

Singapore Green Building Masterplan

Ms Chris Tay

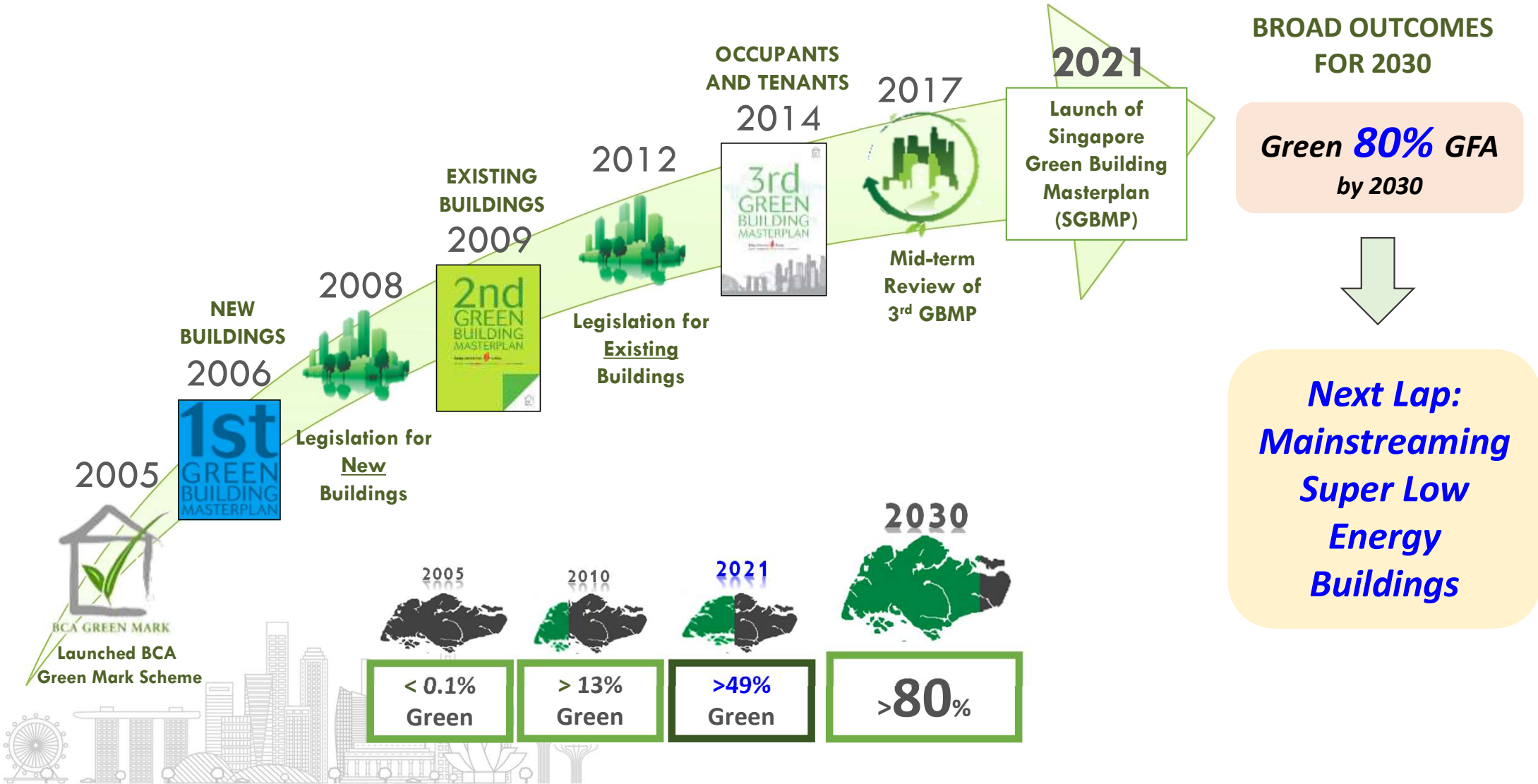
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Our green building journey started in 2005, with several iterations of the Green Building Masterplan to bring us to where we are today



The realisation of the Singapore Green Building Masterplan (SGBMP) will be important to meet Singapore's sustainability ambitions and international commitments

SINGAPORE'S AMBITIONS AND COMMITMENTS

Singapore Green Plan 2030

- Greener Infrastructure and Buildings under 'Energy Reset' pillar

Budget 2022 : Singapore will raise its climate ambitions by pledging to achieve net zero emissions by or around mid-century

Buildings contribute about 20% of Singapore's carbon emissions.

Green buildings can contribute a big part in our transition to a low-carbon and climate resilient future.



EMISSIONS PROFILE (2019)

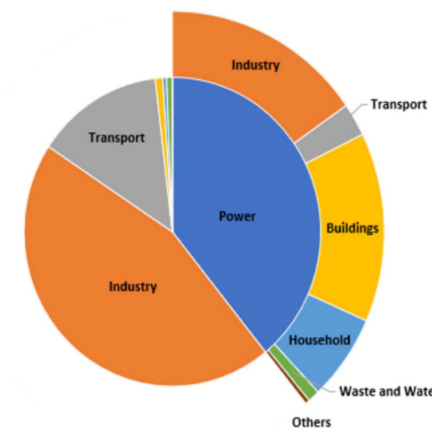
Total emissions: 51.6 MtCO₂e

PRIMARY EMISSIONS

Power	39.2%
Industry	45.1%
Transport	13.8%
Buildings	0.8%
Household	0.4%
Waste and Water	0.6%

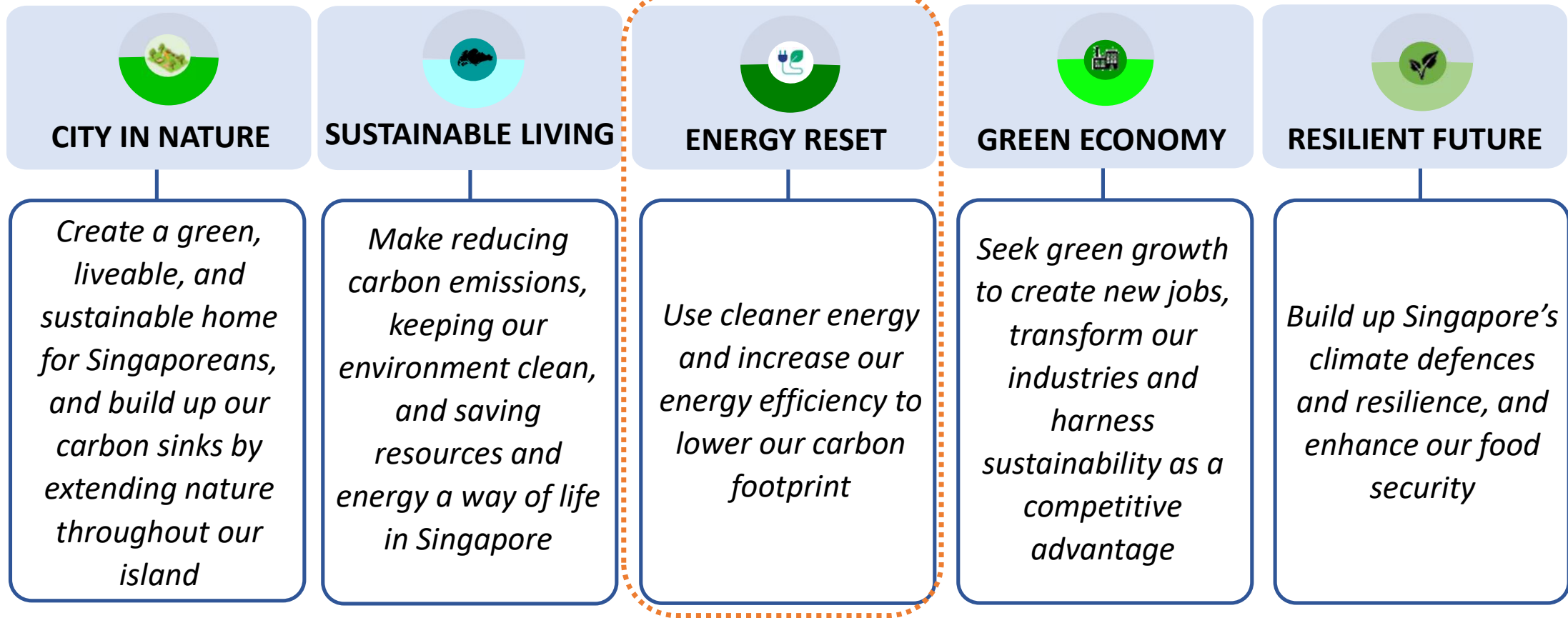
SECONDARY EMISSIONS

Industry	15.3%
Transport	2.4%
Buildings	13.9%
Household	6.3%
Waste and Water	0.9%
Others	0.3%



Source: NCCS

The SGBMP will play an important role in achieving a sustainable and low-carbon Built Environment in support of the Singapore Green Plan 2030, a national sustainability movement to tackle climate change.



Green Government and Green Citizenry as Key Enablers

We have taken decisive steps and put in place collective measures to meet “80-80-80 in 2030” targets since the launch of SGBMP last year

VISION

“A leading green Built Environment sector mitigating climate change and providing a healthy, liveable and sustainable Built Environment for all”



80% of buildings to be green (by GFA) by 2030:

>54% Green Building GFA

1. Raised the **mandatory minimum energy performance standards**
2. Revised the **Green Mark scheme** to set higher energy efficiency standards and place emphasis on key sustainability outcomes
3. Publish **building energy performance data**
4. Introduce **Green Mark Incentive Scheme for Existing Buildings (GMIS-EB) 2.0**



80% of new developments (by GFA) to be Super Low Energy (SLE) buildings from 2030:

Over the past year, **close to 19%** of new developments certified as SLE buildings

5. Raised requirements for public sector buildings under **GreenGov.SG**
6. Encourage SLE adoption in private sector through the **Built Environment Transformation GFA Incentive Scheme**
7. Enhance requirements for developments on **Government Land Sales (GLS) sites**



80%-improvement in energy efficiency (from 2005 levels) for best-in-class buildings by 2030:

Best-in-class green buildings have achieved **65 -70%** EE improvement

8. Push the boundaries of energy efficiency through technology development and demonstration under the **Green Buildings Innovation Cluster (GBIC) 2.0** programme

80% buildings (by GFA) to be green: To step up the pace of greening buildings in Singapore, we will publish building energy performance data, starting with commercial buildings.

➤ **BCA has gradually taken steps to increase the transparency of building energy performance to the public and enabled building owners to benchmark the performance of their buildings.**

2013

- All building owners are required to submit their building energy performance data

2017

- Building Energy Benchmarking Report published yearly

2020

- Building owners could opt to voluntarily have their building's energy data disclosed to the public
- Circular to give notice that data submitted from 2020 onwards would be published in the following year

2021

- **Identify all buildings in the data that we publish, beginning with commercial buildings**

Building and Construction Authority

➤ **Commercial buildings include offices, hotels, retail and mixed developments**

➤ The publication of building energy performance will be on data.gov.sg and on the Building Energy Submission System (BESS) portal

<https://www.bca.gov.sg/BESS/BenchmarkingReport/BenchmarkingReport.aspx>

BCA
Building
Energy
Benchmarking Report
(Statistics and Figures) 2020

Director of BDRP
2020 3

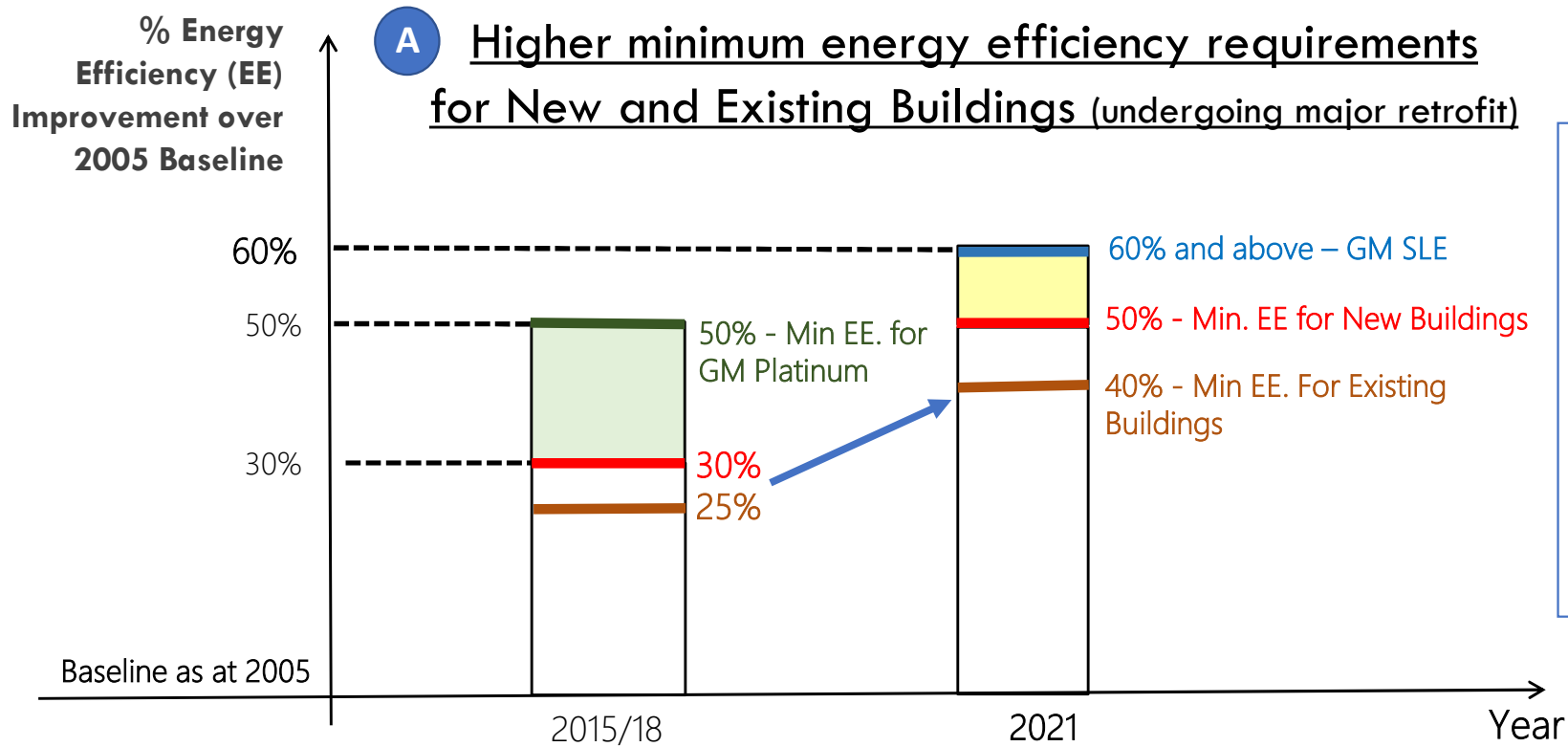
Singapore Building
Energy Benchmarking 4

Statistics and Figures
of Commercial
Buildings 7

Statistics and Figures
of Other "Included"
Building Types 11



80% buildings (by GFA) to be green: To future-proof and improve the quality of our building stock, we have raised the mandatory environmental sustainability standards for buildings in 2021.



These requirements will apply for building projects with GFA of 5,000 sq m or more, new developments starting from 1 December 2021, and existing buildings starting from 1 June 2022.

Find out more at <https://go.gov.sg/circular-esreq-2021>

Raise Min. EE standards to 50% & 40% respectively



80% buildings (by GFA) to be green: We have also raised sustainability standards with the revised Green Mark scheme

Green Mark 2021 is a key lever that facilitates high performance and climate action in buildings

- Higher energy performance requirements and longer term sustainability outcomes
- It is aligned to the wider Green Plan, SGBMP's '80-80-80 in 2030' and a driver of the Construction ITM (Smart, Productive and Green)
- It supports and prepares the value chain for the future green economy - towards climate resilience, carbon neutrality and transition plans, whilst championing SLE, DfM, Smart FM, IDD, DfMA & SC, Healthy buildings.

GREEN MARK 2021



For more info, please visit <https://go.gov.sg/gm2021>

Note: The effective date for GM: 2021 is from 1 November 2021 for all new GM applications.

- SLE : Super Low Energy Building
- DfM: Design for Maintainability
- Smart FM : Smart Facilities Management
- IDD: Integrated Digital Delivery
- DfMA: Design for Manufacturing and Assembly
- SC: Sustainable Construction

80% buildings (by GFA) to be green: Raise sustainability standards with the revised Green Mark scheme

Key Features of GM: 2021

1. All in one Green Mark Framework for buildings:

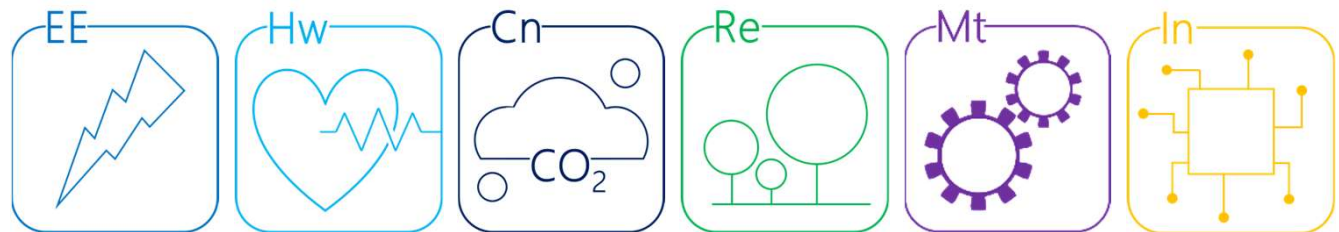
- Single GM for New and Existing, Non Residential and Residential Buildings. Sunsets the legacy frameworks, lifts the performance for all projects.

2. Simple, Flexible and Smart Rating System:

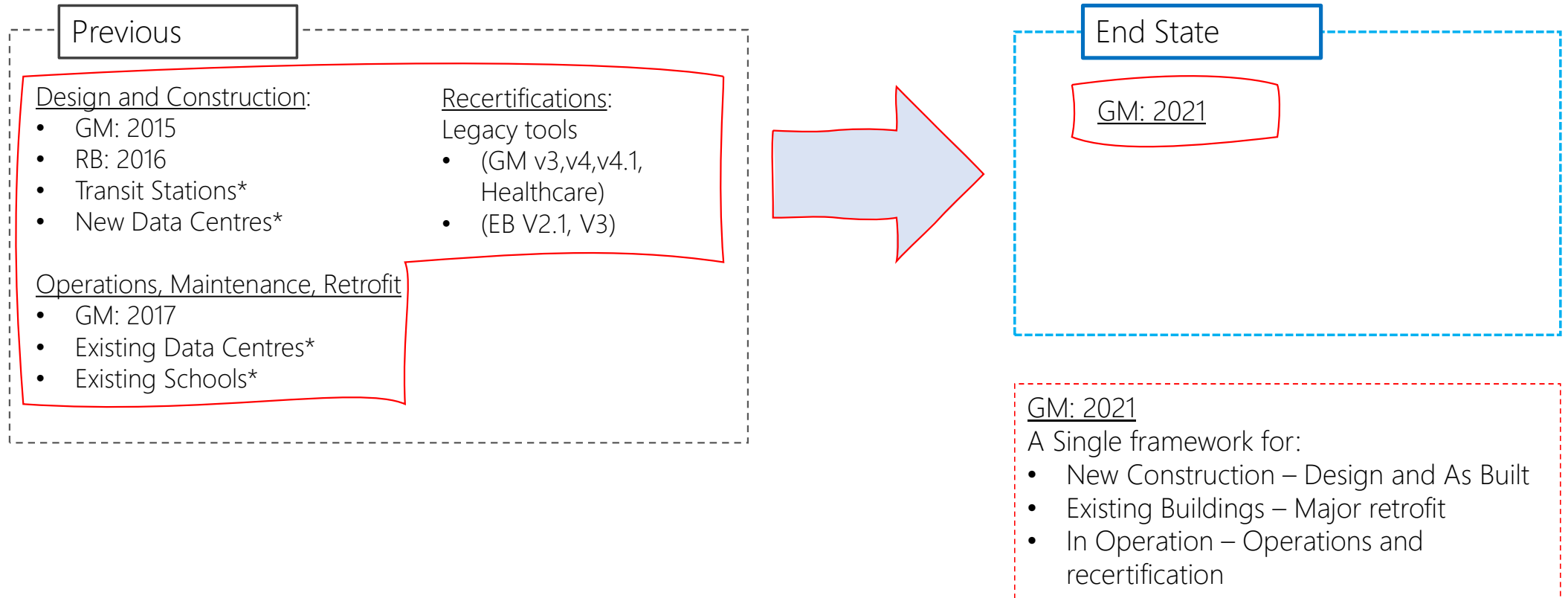
- Streamlined criteria and assessment methodology. Energy efficiency pathways mapped to building types with parallel routes for compliance. Sustainability sections aligned to global issues with flexibility to approach the sustainability issues pertinent to their project.

3. Globally Relevant & Leading:

- GM 2021 pushes the boundaries of sustainability, aligned to the UN SDGs, International Green Building movement, finance taxonomies and global real estate reporting platforms.



1. All in one Green Mark Framework for buildings



Streamlining all building criteria into 1 Green Mark scheme with tools introduced in phases



2. Simple, Flexible and Smart Rating System

Energy Efficiency [Pre-requisite] – Harmonised EE compliance pathways for new & existing buildings

Pathway 1 – EUI*

- Expanded for more building types based on a larger data set. >50% to SLE

*EUI – Energy Utilisation Intensity – total annual building energy consumption/m²

Pre-requisite: Air-Conditioning System Total System Efficiency (AC TSE) (kW/RT) = Air conditioning Plant + Air Fan system)
New Building = 0.8 kW/RT, Existing Building = 0.9 kW/RT

Pathway 2 – Fixed Metrics*

- Key performance metrics (ingredients) that make an Energy Efficient project

Pathway 3 – Energy Savings

- Enhanced Energy modelling framework, to look at holistic energy performance.

Pre-requisite: Air-Conditioning System Total System Efficiency (AC TSE) (kW/RT) = Air conditioning Plant + Air Fan system)
New Building = 0.8 kW/RT, Existing Building = 0.9 kW/RT

Buildings that demonstrate higher standards of energy performance (> 60% EE improvement from 2005 levels) through either of the 3 pathways will be recognised as a GM Super Low Energy building.



Green Mark

SLE

Super Low Energy Building



2. Simple, Flexible and Smart Rating System

Sustainability Sections – Aligned with global sustainability issues with flexibility for demonstration

- I. No pre-requisites - flexibility to score in sections relevant to the project while demonstrating good breadth and depth of sustainability issues



- II. Point Scoring – total 15 points available per section

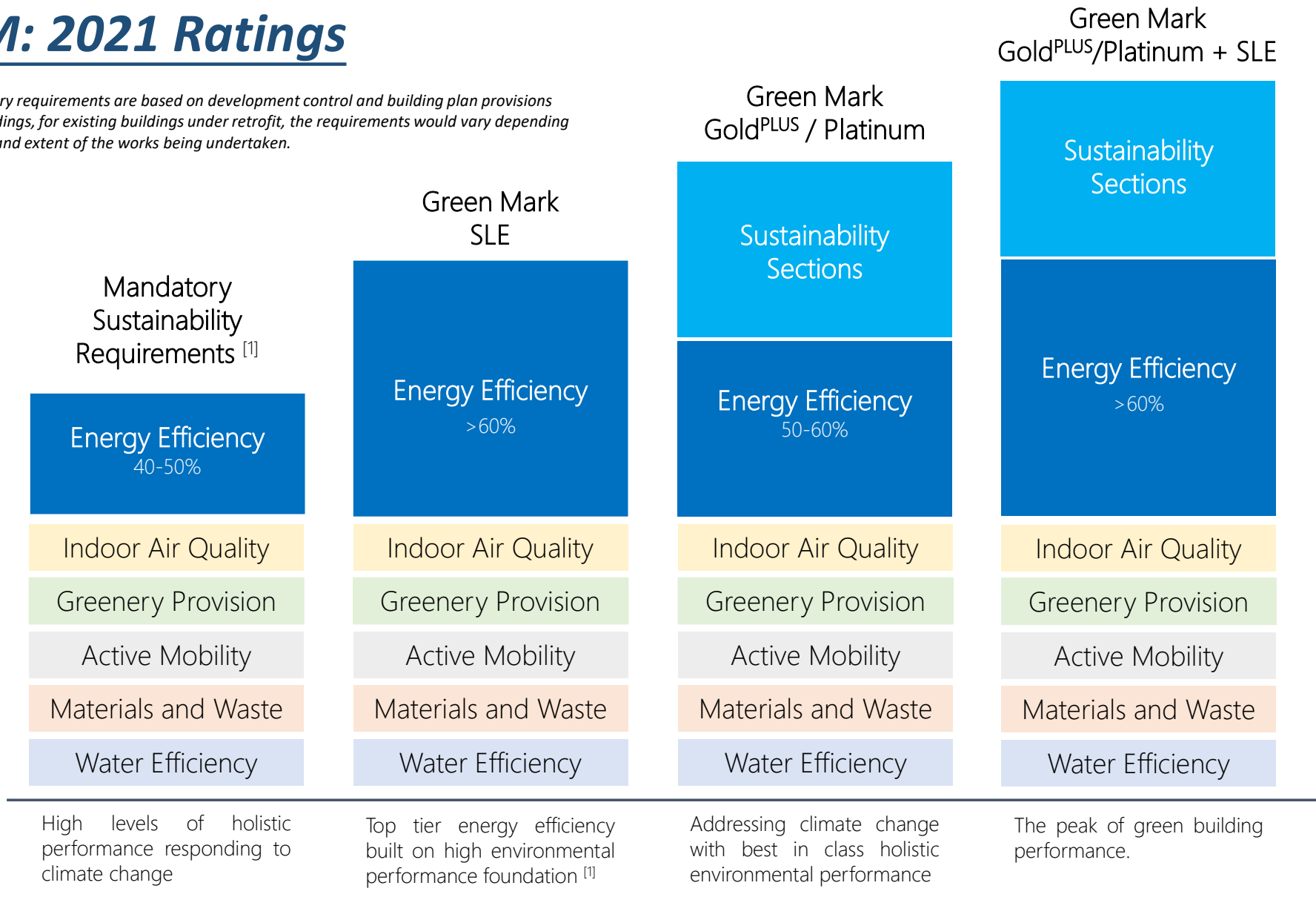
- Gold^{PLUS}: score 30 points across sections
- Platinum: score 40 points across sections

- III. Exemplary performance recognised

- Projects that demonstrate exceptional performance in a section are given a badge
- Badges are awarded for a score of 10 points or more in a section.

GM: 2021 Ratings

[1] Mandatory requirements are based on development control and building plan provisions for new buildings, for existing buildings under retrofit, the requirements would vary depending on the type and extent of the works being undertaken.



GM: 2021 Criteria at a Glance.

Sustainability outcomes, metrics and standards Grouped together. To achieve certification, **Requisite levels of EE** required with points scored across the sections.

Energy Efficiency

Energy Efficiency

- >50% (Gold^{PLUS})
- >55% (Platinum)
- >60% (SLE)

Intelligence

Intelligence

- Aligned to smart building certification systems, IDD, data ethics, digital twins, real time analytics

Health and Wellbeing

Health and Wellbeing

- Physiological (Physical)
- Psychological (Mental)
- Sociological (Inclusive)

Whole of Life Carbon

Whole of Life Carbon

- Embodied Energy
- Construction
- Fit Out

Maintainability

Design for Maintainability

Use of Design for Maintainability appraisal tool– the score will translate to section achievement

Resilience

Resilience

- Protect
- Manage
- Restore

Energy Efficiency

Building Type	PATHWAY 1	PATHWAY 2	PATHWAY 3
Commercial			
Office Buildings	•	•	•
Hotels	•	•	•
Retail Buildings	•	•	•
Educational			
IHL (University, Polytechnics and ITE)	•	•	•
Private Schools and Colleges	•	•	•
Junior Colleges (MOE)	•	•	•
Secondary Schools (MOE)	•	•	•
Primary Schools (MOE)	•	•	•
Healthcare			
Hospitals (Private and General)	•	•	•
Community Hospitals	•	•	•
Polyclinic	•	•	•
Nursing Home/ Youth Homes	•	•	•
Other Non-Residential			
Mixed Developments	<i>by GFA mix</i>		
Community Centres	•	•	•
Civic Buildings	•	•	•
Cultural Institution	•	•	•
Sports and Recreation Centres	•	•	•
Religious/ Place of Worship		•	•
Industrial			
High Tech Industrial		•	•
Light Industrial		•	•
Warehouses, Workshops and Others		•	•
Residential			
Multi Residential (HDB, EC, Condo, pte apartments)		•	
Cluster Housing		•	
Landed Housing		•	
Pre-requisites	New Building	Existing Building	
AC Total System Efficiency	0.8	0.9	
Airside efficiency for buildings supplied by DCS	0.2	0.25	
EUI occupancy rate	100% (design)	≥60%	
Renewable Energy included	On-Site		

Building Type	GoldPLUS EE >50%	Platinum EE ≥55%	SLE EE ≥60%
Commercial			
Office Buildings (Large)	155	140	115
Office Buildings (Small)	135	120	100
Hotels (Large)	230	220	180
Hotels (Small)	185	170	130
Retail Malls	240	210	160
Educational			
IHL (University, Polytechnics and ITE)	130	120	90
Private Schools and Colleges	110	100	80
Junior Colleges (MOE)	60	50	40
Secondary Schools (MOE)	40	35	30
Primary Schools (MOE)	40	35	30
Healthcare			
Hospitals (Private and General)	375	340	300
Community Hospitals	230	210	185
Polyclinic	150	135	120
Nursing/Youth Homes	90	80	70
Other Non-Residential			
Mixed Developments	<i>by GFA mix</i>		
Community Centres	150	125	110
Civic Buildings	80	70	60
Cultural Institution	180	140	120
Sports and Recreation Centres	110	80	50
Religious/ Place of Worship	NA		
Industrial			
High Tech Industrial	NA		
Light Industrial	NA		
Warehouses, Workshops and Others	NA		
Residential			
Non Landed Residential (HDB, EC, Condo, pte apartments)	NA		
Cluster Housing	NA		
Landed Housing	NA		

Pathway 2 – Fixed Metrics

EE levels of performance for Gold^{PLUS} through to SLE, by building typology

OFFICE	GoldPLUS	Platinum	SLE
PARAMETER			
Reduced Heat Gain (ETTV) [New Development only]	40	38	38
Non AC Areas	-	10%	25%
ACMV TSE*	0.8	0.74	0.68
Lighting Power Budget	Table 2A		
Mechanical Ventilation	Table 2B		
Integrated Energy Management & control Systems	-	Lighting controls shall be provided in accordance with SS 530: 2014 Code of Practice for Energy Efficiency Standard for Building Services and Equipment.	Energy consumption monitoring and benchmarking system. Automatic controls for the air-conditioning system to respond to periods of non-use, or reduced heat load. Lighting controls shall be provided in accordance with SS 530: 2014 Code of Practice for Energy Efficiency Standard for Building Services and Equipment.
On-Site Renewables - replacement to make up any deficiencies from the above list, with safety factor	-	-	1.1

- Key performance metrics (ingredients) that make an energy efficient project. All aspects must be met individually.
- Any shortfall in performance can be made up with the use of onsite renewables, subject to the building typology multiplication factor.
- For projects utilising a DCS shall be used in lieu of Total System Efficiency (TSE) and shall be the air system performance.

Gold ^{PLUS} EE > 50%	Platinum EE ≥ 55%	SLE EE ≥ 60%
0.2	0.18	0.16



Pathway 3 – Energy Savings

	Pathway 3 – Energy Savings		
	Gold ^{PLUS} EE >50%	Platinum EE ≥55%	SLE EE >60%
Saving from BAU (2005 Code)	50	55	60
Saving from Current Reference (Annex C) <i>*Including buildings supplied by DCS</i>	30	35	40

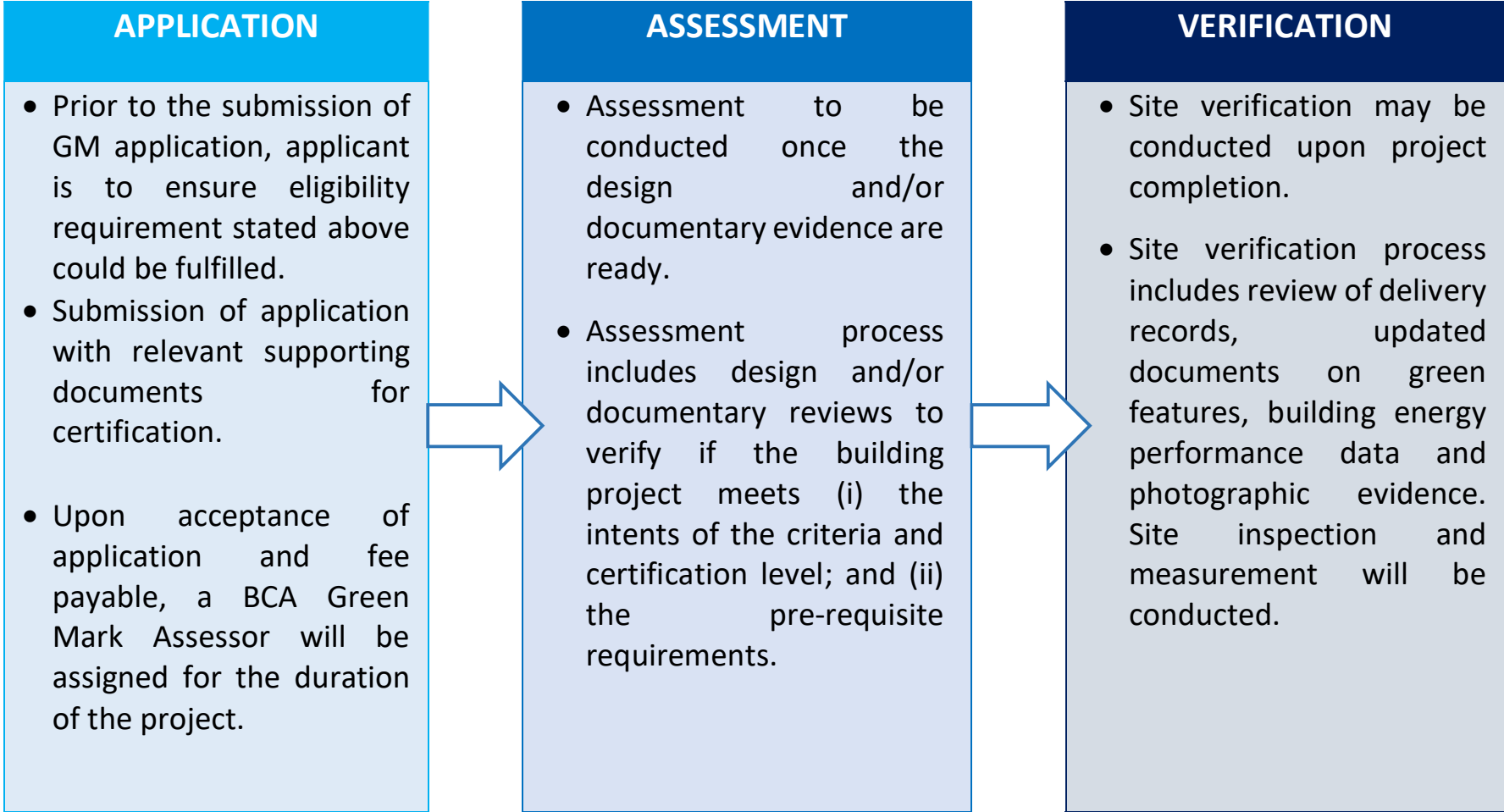
EE vs current code levels

Additional Requirements	New	Existing
AC TSE	0.8	0.9
Airside efficiency (for buildings supplied by DCS)	0.2	0.25
Savings from Renewable Energy	no cap	
Savings from Passive Design	no cap	



GM: 2021 Process

The BCA GM: 2021 certification process is as follows:



For more information on SGBMP, please visit <https://go.gov.sg/sgbmp>.

Thank you



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