**Factsheets for SGBC Gala Dinner 2025**

- Annex A: Factsheet on 20 years of greening Singapore's built environment
- Annex B: Recipients of Green Mark 20th anniversary commemorative certificate
- Annex C: Factsheet on Aligning Asia Pacific Green Building Rating Tools to the ASEAN Taxonomy for Sustainable Finance Publication Series
- Annex D: Factsheet on Built Environment Decarbonisation Technology Roadmap
- Annex E: Factsheet on Technical Reference for Hybrid Cooling

**Annex A: Factsheet on 20 years of greening Singapore's built environment**

## 1. BACKGROUND

Singapore's green building efforts play a pivotal role in supporting our national target to achieve net zero emissions by 2050. At the sectoral level, the Built Environment sector has been actively contributing to Singapore's Nationally Determined Contributions (NDC), which is our international commitment under the UN's Paris Agreement to reduce carbon emissions.

The various strategies to mitigate the effects of climate change are summarised under the Singapore Green Plan (SGP), which includes our Singapore Green Building Masterplan (SGBMP) as part of the "Energy Reset" Pillar.

### 1.1 Our green building journey and evolution of Green Mark

BCA's Green Mark (GM) certification scheme was launched in January 2005. It was conceptualised by BCA and Built Environment sector stakeholders who were part of the BCA Green Mark Advisory Committee. The Advisory Committee was chaired by Er. Lee Chuan Seng, who was also Singapore Green Building Council (SGBC)'s founding President.

The GM scheme is a green building rating system designed to evaluate a building's environmental impact and performance. It provides a comprehensive framework for assessing the overall environmental performance of new and existing buildings to promote sustainable design and best practices in construction and operations in buildings.

In the pilot version of the GM scheme, building projects were rated as GM Certified, Gold, Gold$^{PLUS}$, or Platinum. A total of 17 buildings were certified in 2005, including the National Library Building and Republic Plaza. The GM scheme became one of the initiatives under the Green Building Masterplans (GBMP), which later evolved into what we know today as the SGBMP.

The first GBMP was launched in 2006, focusing on greening new buildings:

- BCA established the first target to green at least 80 percent of buildings in Singapore by 2030.
- The plan was to start by getting the public sector to take the lead, in line with the Public Sector Taking the Lead in Environmental Sustainability (PSTLES) initiative.
- The **GM scheme underwent two rounds of revisions between 2006 to 2009**, incorporating energy modelling, establishing essential energy efficiency prerequisites, and introducing Computational Fluid Dynamics simulation.

The 2nd GBMP was launched in 2009, focusing on greening existing buildings:

- There was an expansion of initiatives to spur ecosystem for energy retrofits.
- The **GM scheme went through 2 more rounds of revisions in 2010 and 2012** to include pre-requisites outside of energy efficiency and mandate GM lowest standard (i.e. GM Certified) as part of regulations for 2013 for existing buildings.
- The Zero Energy Building at BCA Academy - whereby an existing building was retrofitted to become a zero-energy building - was also launched, serving as a living laboratory where Singapore's green building capabilities could be demonstrated.

The 3rd GBMP was launched in 2014 and focused on an occupant-centric approach to greening buildings:

- BCA legislated existing building standards and energy consumption reporting to track building stock performance.
- The GBMP was expanded to encourage tenants to reduce energy usage, as well as enable improvements to Indoor Environmental Quality (IEQ) and occupant wellness.The Green Building Innovation Cluster (GBIC) Programme was launched to spur the research and innovation ecosystem for green building technologies.
- The Super Low Energy (SLE) Programme & Technology Roadmap was launched.

        - SLE pushes buildings to achieve at least 60% energy savings compared to 2005 building codes.
- The **GM scheme underwent another round of revision in 2015**, and the "Certified" level was removed from the scheme, so as to distinguish regulations, which required building owners to meet a minimum green standard for their buildings, from the voluntary GM Scheme where building owners may choose to achieve higher green standards for their buildings.

The Singapore Green Building Masterplan (SGBMP) was launched in 2021:

- BCA established the "80-80-80 in 2030" targets to unlock the next lap of building energy efficiency improvement.
    - 80% of buildings to be green by 2030 (by GFA).
    - 80% of new developments (by GFA) to be SLE buildings from 2030.
    - 80% improvement in energy efficiency (compared to 2005 levels) for best-in-class green buildings by 2030.
- **In 2021, the sixth edition of the GM scheme was launched as GM 2021.** It saw the following changes:
    - Raising of standards in energy performance (SLE / Zero Energy (ZE) / Positive Energy (PE) standards), to place greater emphasis on non-energy sustainability outcomes which align with the UN Sustainable Development Goals.
    - Energy efficiency was made the sole pre-requisite.
    - Introduction of badges across sustainability sections (i.e. Intelligence, Health & Well-being, Whole Life Carbon, Maintainability, Resilience).

More information on GM 2021 (BCA's latest GM scheme) can be found at:

- Green Mark webpage
- Green Mark 2021 media factsheet

## 2. ACHIEVEMENTS AND OUTCOMES

### 2.1 Progress towards our "80-80-80 in 2030" target

- **To green 80% of our buildings (by GFA) by 2030**. As of end December 2024, about 61% of our buildings' GFA has been greened.
- **For 80% of new developments (by GFA) to be Super Low Energy (SLE) buildings**[1] **from 2030**. In 2024, close to 26% of new developments (by GFA) have been certified as SLE buildings.
- **To achieve 80% improvement in energy efficiency (compared to 2005 levels) for best-in-class green buildings by 2030**.[2] As of December 2024, our best-in-class buildings have achieved 72% improvement in energy efficiency over 2005 levels.

### 2.2 Number of certified buildings

As of March 2025, there are 2,590 GM-certified buildings in Singapore

### 2.3 Positive impact on the environment

Based on our data as of March 2025, annual energy savings from the stock of GM-certified buildings (energy savings calculated based on minimum standards at the point of GM certification):

- Is equivalent to powering one million 4-room HDB flats over a year, or
- Translates to over S$1.3 billion dollars saved per year.

Carbon emissions offset by GM-certified buildings is about 1.7 million tCO2e annually, equivalent to

- Replanting 1 million hectares of forest / a forest over 13 times the size of Singapore, or
- Having more than 396,000 internal combustion engine cars (non-electric cars) taken off the roads.

[1] SLE buildings refer to buildings that have achieved at least 60% improvement in energy efficiency compared to 2005 levels.
[2] Best-in-class buildings refer to buildings that achieve the highest possible energy efficiency standards with the technology available at the time.

### 2.4 Bringing Green Mark overseas

With two decades of experience, Singapore has built expertise in greening buildings. With the help of BCA's international arm, BCA International (BCAI), Singapore green consultants and firms have successfully exported their capabilities to help overseas stakeholders in their green and sustainability aspirations.

Notable projects include:

a) 'Wisma BCA Foresta', HQ of PT Bank Central Asia Tbk, Indonesia.
   - Completed and awarded with GM SLE for existing buildings in October 2024.
   - This is the first GM SLE awarded in Indonesia.
   - Supported by G-Energy Global as their green consultant.
   - Bank Central Asia is Indonesia's largest bank.
   - More details on LinkedIn post.

b) 'Sobha One', new premium luxury condominium estate of Sobha Realty, Dubai.
   - This is the first-ever GM project in the Middle East, and the first GM Platinum SLE awarded in the United Arab Emirates, in December 2024.
   - Supported by GreenA Consultants as their green consultant.
   - More details on LinkedIn post.

GM is also an international recognised certification. More details at https://www.sgbc.sg/international-sustainable-finance-guide/

## 3. BENEFITS TO INDUSTRY AND END USERS

### 3.1 Business case for developers and building owners

The investment in green buildings has reaped both environmental and financial benefits , particularly for GM Super Low Energy buildings (SLEBs).

- New commercial buildings achieving the highest GM SLE standard can recover their sustainability investments in about 5 to 6 years.[3]

[3] From Green Mark submissions database

- GM SLE office buildings consume 59% less energy than their non-GM counterparts.[4]

The market has responded positively to these initiatives.

- GM-certified office buildings are increasingly sought after, commanding higher occupancy rates and rental premiums.
    - According to Cushman and Wakefield's 2024 report, GM-certified buildings in the CBD are not only maintaining occupancy rates 2.5%-4.0% higher than non-certified ones, but are also commanding rents up to 12% higher for Platinum certifications.
    - A 2024 article by real estate company, Savills, also cited research studies that proved the business case for Green Mark.
        - The Keppel REIT has all its Singapore office assets bearing the highest BCA GM Platinum Award. This has allowed Keppel REIT to enjoy a 99% occupancy rate for its Singapore properties.
        - Grade A office stock enjoys a rental premium as high as 18% for buildings certified with GM.
    - A 2025 research study by real estate company, CBRE, mentioned Singapore as the 3rd highest in Asia Pacific in terms of attracting higher occupancy rates.

This trend is driven by businesses' growing commitment to sustainability goals, with many willing to pay more for environmentally responsible spaces. Building owners with higher GM ratings find themselves at a competitive advantage, particularly when seeking refinancing or green loans.

### 3.2 Health and well-being benefits for business owners, building users and occupants

In 2017, BCA and the National University of Singapore conducted comprehensive research on certified GM buildings, revealing that occupants experienced significantly

[4] From 2023 data in BCA's Building Energy Submission System

better indoor environmental conditions compared to those in non-certified buildings. The study demonstrated measurable improvements in temperature control, humidity levels, air quality, and overall occupant satisfaction.

Other research findings also showed that green buildings maintained lower concentrations of PM2.5, bacteria, and fungi compared to conventional buildings.

Occupants reported statistically significant reductions in health-related symptoms, including headaches, unusual fatigue, and skin irritation.

These findings substantiate the direct correlation between green building design and occupant wellbeing.

More details can be found here:

- Press release and Factsheet
- Research paper

The findings from this study were embedded into the Health and Wellbeing section of the GM 2021's criteria and best practices. This will ensure that projects coming in for GM certification and attaining the Health and Well Being section will deliver superior performance in Indoor Air Quality (IAQ). Some notable examples include CapitaSpring (SGBC Leadership in Sustainability Award, Health & Wellbeing, CapitaLand), Paya Lebar Green (Hw Badge, Lendlease), and the Singapore Pools Building (Hw Badge).

**Annex B: Recipients of Green Mark 20th anniversary commemorative certificate**

To commemorate Green Mark's 20th anniversary, a total of 20 commemorative certificates were given out to 9 partners and 11 projects that made outstanding contributions to Singapore's green building journey. These include:

**Projects**

1. Republic Plaza
2. City House
3. Environment Building
4. Keppel Bay Tower
5. Ocean Financial Centre
6. Singapore Pools Building
7. Mapletree Benoi Logistics Hub
8. National Library Building
9. United World College of South East Asia – East Campus
10. ITE College East
11. Republic Polytechnic

More information on the projects here.

**Partners**

12. City Development Limited (CDL)
13. CapitaLand
14. Mapletree
15. Keppel
16. Lendlease
17. JTC
18. HDB
19. NTU
20. NUS

More information on the partners here.

**Annex C: Factsheet on Aligning Asia Pacific Green Building Rating Tools to the ASEAN Taxonomy for Sustainable Finance Publication Series**

1. The Insights Report on Aligning Asia Pacific Green Building Rating Tools to the ASEAN Taxonomy for Sustainable Finance is the first in a new series of regional publications developed to support the transition towards a more sustainable, circular, and resilient built environment across Asia Pacific. This is led by the World Green Building Council and supported by SGBC member OCBC, along with Asia Pacific Green Building Councils.

2. The Insights Report published on 11 July 2025 offers a concise yet strategic overview of the current state of readiness across the sector. It presents key messages and early observations drawn from multi-stakeholder engagement, regional data, and global trends. The paper highlights the urgent need for systemic change in how we design, build, use, and recover building materials, and identifies the policy, industry, and financial levers that can help accelerate this transition.

3. Specifically, the Insights Report serves a threefold purpose:
    a. Framing the urgency – It outlines why the building and construction sector must shift away from today's linear consumption model, and how this shift aligns with climate targets, economic resilience, and resource security.
    b. Opportunities for progress are identified in climate adaptation, biodiversity safeguards, embodied carbon, and ongoing performance tracking — priority areas for future iteration.
    c. Setting the stage – It introduces the broader framework that will be detailed in the next two publications, helping stakeholders anticipate and prepare for more technical guidance to come.

4. The Insights Report is designed for senior decision-makers to quickly grasp the strategic direction and areas for leadership. It has been developed in consultation with regional green building councils, industry partners, and policy leaders — and is intended to initiate informed dialogue and collective action across the ecosystem.

5. The Insights Report will be complemented with the following in September 2025:

a. The Practitioner’s Guide – a document that provides practical recommendations, use cases, and implementation pathways for government agencies, developers, and investors.
b. The Technical Annex – a detailed compilation of methodologies, indicators, and data sets that underpin the framework and allow for deeper analysis and benchmarking.

6. Together, this three-part publication suite will form a common reference point for policymakers and market actors, supporting more coherent action, investment alignment, and measurable progress across the Built Environment sector.

**Annex D: Factsheet on Built Environment Decarbonisation Technology Roadmap**

1. Singapore is committed to reducing national emissions to about 45 to 50 $MtCO_2e$ by 2035 from the projected 60 MtCO2e in 2030. With buildings accounting for over 20% of Singapore's emissions, the Built Environment sector is an important piece of the puzzle to achieving Singapore's climate ambitions under the Singapore Green Plan 2030 and beyond.

2. Technology plays a key role in this transition to enable the rapid development and deployment of solutions to encourage the switch to low-carbon alternatives and drive transformational change. The 2018 Super Low Energy (SLE) Building Technology Roadmap outlined broad strategies to help the industry design and develop cost-effective SLE buildings. Since then, SLE projects have gained traction locally with over 180 projects.[5]

3. Through funding support under the Green Building Innovation Cluster (GBIC) Programme, progressive building owners have pushed building performance further, with our best-in-class SLE buildings achieving 72% energy savings over 2005 levels. The ecosystem for SLE-enabling technologies has also evolved several technologies and strategies from the earlier roadmap, reaching greater maturity or wider industry acceptance.

**BE Decarbonisation Technology Roadmap**

4. Against the backdrop of an evolving global landscape, it is timely to assess emerging trends, technologies, and innovations, to lay the foundation for Singapore's next set of ambitious decarbonisation goals beyond 2030. To this end, SGBC partnered BCA with support from A*STAR's Consortium Operation & Technology Roadmap team to refresh the 2018 SLE Building Technology Roadmap.

[5] Data correct as of June 2025.

5. The roadmap serves as a guide for industry stakeholders to identify key future-ready solutions and strategies that reduce whole life carbon emissions in building projects, to prepare Singapore's built environment and its firms for a low-carbon future. It builds on the foundations laid in the 2018 edition but has been refreshed and expanded in scope to take a “Whole Life Carbon” approach in identifying the latest developments to harness to reduce both operational and embodied carbon in the Built Environment Sector.

6. Since January 2025, SGBC and BCA have engaged over 60 Built Environment sector firms, government agencies, technology providers, and Institutes of Higher Learning, to identify 54 key technologies and strategies (existing and emerging) to help building owners decarbonise their building portfolios.

| **Themes** | **Strategies** | **Number of solutions** | **Examples** |
|---|---|---|---|
| **Operational Carbon Reduction** | District Integration | 2 | *Switch to District Cooling System* |
| | Passive | 9 | *Ventilated Facades, Natural Ventilation* |
| | Active | 22 | *Alternative Cooling Technologies, Energy Recovery Systems* |
| | Smart Technologies and AI | 5 | *Occupant-Centric Optimisation* |
| | Renewable Energy | 6 | *Façade Solar, Micro Wind Turbines* |
| **Embodied Carbon Reduction** | Maximise Use of Existing Assets | - | *Adaptive Reuse, reusing of existing Bored Piles, Reusing Steel, Carbon Calculator for Whole Life Carbon Assessment* |
| | Low-Carbon Materials | 10 | *Low Carbon Concrete, Mass Engineered Timber, Replacement of Reinforcement Bar* |
| | Low-Carbon Construction Sites | - | Hydrogen and renewable energy sources, Optimising Battery design and lifecycle management |

7. Across both operational and embodied carbon reduction, a key recommendation is that the greatest carbon savings potential in the building lifecycle lies in the project conception and design stages. Fundamental choices about building orientation, materials, and space utilisation determine immediate embodied carbon lock-in while shaping decades of operational practices and carbon emissions.

**Public Consultation Phase**

8. SGBC and BCA will be embarking on a month-long public consultation on the identified technology solutions between 11 July 2025 – 11 August 2025. The public consultation will provide an opportunity for the wider industry and public to add on to the solutions identified. Interested parties can submit their comments and solutions via SGBC's website. SGBC and BCA target to launch the finalised report by Q1 2026.

## Annex E: Factsheet on Technical Reference for Hybrid Cooling

### Pushing for Alternative Cooling Approach

1. In Singapore, cooling systems account for up to 50%[6] of a building's total energy consumption. As the Built Environment sector continues to push for sustainability, it is crucial to explore alternative cooling technologies (ACTs) to reduce energy consumption while maintaining thermal comfort. One promising ACT is the use of hybrid cooling systems.

2. Hybrid cooling systems leverage an innovative approach where the air-conditioning system is designed and operated at a higher indoor set-point temperature (i.e. from typical 24 degrees C to 26 - 27 degrees C). Thermal comfort for occupants is not compromised despite higher temperature settings as the cooling effect is supplemented with elevated air movement through strategically positioned ceiling fans. Adoption of hybrid cooling can reduce energy consumption for cooling systems by up to 30%.

### Establishing Industry Guidelines through a Technical Reference

3. To facilitate wider adoption and provide guidance for industry practitioners implementing hybrid cooling systems in their projects, a local technical reference (TR) has been developed. This initiative addresses the current gap in international standards and provides guidelines suited to our tropical climate.

4. The TR was developed by an industry-led working group established through Enterprise Singapore in January 2024. It was co-led by Er. Joseph Goh (DLM Pte Ltd) and A/P Adrian Chong (NUS), with members coming from Built Environment sector firms (Surbana Jurong, GreenA, Squire Mech), professional associations (IES, ASHRAE Singapore Chapters, ACES), Institutes of Higher Learning and

[6]Air-con System Efficiency Primer: A Summary, NCCS & NRF, 2011

research institutes (NUS, SIT, KATRiS, BEARS Ltd), and government agencies (BCA, NEA).

5. The comprehensive TR establishes clear guidelines and recommendations covering the lifecycle of hybrid cooling systems, from design and performance specifications to installation procedures and maintenance requirements. This TR ensures consistent standards across:
    - System design and efficiency
    - Component specifications
    - Installation requirements

**TR 141:2025 Hybrid Cooling System for Air-Conditioning**

6. This industry-led TR supports the Built Environment sector in accelerating the deployment of hybrid cooling systems across various building typologies, including commercial and office buildings, whether new or undergoing retrofitting. By providing clear standards and guidelines, it aims to drive greater adoption and acceptance among end-users, developers and building owners. A copy of this new TR can be obtained through the QR code or link below:

https://www.singaporestandardseshop.sg