Proposed Legislative Framework on Environmental Sustainability for Buildings

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

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Agenda

1. Background
2. Proposed Legislative Framework
3. Responsibilities of QP & Practitioners
3. Administrative Procedures
BCA Green Mark is a voluntary scheme

Launched in Jan 2005

Background

BCA Green Mark is a green building rating system to evaluate building for its environmental impact and performance

Launched in Jan 2005
Promotes Awareness of Environmental Impact of Buildings

- Energy
- Water
- Materials/Land
- Indoor Environment
- Quality

Buildings can be GREEN
Efficient Use, Environmental Friendly

Other Objectives:

- Recognise 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
Key Initiatives

- **BCA Master Plan on Green Building Technologies**
  - $20 mil Incentive GMIS
    - Dec 06
  - $50 mil MND Research Fund
    - Jan 07
  - Public Sector Green Mark Certified
    - Apr 07
  - Legislation Environmental Sustainability
    - Apr 08

Current Legislative Framework

- Building Control (BC) Act
  - Building Control Regulations
  - Building Control (Accredited Checkers) Regulations
  - Building Control (Buildable Design) Regulations
  - Building Control (Inspection of Building) Regulations
  - Building Control (Temp Bldgs) and (Outdoor Advertising) Regulations
  - Approved Document – Energy Efficiency/ Lighting and Ventilation

Only new building works need to comply with energy efficiency requirement under Approved Document

**2 Key Requirements**

- ETTV and RTTV = 50 W/m²
- Air-Conditioning Equipment and lighting – newly revised code SS530 together with other requirements such as electrical sub metering etc

Note:
ETTV - Envelope Thermal Transfer Value
RTTV - Roof Thermal Transfer Value

Only if Air-Conditioned Space > 500 m²
**Current Situation - Energy Consumption**

- **Air-Conditioned Buildings**: 30% of energy use
- **Non Air-Conditioned Buildings** including residential, school, industrial buildings: 70% of energy use

**Current Regulatory Requirement**

- **Current Legislative Framework**
  - Building Control (BC) Act
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  **2 Key Requirements**
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**Note:**
- SS 530 – Code of Practice for Energy Efficiency Standard for Building Services and Equipment

- Only if Air-Conditioned Space > 500 m²
Enabling Provision under the Building Control Act

Section 49 (a)(2)(e)(viii)

“Environmental sustainability measures that improve the total quality of life and minimises adverse effects to the environment, both now and in the future;”

Building Control (Amendment) Bill was passed by Parliament on 20 Sep 2007

Proposed Legislative Framework

Objective

- To establish a **minimum environmental sustainability standard** in the planning, design, construction and operation of building projects, to mitigate the environmental impacts of built structures
Proposed Legislative Framework

What is the minimum environmental sustainability standard?

- A minimum energy standard that yields about 10% - 15% energy saving over our revised Energy Efficiency Standard SS 530 and
- Other green requirements which enhance water efficiency, environmental protection, indoor air quality etc

Legislation using BCA Green Mark

BCA Green Mark can be an effective mean to appraise and set the optimum standard of environmental sustainability of a building

<table>
<thead>
<tr>
<th>Green Mark Rating</th>
<th>Green Mark Points</th>
</tr>
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<tbody>
<tr>
<td>Platinum</td>
<td>90 &amp; above</td>
</tr>
<tr>
<td>Gold Plus</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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</tbody>
</table>

Set minimum requirements for environmental sustainability – Green Mark Certified Level

Min 50 points
Scope of Legislation

The legislation will cover

- All new developments and existing buildings undergoing major retrofitting works with GFA of 2000 square metres or more

Major Retrofitting Works

- Works involving major overhauling of air-conditioning system and significant modification to building façade along with other building services

Scope of Legislation

Implementation Time Frame

- Requirement to be implemented from Apr 08 onwards (Note: Effective date was subsequently confirmed to be 15 Apr 2008)

- Effective date will be pegged with the 1st submission date to URA for Planning Permission
To meet Green Mark Score 50 points

Mandatory Requirements under Current BC Regulations
Building Envelope/ Roof / Air-Conditioning System/ Artificial Lighting/ Ventilation/ Luminance Level etc

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

Part 1 - Energy Efficiency
1-1 Building Envelope
1-2 Air-Conditioning System
1-3 Building Envelope – Design/ Thermal Parameters
1-4 Natural Ventilation
1-5 Artificial Lighting
1-6 Ventilation in Carparks
1-7 Ventilation in Common Areas
1-8 Lifts and Escalators
1-9 Energy Efficient Practices & Features
1-10 Renewable energy

Other Green Requirements Min 20 points
Elective Requirement from other areas Combination of the following items to meet 20 points)

Part 2 - Water Efficiency
Part 3 – Environmental Protection
Part 4 - Indoor Environmental Quality
Part 5 – Other Green Features

Criteria for Non-Residential Buildings

Minimum requirements
ETTV of 50W/m²

Additional requirements
About 10-15% Energy Saving

Green Mark Criteria
Linking Green Mark Points to Energy Efficiency

Breakdown of electricity usage in a typical office building

- Cooling: 60%
- Lighting: 15%
- Ventilation: 10%
- Lift and Escalator: 10%
- Others: 5%

**Improve Aircon system efficiency**
- by 5% → Reduce 3% energy → Award 10 points
- by 10% → Reduce 6% energy → Award 20 points

**Criteria for Residential Buildings**

To meet Green Mark Score

- 50 points

**Mandatory Requirements under Current BC Regulations**
- Building Envelope/ Roof/ Air-Conditioning System/ Artificial Lighting/ Ventilation/ Luminance Level etc

**Energy Related Requirements**
- Min 30 points

- Elective Requirement for Energy Improvement (Combination of the following items to meet 30 points)
  - Part 1 - Energy Efficiency
    - 1-1 Building Envelope- RETV
    - 1-2 Dwelling Units Indoor Comfort
    - 1-3 Natural Ventilation in Common Areas
    - 1-4 Lighting
    - 1-5 Ventilation in Carparks
    - 1-6 Lifts
    - 1-7 Energy Efficient Features
    - 1-8 Renewable/Clean energy

- RETV of 25 W/m²

- Other Green Requirements
  - Min 20 points

- Elective Requirement from other areas
  - Combination of the following items to meet 20 points
  - Part 2 - Water Efficiency
  - Part 3 – Environmental Protection
  - Part 4 - Indoor Environmental Quality
  - Part 5 – Other Green Features

**About 10-15% Energy Saving**
**Findings**

- Usage pattern is different from that of typical air-conditioned commercial building
- Modeling and simulation were carried out
- RETV (Residential Envelope Transmittance value)

\[
RET V = 3.4(1-WWR)U_w + 1.3(WWR)U_f + 58.6(WWR)(CF)(SC)
\]

Heat conduction \(_{\text{wall}}\) + Heat conduction \(_{\text{glass}}\) + Heat Retention \(_{\text{glass}}\)
Examples of Residential Buildings used for Case Studies - RETV

Proposed Cut Off RETV of 25W/m²
RETVD – Part of the Energy Efficiency Requirement under Approved Document

Applicable only for all new residential buildings with GFA of 2000m² or more

Only new building works need to comply with energy efficiency requirement under Approved Document

2 Key Requirements
- RETV = 50 W/m²
- Air-Conditioning Equipment and lighting – newly revised code SS530 together with other requirements such as electrical sub metering etc

Approved Document – Energy Efficiency/ Lighting and Ventilation

RETVD Requirements

- Submission and computation requirements similar to ETTV
- Refer to the new Code on Envelope Thermal Performance for Buildings and Revised Approved Document – Section I – Energy Efficiency

Deem to satisfy provision based on WWR and shading coefficient (SC)
Software Tools

AutoCAD Revit Architecture Suite

Collaboration with Autodesk and NUS in developing the ETTV/ RETV software

Collaboration with NUS to develop a design tool which can be used by engineers, architects and building services professionals to demonstrate compliance with prescriptive and energy performance standards relating residential development (RETV)

Introducing the Building Control (Environmental Sustainability) Regulation

Current Legislative Framework

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Proposed New Regulation to be incorporated under BC Act

- Building Control (Environmental Sustainability) Regulations 2008

Approved Document – Energy Efficiency, Lighting and Ventilation
New Building Control (Environmental Sustainability) Regulation

- Code will spell out the compliance method

Environmental Sustainability Code
- Statutory Requirement
- Submission Procedures
- Compliance Method

Applicable only for all new buildings and existing buildings undergoing major retrofitting works with GFA of 2000m² or more

Responsibilities of QP and Practitioners

Compliance to regulation based on Qualified Person’s and Practitioners’ Declaration

**QP’s Responsibility**

Who is responsible for the submission?

- **Architect**
  Overall-in-charge to ensure that the minimum environmental sustainability standard is achieved that is Green Mark Score of 50 points

- **M & E Engineer**
  To be responsible for their part of the design and the respective points allocated
**Definition of Practitioner**

Practitioner in relation to any building works means –

(a) The qualified person appointed to prepare building plans

(b) A professional engineer registered under the Professional Engineers Act in mechanical or electrical engineering

Currently …**Green Mark** Assessments are conducted as an independent third party certification

- Substantial completion of design stage
- Construction stage
- TOP stage
- Verification during TOP stage

**LEGISLATION**

Do not require Third Party Certification
**Compliance to Regulation**

- Based on Qualified Person’s and Practitioners’ Declaration

- Random audit and site checks prior or during TOP inspection to be carried out to ensure compliance

**Third party assessment by BCA will be conducted to award projects with Green Mark Gold Rating and above**
Submission using GM e-Filing and Corenet e-Submission

GM e-Filing will be made available at BCA Webpage

For QP(BP) only need to register once
Building Plan and As-Built Submission Stage

Appropriate Practitioner (Mechanical)
Submit his assigned score for the building works under his charge

Appropriate Practitioner (Electrical)

QP(BP)
Project Coordinators

Green Mark e-Filing System

System will auto-generate a GM e-Filing number
- To key in GM score
- To generate the GM forms and calculation

For BP Submission
Attach e-signed GM forms and calculation together with Corenet e-form for BP Application

For As-built Submission
Attach e-signed GM forms and as-built calculation and submit thru Corenet e-correspondences

AFTER GM e-filing
Green Mark e-Filing System

CORENET e-Submission System
Documentary Evidences

Documentary evidences to be maintained are as follows

For example:
- Tender specifications or equivalent
- Plan layouts and elevations showing the applicable areas, locations and types of green features
- Computation showing the relevant evidences in meeting the criteria

Submittal of documentary evidences may be required and shall be made in such manner and be in such form as the Commissioner of Building Control requires upon request.

In Summary...

- BC (Environmental Sustainability) Regulation will be in operation from 15 Apr 08 onwards
- Implementation date will be based on the 1st submission date to URA for planning approval
- It is applicable to new building developments and existing building undergoing major retrofitting with GFA of 2000 sq metres or more
In Summary…

- Requirements form part of building plan submission process and TOP clearance

- QP(BP) and appropriate practitioners are jointly responsible for this requirement

- Compliance method will be based on Green Mark Criteria

NO third party certification required

Conclusion

Legislation together with other Green Initiatives will help to accelerate Green Building Developments in Singapore
Together we can build a World Class Built Environment

Thank You

Questions and Answers
What happen if my project has both Residential and Non-Residential Buildings?

Treated as if it is separate building works

Use Criteria for Residential Buildings
To get Min GM score of 50 points

Use Criteria for Non-Residential Buildings
To get Min GM score of 50 points
If I only have a very small areas that are meant for non-residential use, do I need to submit for GM calculation using non-residential criteria?

- **Residential Buildings**
  - Use Criteria for Residential Buildings
  - To get Min GM score of 50 points
  - **NO NEED**
  - To submit the GM score for These non-Residential Buildings

- **Non-Residential Buildings**
  - < 2000 m²

What if my residential buildings is also less than 2000 m² but the total GFA (including non-residential buildings) is more than 2000 m²?

- **Residential Buildings**
  - < 2000 m²
  - Use Criteria for Residential Buildings
  - To get Min GM score of 50 points

- **Non-Residential Buildings**
  - < 2000 m²
  - It is still subject to legislation but only need to use the Criteria for the larger part of the building works, in this case the criteria for the residential buildings
  - **NO NEED**
  - To submit the GM score for These non-Residential Buildings

It is smaller in areas as compared with residential buildings