Development Policy, Building Regulation and a Sustainable Built Environment

A Singapore Perspective

by

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Commissioner of Building Control, Singapore
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Presentation Outline

Singapore’s Challenges

MasterPlan to Green Our Buildings

Going forward – Greening Existing Buildings, Sustainable Construction & Rising Sea Level
Singapore’s Challenges . . . . .

- Island city-state
- No natural resources
- Small & densely populated
- 5 million people within 700 sq km
80% of Buildings in Singapore to attain at least BCA Green Mark Certified rating by 2030

35% improvement in Overall Energy Efficiency by 2030 from 2005 levels
BCA’s Green Building Master Plan

Incentives
Encourage

Enable
Training Framework

Regulatory
Enforce

Engage
Consumer and Industry Education

BCA GREEN BUILDING MASTERPLAN

Building and Construction Authority
We shape a safe, high quality, sustainable and friendly built environment.
Energy consumption in Singapore buildings

**Fuel Consumption in Singapore (2005)**
- 51% Power Generation
- 31.7% Industry
- 15.8% Transport
- 0.9% Buildings
- 0.6% Households

**End-use Electricity Consumption in Singapore (2005)**
- 3% Others
- 43% Industry
- 31% Buildings
- 18% Households
- 5% Transport
BCA Green Mark Scheme

Launched in 2005

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

Estimated Energy Savings

- 10% to 15%
- 15% to 25%
- > 25%
- > 30%
$20 million Green Mark Incentive Scheme for NEW Buildings

Extra nudge for private developers & consultants to achieve the higher Green Mark ratings:

- Gold ($3 per m² GFA)
- GoldPlus ($5 per m² GFA)
- Platinum ($6 per m² GFA)

**Cap:**
- $3 million in cash for developer
- $100,000 in cash for architects & M&E consultants

Introduced in Dec 2006; fully committed by mid-2010
## $100 million Green Mark Incentive Scheme for EXISTING Buildings

<table>
<thead>
<tr>
<th>Green Mark Requirement</th>
<th>Aircon System Efficiency (kW/ton)</th>
<th>Energy Savings</th>
<th>Co-funding Rate (of equipment cost)</th>
<th>Cap (S$)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gold (Certified)</strong></td>
<td>0.7</td>
<td>15% (20%)</td>
<td>20%</td>
<td>$150,000</td>
</tr>
<tr>
<td><strong>Gold Plus</strong></td>
<td>0.65</td>
<td>30%</td>
<td>35%</td>
<td>$500,000</td>
</tr>
<tr>
<td><strong>Platinum</strong></td>
<td>0.6</td>
<td>35%</td>
<td>40%</td>
<td>$1,500,000</td>
</tr>
</tbody>
</table>

**GMIS-EB Qualifying Criteria**

- **Option 1**: Based on total building consumption
- **Option 2**: Based on landlord’s consumption
Green Mark Incentive Schemes

Green Mark Additional Gross Floor Area (GFA) Incentive Scheme for ALL Buildings

- New private developments
- Major A&A to existing buildings

Green Mark Platinum
- Up 2% additional GFA beyond MP GPR
- (subject to cap of 5,000sqm)

Green Mark GoldPlus
- Up 1% additional GFA beyond MP GPR
- (subject to cap of 2,500sqm)

<table>
<thead>
<tr>
<th>Green Premium</th>
<th>GM Platinum</th>
<th>GM GoldPlus</th>
</tr>
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<tbody>
<tr>
<td>Non-Residential</td>
<td>$182 / sqm</td>
<td>$92 / sqm</td>
</tr>
<tr>
<td>Residential</td>
<td>$123 / sqm</td>
<td>$92 / sqm</td>
</tr>
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</table>

GM GFA = Total Permissible GFA x Green Premium Land Value
$50 million MND Research Fund for the Built Environment

To intensify and encourage R&D so as to make the mass application of green building technologies more viable and cost-effective.
To train 18,000 to 20,000 green specialists within the next 10 yrs
Enable . . . . .
Training Framework

Zero-Energy building

Retrofitting an existing building ...

ZEB@ BCA Academy
A vibrant centre to showcase, test and train in GBT
Public Sector taking the lead

- New public sector buildings to achieve Green Mark Platinum rating
- Land sales condition in key growth areas to achieve higher Green Mark ratings
- Existing public sector buildings to achieve Green Mark GoldPlus rating by 2020
Engage......
Consumer and Industry Education

Raising Awareness

- Advertisements on Bus, MRT
- Roadshows
- Consumers’ Video Clip
- “Let’s Build A Green Future” Exhibition
- Advertisements on Newspaper
- Green Competitions in School

www.greenmark.sg
• Publicising the Business Case for Green Buildings

<table>
<thead>
<tr>
<th>BCA Green Mark Rating</th>
<th>Green Cost Premium (%)</th>
<th>Payback Period (years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Platinum</td>
<td>2% to 8%</td>
<td>2 yrs to 8 yrs</td>
</tr>
<tr>
<td>Gold Plus</td>
<td>1% to 3%</td>
<td>2 yrs to 6 yrs</td>
</tr>
<tr>
<td>Gold</td>
<td>1% to 2%</td>
<td>2 yrs to 6 yrs</td>
</tr>
<tr>
<td>Certified</td>
<td>0.3% to 1%</td>
<td>2 yrs to 5 yrs</td>
</tr>
</tbody>
</table>
Minimum Green Mark Certified from 15 April 2008
- all new developments or additions (with GFA ≥ 2,000 m²)
- existing buildings undergoing major retrofitting works (with GFA ≥ 2,000 m²)

Estimated improvement in energy efficiency by at least 18% compared to 2005 standard

<table>
<thead>
<tr>
<th>Green Mark Rating</th>
<th>Green Mark Points</th>
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<tbody>
<tr>
<td>Platinum</td>
<td>90 &amp; above</td>
</tr>
<tr>
<td>GoldPlus</td>
<td>85 to &lt;90</td>
</tr>
<tr>
<td>Gold</td>
<td>75 to &lt;85</td>
</tr>
<tr>
<td>Certified</td>
<td>50 to &lt;75</td>
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</table>
From 5 May 2010, mandatory higher Green Mark ratings for new buildings on Govt land sales sites in new growth areas.
Raising the bar of Green Mark rating for new buildings as from 1 Dec 2010

% Improvement in energy efficiency

- Platinum Level
- GoldPlus Level
- Gold Level
- Green Mark 50 points (28%)

+10%

2005 Standard New Standard in December 2010

Continuous improvements
Addressing Energy Consumption in Existing Buildings

IMCSD’s Target for our Built Environment . . . .

90% of our building stock are existing buildings

80% of Buildings ‘GREEN’ by 2030

Today - 8% Green
Energy Efficiency of Existing Building Stock

Large existing building stock: 210 mil sqm

49% of national electricity consumption (including households)
Estimated Composition of Building Sector by Floor Area

- Private Housing: 12.1%
- Offices, Retail Malls, Hospitals, Hotels (Public & Private): 7.6%
- Factory & Warehouse: 17.9%
- Govt buildings (non-commercial) & Schools: 7.3%
- Others: 2.2%

Public Housing: 52.9%
Typical Energy Use Profile

**Retail Malls**
- Aircon Systems (30 – 40%)
- Tenants (40 – 50%)
- Lighting (10 – 15%)
- Others (5 – 10%)

**Office Buildings**
- Lighting (24.9%)
- AirCon (48.4%)
- MV (6.1%)
- Lift (7.7%)
- Others (13.0%)
Submission of annual energy consumption data

Retrofitting buildings to meet a prescribed minimum Green Mark Standard, such as a minimum building design energy efficiency standard

Periodic auditing of building’s central cooling systems
Sustainable Construction

Life-Cycle of Built Environment

- Raw Materials Extraction
- Production
- Design & Construction
- Operation
- Maintenance & Retrofitting
- Disposal
- Demolition
- Recycle/Reuse

Green Buildings

Building and Construction Authority
We shape a safe, high quality, sustainable and friendly built environment.
Sustainable Construction Masterplan

**Efficient Design to Optimize Use of Natural Materials**
- Government Take The Lead
- Encourage Private Sector
- Build Industry Capabilities
- Raise Awareness
- Legislate Minimum Standard

**Environmentally-friendly materials to reduce carbon footprint**

**Recycling and Use of Recycled Materials**
Climate Change: Sea level Rise

- IPCC’s projection: global sea-level rise up to 59cm by 2100

- In 2008, BCA formed a new department to look into the impact of rising sea-level to Singapore, study the mitigating measures available, and introduce regulations to control coastal developments

- A Risk Map Study will be carried out to identify the coastal areas at risk of inundation
Sustainable Development – ‘The Singapore Way’

The Winners of the 2010 Aspen Institute Energy and Environment Awards

GOVERNMENT

Singapore, Building and Construction Authority

For development of significant new policies to enhance the sustainability of the built environment.

The Singapore Building and Construction Authority has focused its sustainable development efforts on two key components: (I) Green Buildings and (II) Sustainable Construction. Together, these two components make up the entire life-cycle of the built environment. To change the status quo, the Building and Construction Authority has formulated two master plans which provide innovative solutions and guidance to the building and construction industry to address concerns of climate change and the environment.

- Asia’s most competitive economy
  (World Economic Forum)
- Asia’s no 1 place to live, work and play
  (Mercer Consulting)
- Top 20 vibrant cities
  (Hub Culture Zeitgeist Cities Ranking)
We shape a safe, high quality, sustainable and friendly built environment.