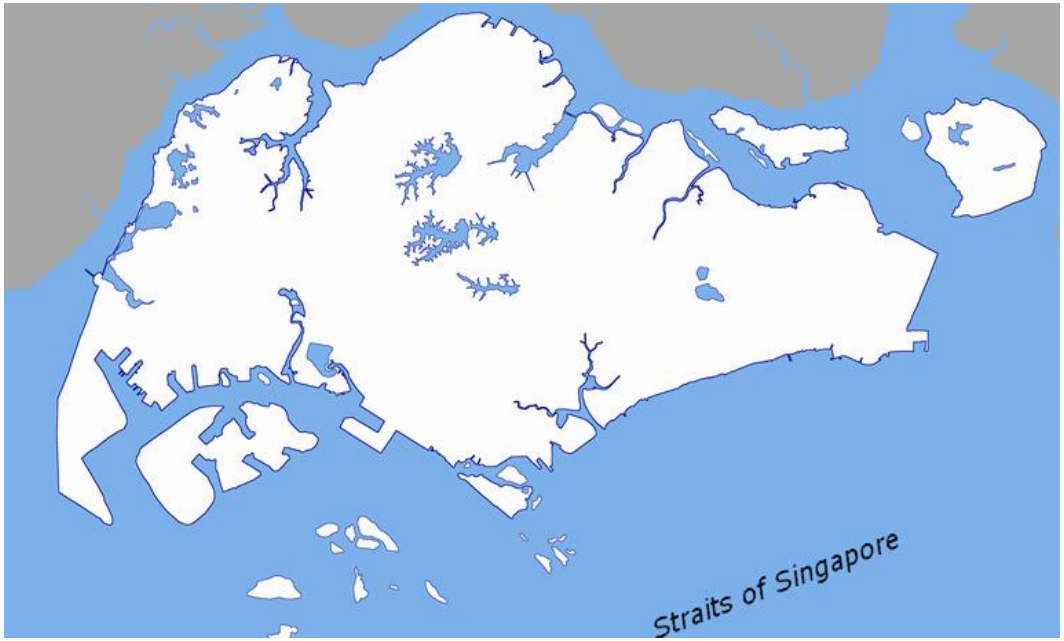
Today

Greening Singapore's Built Environment 80% by 2030

Ang Kian Seng – BCA, Singapore

ABOUT SINGAPORE

- 5 million in about 700 sq km
- 1 deg North; hot & humid climate all year round
- SE Asia; major transportation hub
- No natural resources



80% OF

BUILDINGS ‘GREEN’

2030

About BCA Green Mark Scheme

Launched BCA Green Mark in 2005 - a green building rating system to evaluate building for its environmental impact and performance

BCA GREEN MARK

2005

Green Mark	Try Again		Certified		Gold		Gold Plus		Platinum	
Score	0	49	50	74	75	84	85	89	90	100

Holistic Approach

BCA Green Building Masterplan

Government Taking the Lead

NEW Public sector buildings and existing buildings undergoing major retrofitting works with more than 5,000m^2 air-conditioned floor area to achieve Green Mark Platinum rating

New Buildings

Government Taking the Lead

Existing government buildings with more than 10,000m^2 air-conditioned floor area to achieve Green Mark Gold Plus standard by 2020

Picture courtesy

Existing Buildings

High Green Mark ratings for government land sales sites in new growth areas

New growth areas will achieve energy use reduction of <u>at least</u> 25%

New
Buildings

BCA Green Building Masterplan

Incentivising Private Sector

S$20 million

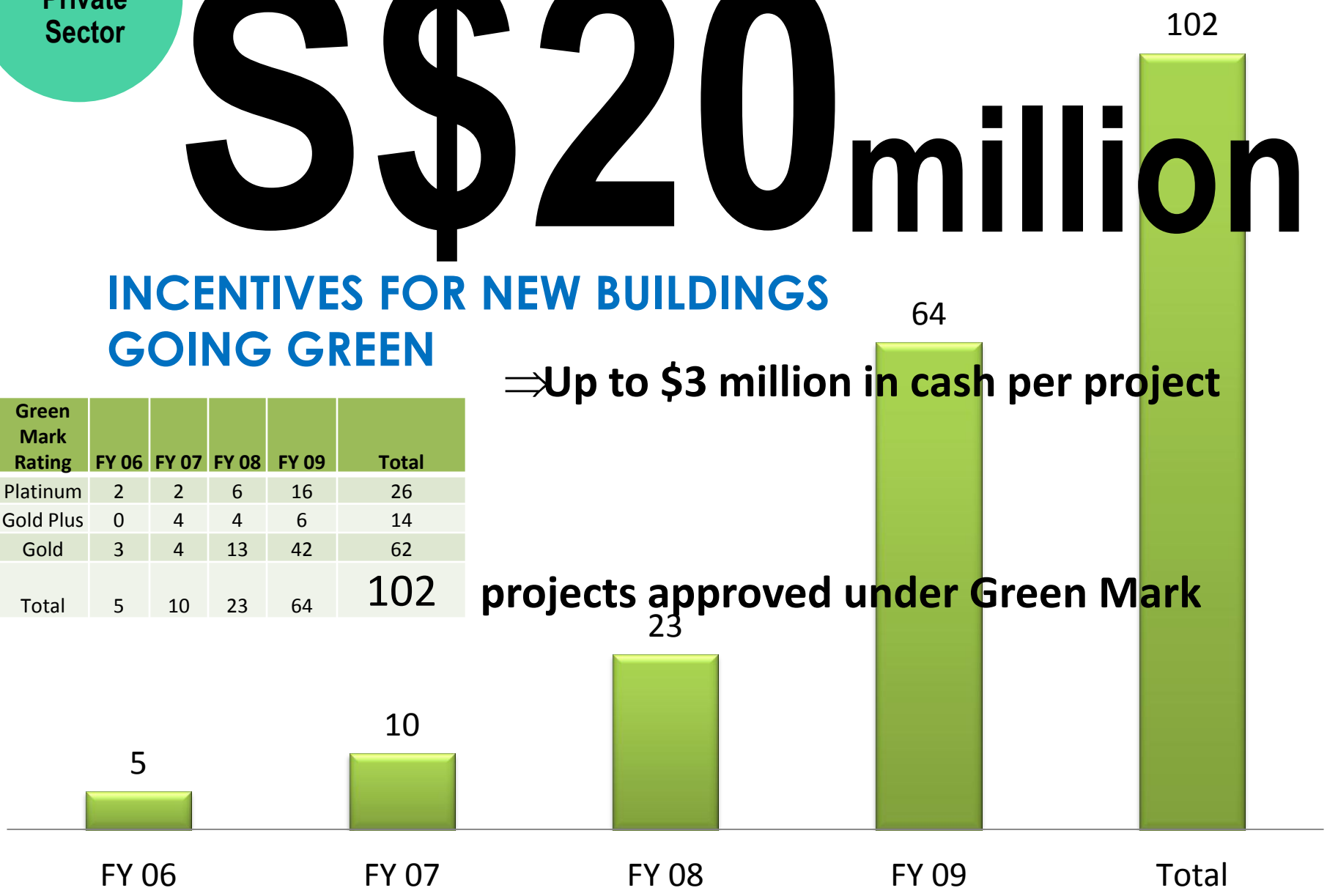
20 mil. GMIS FUND for NB IS FULLY COMMITTED

INCENTIVES FOR NEW BUILDINGS GOING GREEN

⇒**Up to $3 million in cash per project**

Green Mark Rating	FY 06	FY 07	FY 08	FY 09	Total
Platinum	2	2	6	16	26
Gold Plus	0	4	4	6	14
Gold	3	4	13	42	62
Total	5	10	23	64	102

projects approved under Green Mark



Green Mark Bonus GFA Incentive Scheme

for private sector to achieve higher Green Mark ratings

Building and Construction Authority

Urban Redevelopment Authority

Green Mark Platinum	• **Up to 2% additional GFA** beyond MP GPR • (subject to cap of 5,000sqm)
Green Mark Gold^{Plus}	• **Up to 1% additional GFA** beyond MP GPR • (subject to cap of 2,500sqm)

46 Applications received

Incentivising Private Sector

S$100 million

INCENTIVES FOR PRIVATE SECTOR TO RETROFIT TO IMPROVE ENERGY EFFICIENCY

(A) Co-fund cost of equipment for energy retrofits

- 13 applications given in principle approval, Co-funding amount = $3 million

(B) Health check' scheme – Energy audit of the A/C plants

- 8 applications given in principle approval, Co-funding amount = $47,000

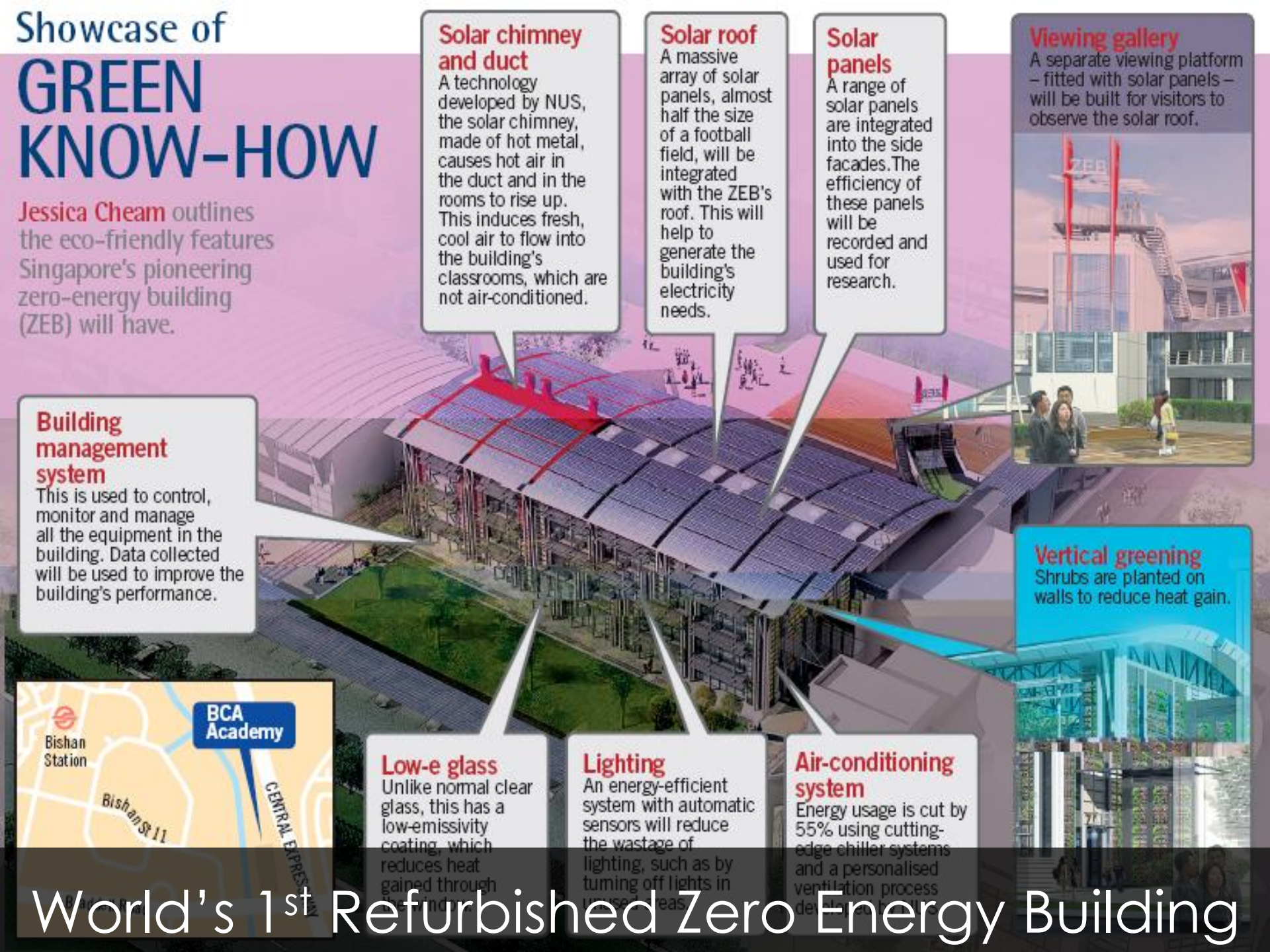
BCA Green Building Masterplan

S$ 50 million Research Fund

48 projects accepted under Research Fund for funding support at **$32 mil**

Showcase of GREEN KNOW-HOW

Jessica Cheam outlines the eco-friendly features Singapore's pioneering zero-energy building (ZEB) will have.



Solar chimney and duct
A technology developed by NUS, the solar chimney, made of hot metal, causes hot air in the duct and in the rooms to rise up. This induces fresh, cool air to flow into the building's classrooms, which are not air-conditioned.

Solar roof
A massive array of solar panels, almost half the size of a football field, will be integrated with the ZEB's roof. This will help to generate the building's electricity needs.

Solar panels
A range of solar panels are integrated into the side facades. The efficiency of these panels will be recorded and used for research.

Viewing gallery
A separate viewing platform – fitted with solar panels – will be built for visitors to observe the solar roof.

Building management system
This is used to control, monitor and manage all the equipment in the building. Data collected will be used to improve the building's performance.

Vertical greening
Shrubs are planted on walls to reduce heat gain.

Low-e glass
Unlike normal clear glass, this has a low-emissivity coating, which reduces heat gained through

Lighting
An energy-efficient system with automatic sensors will reduce the wastage of lighting, such as by turning off lights in

Air-conditioning system
Energy usage is cut by 55% using cutting-edge chiller systems and a personalised ventilation process

World's 1st Refurbished Zero Energy Building

BCA Green Building Masterplan

Building Capability of a 'Green' Collar Workforce

18,000 – 20,000

Professional, Managerial, Executive & Technician (PMET)s

2nd Green Building Masterplan

1 Development

Driving and Planning of New/Retrofitting Green Buildings

sustainability

O&M

Optimal Performance over Lifespan

Courses available at BCA Academy

	Courses
i Executive Development Programmes	• Leadership in Environment Sustainability • Innovations in Sustainable Design & Technology
ii Academic Programmes	• MSc in Facilities & Environment Management • BSc in Integrated events and sustainable Facilities • Diploma in Mechanical Engineering (GBT)
iii Specialist Certification Programmes	• Green Mark Manager Certification Course • Green Mark Facility Manager • Green Mark Professional (GMP)
iv Niche Competency Programmes	• Course on Energy management • Course on Solar Modeling • Course on Energy Efficiency & Efficient drive

Building Industry Capabilities through Training

...ling Capability of a 'Green' Collar Workforce

TRAINING & EDUCATIONAL FRAMEWORK

(GREEN & Sustainability)

...ve ...nes

...ast Talk

...p in Green

Direct Qualification

Certifiable Qualification

Certification Course (Professional)

1,563 ***attended Green Mark Manager Training Course***

115 ***attended Green Mark Professional***

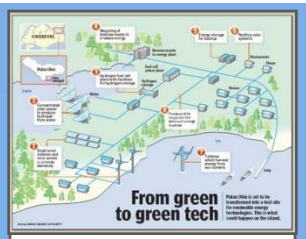
133 ***attended Green Mark Facilities Manager Training Course***

Large-scale Integrated Living Labs

Smart Grids
Intelligent Energy Systems testbed

Cleantech Park
Green business park in the tropics

Punggol Eco-Town
Sustainable public housing solutions



Pulau Ubin
Off-grid energy solutions and applications

Jurong Island
Enhancing sustainability and competitiveness of Chemical industry

EV Testbed
Trialling of EVs & charging solutions

HDB
Solar capability building on public housing

Urban Solutions Innovation Centres

- **Global Technical Centre for Integrated Water Resources & Urban Planning**
- Decision and modelling software for cities
- Working with players in ecosystem, eg Cleantech Park, HDB, Sembcorp in China

- **Urban Solutions Centre of Excellence**
- 20-man team to derive customer insights and to customize Urban Solutions
- Power, Smart Grid, Water etc

- **Global City Mgmt Centre**
- 60-man CoC to Design and Implement Urban Solutions for Global Markets
- Singapore as a testbed and launch pad

- **CleanTech Centre** to support incubation of Cleantech risk management services
- 90-man R&D centre
- Clean Energy, Urban Solutions, Carbon Mkt Services, Green Shipping and Ports, etc

ST Electronics – Green Business Focus

- Clean City – reducing traffic congestion & carbon emission
  - Urban transport management
  - Telematics & connected cars
- Efficient City – providing energy-efficient & eco-enabling ICT
  - Green ICT – IT as the 4th utility
  - Green Building & Infrastructure
  - Integrated Water Management System
  - Smart Grid
- Safe City – ensuring public safety
  - Integrated Security Management
  - Emergency Response & C2 Systems for public safety agencies

BCA Green Building Masterplan

International Panel of Experts

Er. Lee Chuan Seng
IPE Chair

Dr John Keung
IPE Chair

Prof Kazuo Iwamura, Musashi Institute of Tech

Peter Head
Director, Arup

Kevin Hydes
Immediate Past Chair of WGBC

Maria Atkinson
Global Head of Sustainability, Lend Lease

Professor Joachim Luther, SERIS

Dr Nirmal Kishnani, NUS

A/P Raymond Wong, NTU

SINGAPORE GREEN BUILDING COUNCIL

International Profiling Efforts

International Green Building Conference

26 – 30 Oct 2009 | SUNTEC Singapore

www.igbc.com.sg

Building and Construction Authority

Singapore Green Building Week

International Green Building Conference

Singapore 2011

13 – 16 Sep 2011


BCA Green Mark – Beyond Singapore
People's Republic of China
Middle East
Taiwan
Hong Kong
Myanmar
Laos
India
Thailand
Vietnam
Cambodia
Philippines
Malaysia
Singapore
Indonesia

BCA Green Building Masterplan

Building and Construction Authority

Code for Environmental Sustainability Of Buildings

Version 1.0

Green Mark Rating	Green Mark Points
Platinum	90 & above
Gold^{Plus}	85 to <90
Gold	75 to <85
Certified	50 to <75

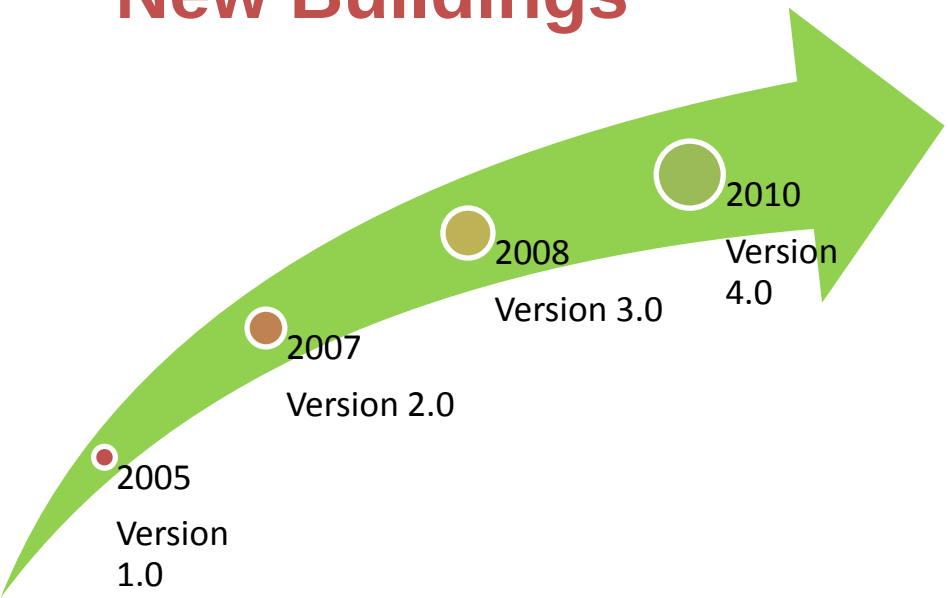
All new developments and existing buildings undergoing major retrofitting works (with GFA ≥ 2000 m^2)

Minimum Green Mark Certified Level from Apr 2008

Green Mark for New Buildings

Evolution of the criteria towards a more holistic approach

Versioning of GM for New Buildings



GM Version 4.0
(Effective from 1 Dec 2010)

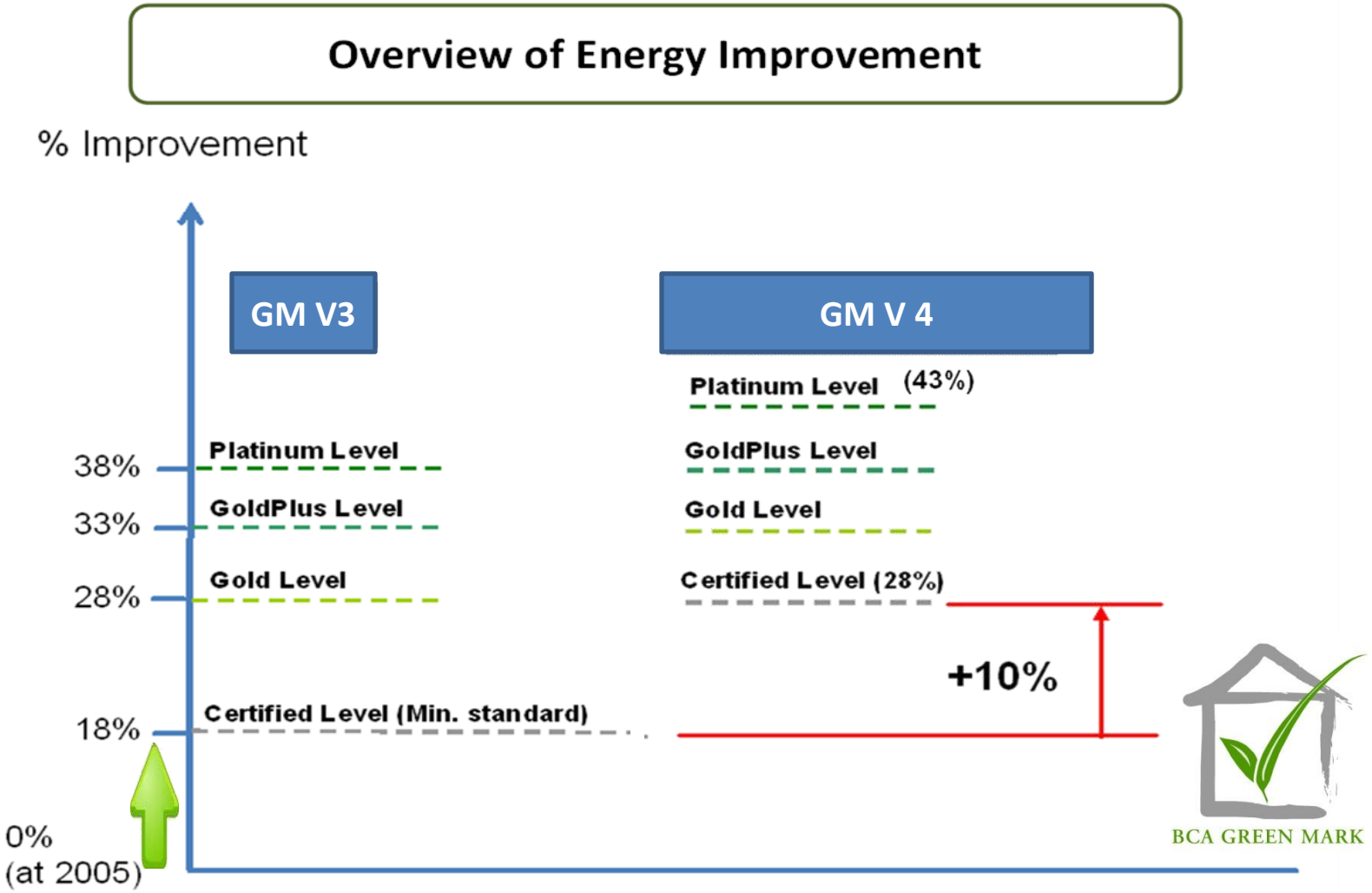
Area of improvements

- 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

BCA Green Mark Scheme

Raising Energy Efficiency Standard

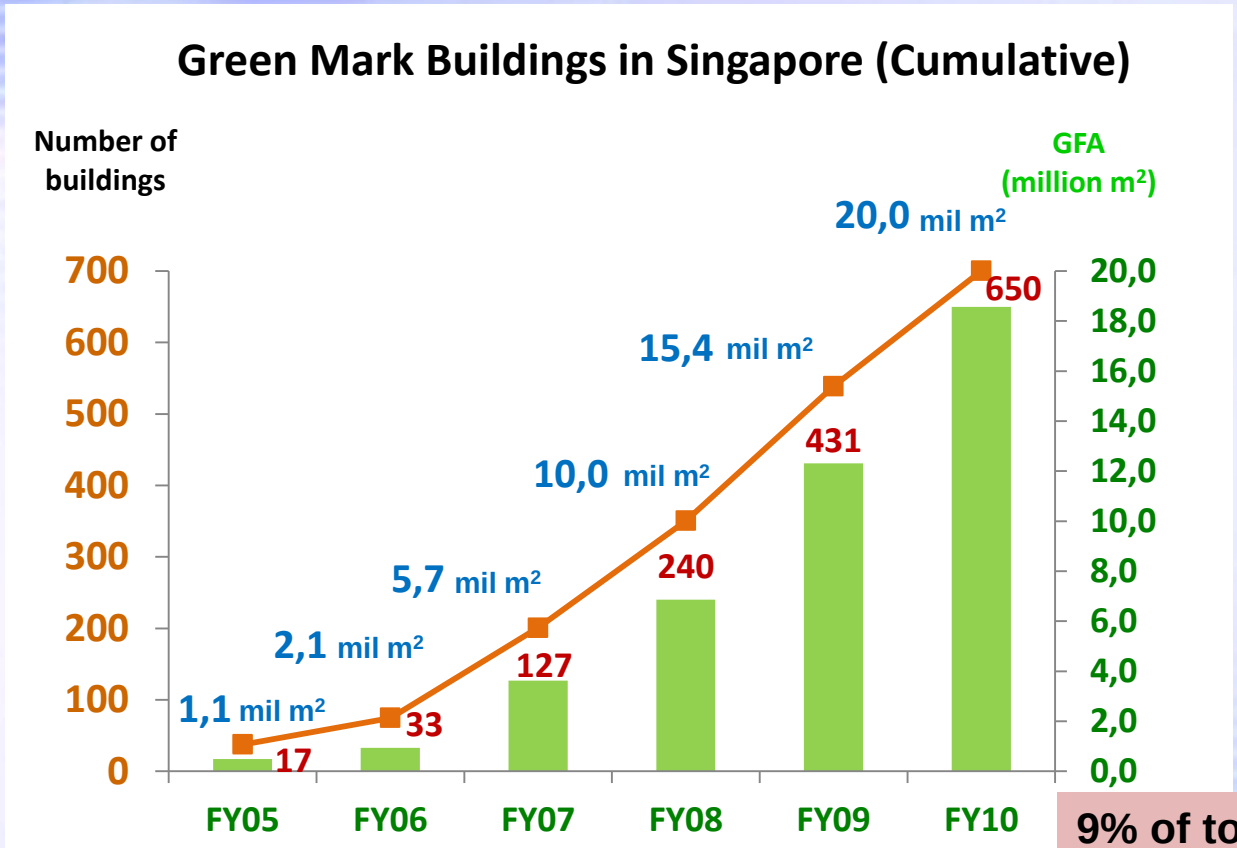
over 2005 design codes



Imposing Minimum Standards

Overview - Green Buildings

Green Mark Buildings (Singapore)



Projected to end FY10

650

Green Mark Buildings

20

million m²

9% of total estimated existing building floor space

Note:
Statistic excludes non-building projects such as district, office interior etc
Statistic includes legislated projects

CONCLUDING REMARKS

- A long journey ahead
- Different set of measures needed for new and existing buildings
- Relatively easy to address new buildings
- Very challenging to green existing buildings


Thank you
www.bca.gov.sg
ang_kian_seng
@bca.gov.sg
Building and Construction Authority
We shape a safe, high quality, sustainable and friendly built environment.