or better		0.65 or better	40%	$2,250,000
Platinum		0.6 or better	50%	$3,000,000

For buildings using **Variable Refrigerant Flow (VRF) System**

Green Mark Requirement		System Efficiency for VRF (kW/RT)^	Co-funding Rate	Cap Amount
Gold or better	+	0.9 or better	35%	$500,000
Gold^{plus} or better		0.85 or better	40%	$600,000
Platinum		0.75	50%	$700,000

Additional eligibility criteria for VRF System :
(1) GFA ≤ 8,000 m2
(2) Achieve minimum 10% energy savings for Total Building Energy Consumption

We shape a safe, high quality, sustainable and friendly built environment.

GMIS-EBP INCENTIVE SCHEME

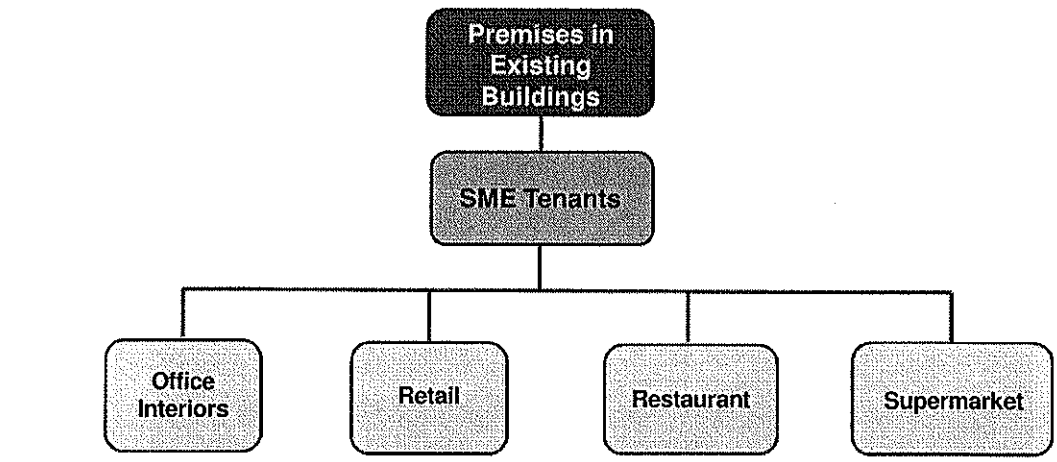
LIST OF COMMONLY APPROVED ENERGY EFFICIENCY EQUIPMENT & ENERGY IMPROVEMENT WORKS FOR BUILDINGS

1	Variable Speed Drives (VSD)
2	Chillers
3	Chilled Water Pumps
4	Condenser Water Pumps
5	Cooling Towers
6	Chiller Plant Energy Optimization System
7	Chiller Auto Condenser Tube Cleaning System
8	Building Automation System (BAS)
9	Energy Efficient Lightings, e.g. T5 & PLC
10	Lighting Control System
11	Light Emitting Diodes (LED) Lightings
12	Efficient Air Handling Units and Fan Coil Units (to show minimum 10% improvement

13	CO2 Sensors for AHU System
14	CO Sensors for Carpark Ventilation Control System
15	Photo Sensors
16	Motion Sensors
17	Heat Pumps
18	Regenerative drives for lifts
19	Motion sensors for escalators
20	Solar panels or other renewable energy sources
21	Permanent Measuring and Verification instrumentations
22	Variable Refrigerant Flow system or equivalent system
23	Consultancy fees related to Energy Improvement Works
24	Piping and electrical cablings related to the Energy Improvement Works.

Note: Any other equipment not in the above common list will be subjected to review and approval from BCA.

GMIS-EBP INCENTIVE SCHEME - Premises



GMIS-EBP INCENTIVE SCHEME - Premises

For Office tenants

Green Mark Requirement		EEI (kWh/m2/yr)	Proposed Lighting power budget (W/m2)	Co-funding Rate	Cap Amount
Certified & Gold	+	No requisite	10 or lower	40%	$15,000
Gold^{plus} or better		75 or lower	9 or lower	50%	$20,000

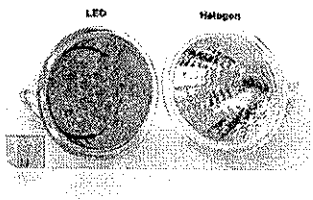
For other types of tenants (retail, restaurant or supermarket)

Green Mark Requirement		Lighting Power Budget (W/m2)		Co-funding Rate	Cap Amount
		Retail & Supermarket	Restaurant		
Certified & Gold	+	25 or lower	15 or lower	40%	$10,000
Gold^{plus} or better		23 or lower	13 or lower	50%	$15,000

*Additional eligibility criteria for other types of tenants (retail, restaurant or supermarket) i.e. **Applicants shall install sub-metering for lightings and receptacle load.**

GMIS-EBP INCENTIVE SCHEME

LIST OF COMMONLY APPROVED ENERGY EFFICIENCY EQUIPMENT & ENERGY IMPROVEMENT WORKS FOR PREMISES



1) Energy Efficient Lightings, e.g. T5
2) Lighting Control System
3) Light Emitting Diodes (LED) Lightings
4) Photo Sensors linked to lightings
5) Motion Sensors linked to lightings
6) Solar panels or other renewable energy sources
7) Sub-metering to monitor electricity use of different services for lighting and receptacle loads
8) Consultancy fees for Green Mark certification, Licensed Electrical Worker (LEW) and Indoor Air Quality (IAQ)

Note: Any other equipment not in the above common list will be subjected to review and approval from BCA.

GMIS-EBP INCENTIVE SCHEME

Disbursement of incentives

For **building owners**, the incentive would be disbursed over 3 stages:

- The ***1st disbursement*** is for the reimbursement of the professional services and will be given out *upon applicant's acceptance of the Letter of Offer for this scheme and upon Green Mark certification.*
- The ***2nd disbursement*** is 50% of the approved co-funding amount minus the 1st disbursement and will be given out *upon completion of the energy improvement works and verification of the air-conditioning system efficiency.*
- The ***final disbursement*** will be the remaining 50% of the approved co-funding minus the 1st and 2nd disbursements and will be given out *one year after the date of completion of the energy improvement works and upon verification of the air-conditioning system efficiency achieved.*

For **tenants**, the incentive would be disbursed *after the completion of the energy improvement works and upon Green Mark certification and verification.*

HEALTH CHECK SCHEME

- Aims to help building owners to understand their central air-conditioning plant system efficiency & apply for Green Mark certification.
- Audit on the central chilled water plant only.
- Eligibility
  - existing buildings with GFA of at least 2000 m2,
  - has a central air-conditioning plant &
  - have not conducted any energy audit in the last 12 months prior to Green Mark application.
- The subsidized rate or subsidy, shall be based on the no. of chilled & condenser water pipe headers and electrical power supply to the chiller plant equipment.
- Application for Health Check is together with application for Green Mark certification.

HEALTH CHECK SCHEME

- BCA appointed Term Contractor (TC) will perform this Health Check audit. Alternatively, audit can also be done by owner own Energy Auditor or M&E PE, but the co-fund will be based on the subsidized rate.
- If Owner chooses to use BCA's TC to carry out the Health Check, he shall pay upfront to BCA the subsidized rate before the audit.
- If Owner chooses to engage his own Energy Auditor or M&E PE to carry out the Health Check, he may claim the subsidy amount, after the Health Check is completed and the audit report has been submitted to & approved by BCA.

HEALTH CHECK SCHEME

Subsidized Amount

Number of chilled water pipe headers / branches	Subsidized Amount (SGD)
One (1)	$ 4,000
Two (2)	$ 4,500
Three (3)	$ 5,000
Four (4)	$ 5,500
Five (5)	$ 6,000
Six (6)	$ 6,500

- "One (1)" refers to 1 chilled water pipe header, 1 condenser water pipe header and 3 chillers.
- "Two (2)" refers to 2 chilled water pipe headers, 1 condenser water pipe header and 3 chillers.
- For different combinations, the above amount will be adjusted in accordance to unit rates.

Building Retrofit Energy Efficiency Financing Scheme (BREEF)

Aim

- Help building owners with the upfront capital required for Energy Efficiency (EE) retrofits.

Eligible Applicants

- Residential and Non-Residential MCSTs, building owners, accredited ESCOs/ EPC firms and Special Purpose Vehicles (SPV).

Loan Condition

- Existing residential or non residential buildings and commit to achieve minimum GM Certified rating (GM ENRB V3/ GM ERB V1) .
- Maintain GM certified rating for period of loan tenure.

Building Retrofit Energy Efficiency Financing Scheme (BREEF)

BREEF Scheme Details

- 8 years — Max Loan Tenure
- S$ 5 million — Max Loan Quantum
- Please contact participating FIs for rates. — Interest Rate

Participating FI: DBS, ORIX, Standard Chartered, UOB

- Email: zhang_xiuting @bca.gov.sg — Contact Person

We shape a safe, high quality, sustainable and friendly built environment.

BREEF Scheme vs. GMIS-EBP

Schemes for Existing Building Sector

Key features:
- Not mutually exclusive.
- May apply for both schemes if criteria are met.

Incentive (GMIS-EBP)	Loan (BREEF)
Target applicant: Building owners & Tenants who are SMEs and building owners who have 30% of it's tenants who are SMEs.	**Target applicant**: Building owners/ MCSTs/ ESCOs/ EPC firms/ SPV
Purpose: Encourage EE retrofits to achieve improved energy performance & GM certification	**Purpose**: Help with upfront capital for EE retrofit to achieve minimum GM certified level
Capital disbursement: 3 tranches for building owner's scheme and upon completion of EE works for tenant's scheme	**Capital disbursement**: After GM certification is obtained.

