



SINGAPORE GREEN BUILDING MASTERPLAN

BUILD OUR GREEN FUTURE TOGETHER

4th EDITION

Co-created by:

Building and Construction  Authority



In support of:

 **GREEN PLAN**

Build 



FOREWORD

Like other countries, Singapore is experiencing the effects of climate change. The past decade has been the warmest on record, and in recent years we have seen more torrential downpours that have resulted in flooding in parts of our island. Such events are happening around the world, and reinforce the need for all of us to take urgent collective action to reduce greenhouse gas emissions.

We are doing our part in Singapore. In February 2022, we announced that we would raise our climate action ambition to achieve net zero emissions by or around mid-century, in line with the assessment of the Intergovernmental Panel on Climate Change on what is required to limit global warming to below 1.5°C. We also launched the Singapore Green Plan 2030 last year to set out our national agenda on sustainable development.

Buildings account for over 20% of Singapore's emissions. Greening our buildings is therefore key to achieving our emissions reduction targets. Since 2006, we have worked steadily towards a low-carbon built environment through successive green building masterplans. The latest edition of the Singapore Green Building Masterplan (SGBMP), launched in March 2021 as part of the 'Energy Reset' Pillar of the Green Plan, builds on the success of these earlier masterplans. It lays the foundation to achieve our net zero aspirations.

We have set three key targets for the SGBMP, or "80-80-80 in 2030": (i) 80% of buildings by Gross Floor Area to be green by 2030, (ii) 80% of new developments to be Super Low Energy (SLE) buildings from 2030, and (iii) 80% improvement in energy efficiency (compared to 2005 baseline levels) for our best-in-class buildings by 2030.

OUR KEY STRATEGIES INCLUDE:

- Raising the sustainability standards of existing buildings;
- Driving the adoption of SLE standards for new buildings; and
- Pushing the boundaries of energy efficiency through research and innovation

The SGBMP would not have been possible without the strong support from the industry and community. I would like to thank our partners at the Singapore Green Building Council (SGBC) and over 80 industry players across the value chain for their invaluable contributions. They have shed light on the challenges that the industry faces on our green buildings journey, as well as the potential to achieve even greater heights. I would also like to thank the more than 5,000 stakeholders, including home buyers, tenants and young Singaporeans, who have provided feedback and insights for the SGBMP. Together, we have drawn up a bold collective vision and a suite of innovative initiatives to drive our green buildings agenda forward.

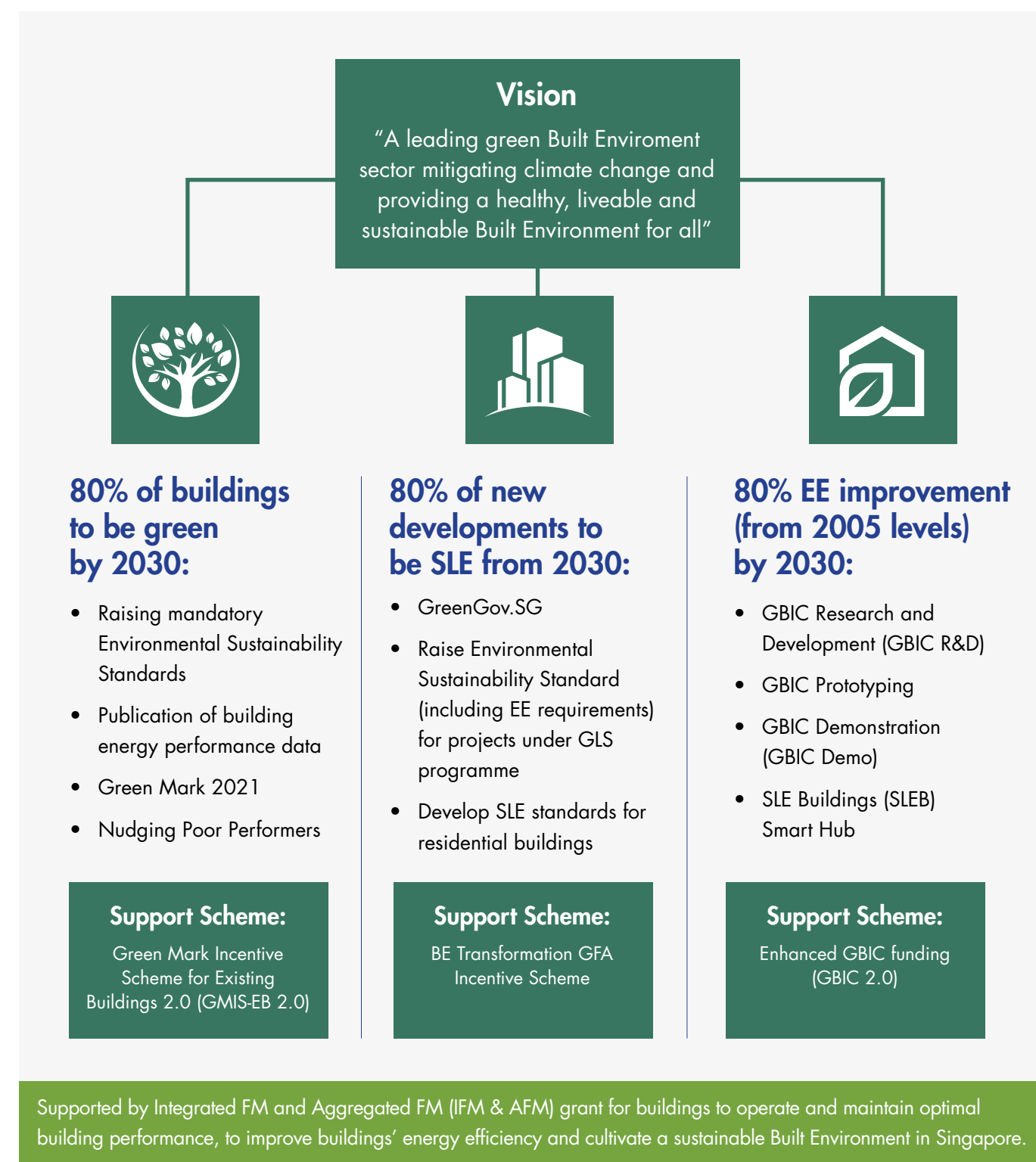
To build a more sustainable city, collaboration between the people, public and private sectors is critical. Architects can incorporate maintainability considerations in upstream design to reduce the maintenance workload downstream. Developers and builders can drive the adoption of sustainable construction practices and materials. Building owners and facilities managers can ensure that our buildings operate sustainably over their lifespan. And building users can adopt sustainable behaviours to reduce our energy usage. The Government will continue to support the industry's collective efforts, as we move towards a low-carbon built environment.

I encourage everyone to join the Building and Construction Authority and the SGBC in the next lap of our green building journey, and work with us towards a greener, more sustainable home.

Mr Desmond Lee

Minister for National Development and
Minister-in-Charge of Social Service Integration

As we **"Build Our Green Future Together"**, SGBMP serves as a roadmap for our buildings in Singapore to venture further in their journey to decarbonise. With collective efforts of industry and public stakeholders through the various initiatives, we can achieve the targets set out in SGBMP and bring us closer to our vision of building a leading green Built Environment (BE) sector mitigating climate change and providing a healthy, liveable and sustainable Built Environment for all.



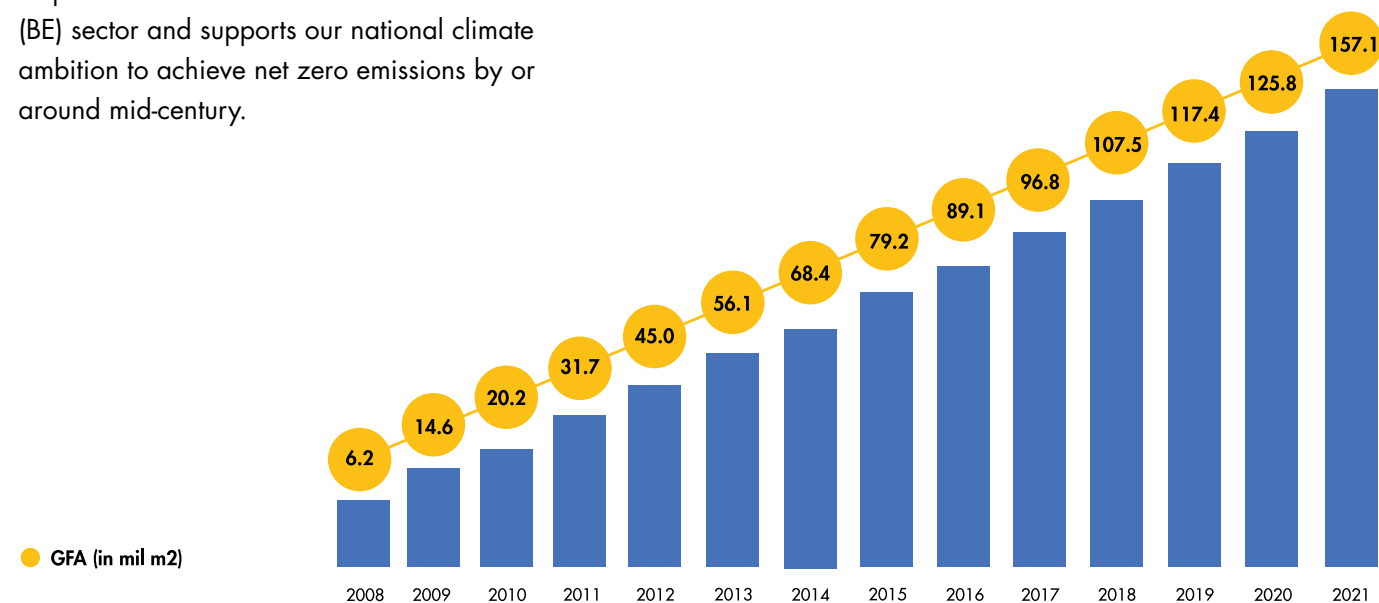
The development of Singapore Green Building Masterplan is a result of an extensive industry collaboration across the BE value chain. The Building and Construction Authority of Singapore would like to extend our sincerest gratitude to all internal and external stakeholders for their invaluable support and contribution towards the development of SGBMP that will enable us to mitigate climate change by further decarbonising our BE sector and build our green future together.

BACKGROUND

The Singapore Green Building Masterplan (SGBMP) is part of the Singapore Green Plan 2030, which is a whole-of-nation movement to advance Singapore's national agenda on sustainable development. Under the "Energy Reset" pillar, SGBMP outlines targets for the Built Environment to transition to a low-carbon state in 2030.

As a highly urbanised island state, buildings account for over 20% of Singapore's carbon emissions¹. Hence, green buildings are a crucial part of Singapore's climate change mitigation strategies. Our green building journey started in 2005 with the launch of BCA Green Mark Scheme. Since 2006, BCA has launched three Green Building Master Plans and has seen an exponential growth in the Gross Floor Area (GFA) of green buildings in Singapore, from 1.1 mil m² in 2005 to more than 157 mil m² in 2021.

With the 26th United Nations Climate Change Conference (COP26), it has become an international consensus that accelerated actions are needed to lower our emission. The latest SGBMP helps to further decarbonise our Built Environment (BE) sector and supports our national climate ambition to achieve net zero emissions by or around mid-century.



¹ Based on Singapore's emissions profile in 2019.

STAKEHOLDER ENGAGEMENT

The journey for the SGBMP started in early 2020. BCA and the Singapore Green Building Council (SGBC) had co-led the SGBMP Committee, consisting of more than 80 industry stakeholders from across the entire Built Environment value chain.

Through the co-creation process, the Committee developed the vision and key outcomes of the next lap of our green buildings journey, as well as calibrated the initiatives that will effectively help drive the green building agenda forward. From March to November 2020, the Committee reached out to more than 5,000 individuals through various engagement channels to gather insights for the development of the SGBMP.

The engagement findings can be found in the [SGBMP Public Engagement Report](#) released in February 2021.

Following the launch of SGBMP in March 2021, engagement events such as webinars were organised by the Committee to raise public awareness about SGBMP and encourage the industry to adopt its initiatives.



POSSIBLE NEXT STEPS FOR SINGAPORE'S GREEN BUILDING JOURNEY

It is important to raise awareness on the benefits of green buildings to get all key stakeholders onboard.

We need to design and operate our buildings better.



We need stronger regulations to raise the minimum building standards while providing support for building owners to get there.

VISION & KEY OUTCOMES

BCA and Singapore Green Building Council (SGBC) had worked with the industry and public to co-create the vision and aspirations for the next lap of Singapore’s green building journey.

VISION

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



of Singapore Green Building Masterplan, dubbed ‘80-80-80 in 2030’, will accelerate our transition to a low-carbon Built Environment.

80% of buildings by Gross Floor Area (GFA) to be green by 2030.

- An existing target from the previous Green Building Masterplans. With majority of buildings being more sustainable and energy efficient, the carbon footprint from the day-to-day operations of our buildings will be reduced. Occupants play an important role in adopting sustainable actions in the buildings, reducing energy wastage and further lowering carbon emissions from buildings.

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

- SLE buildings encourage the adoption of passive design, renewable energy and other energy-efficient technologies. The Government will continue to take the lead in bringing SLE buildings into the mainstream and have all buildings to eventually be SLE buildings. This will greatly reduce the carbon footprint of the BE sector and combat climate change. Hence, demand for green buildings is integral in strengthening the SLE ecosystem.

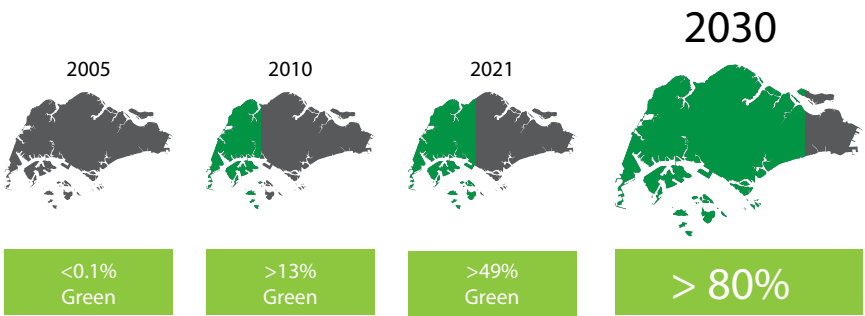
80% improvement in energy efficiency (from 2005 levels) for best-in-class green buildings by 2030.

- By pushing the technological boundaries of building energy performance through Research and Innovation, we can develop new technological solutions to further reduce buildings’ electricity consumption and carbon emissions.

80% OF BUILDINGS BY GROSS FLOOR AREA (GFA) TO BE GREEN BY 2030

1st OUTCOME

As of March 2022, more than 49% of our buildings’ GFA has been greened². This is good progress, but we need to do more.



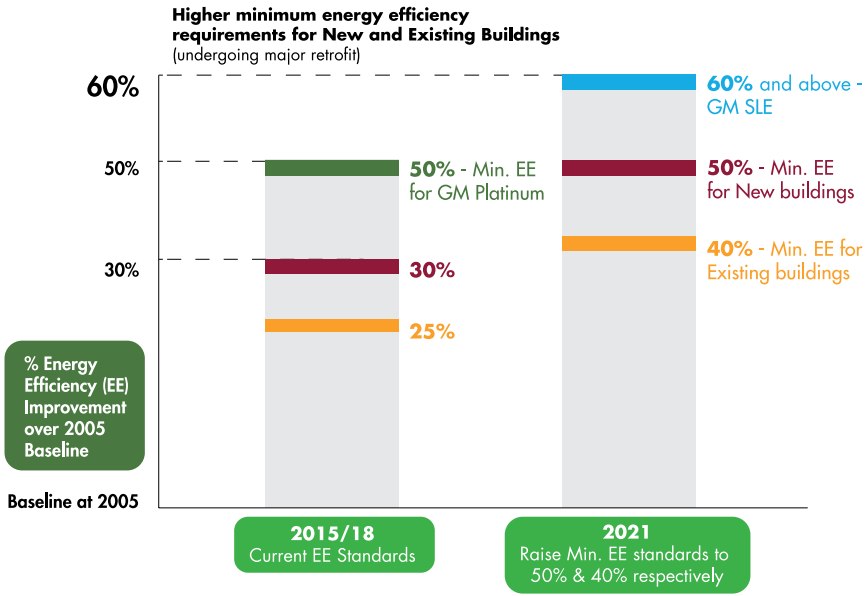
KEY INITIATIVES

- Raise mandatory Environmental Sustainability Standards
- Publication of building energy performance data
- Mandatory Energy Audit
- Green Mark Incentive Scheme for Existing Buildings 2.0 (GMIS-EB 2.0)
- Green Mark 2021 (GM: 2021)

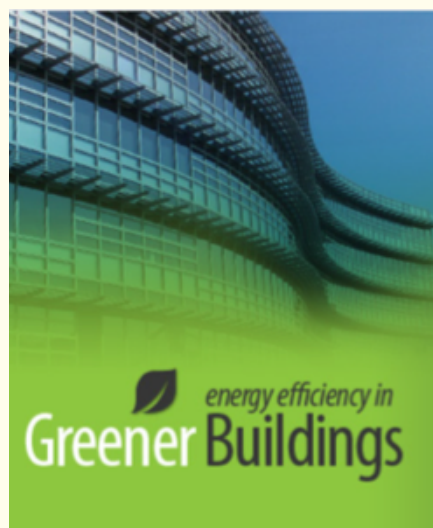
Raise Mandatory Environmental Sustainability Standards³

Our buildings are built to last, and they will stay with us for a long time. BCA has raised the mandatory environment sustainability standards to future-proof and improve the quality of our building stock.

In December 2021, BCA raised the minimum energy performance requirements for **new and existing buildings** undergoing major retrofit to achieve 50% and 40% improvement in energy efficiency over 2005 levels, respectively. For existing buildings that undergo major energy use change, the requirements will be raised from June 2022 to require 40% improvement in energy efficiency over 2005 levels. Other requirements include carbon emission reduction measures such as sustainable construction requirements.



² A building is considered to be green if they meet minimum environmental sustainability standards (effective as of Apr 2008) or achieve BCA’s Green Mark certification.
³ All new buildings and existing buildings undergoing major retrofitting works or major energy use change (with GFA of 5,000 sqm or more) are required to meet minimum environmental sustainability standards.



Publication of building energy performance data to nudge behavioural change

All building owners have been required to submit their building energy performance data annually since 2013. Over the years, BCA has gradually taken steps to increase the transparency of such data to the public. Since October 2021, BCA has identified all commercial buildings in the

published energy performance data and will progressively expand this to cover other types of buildings. This will allow building owners to **benchmark their buildings** against others at no additional cost and spur them to improve their energy efficiency.



Nudging Poor Performers

To further encourage owners of poor performing buildings towards energy performance improvements, BCA is exploring to require buildings with consistently high energy consumption to conduct an energy audit to create greater awareness on the gaps as well as potential areas and business case for improvement through appropriate EE measures.

The poor performers will be identified through the annual mandatory submission exercise via Building Energy Submission System (BESS) based on robust criteria co-created under the SGBMP.

Green Mark Incentive Scheme for Existing Buildings 2.0 (GMIS-EB 2.0)

GMIS-EB 2.0 is an outcome-based incentive scheme to encourage improvement of existing buildings to achieve best-in-class environmental sustainability performance beyond legislative standards. The scheme will be made available to privately-owned buildings with GFA exceeding 5,000 m² that undergo retrofitting works to improve their energy efficiency⁴.

The incentive scheme will support building owners in alleviating the upfront capital expenditure costs of energy efficiency retrofits and encourage greater carbon reduction outcomes by providing a higher funding factor for existing buildings striving for higher performance such as Green Mark Platinum, Super Low Energy and Zero Energy.



⁴ Based on a list of works approved by BCA. Some examples include retrofits to cooling systems, lighting and lifts; installation of solar photovoltaics or other renewable energy sources; building automation systems and sensors; and redesigning spaces to incorporate natural ventilation or hybrid cooling.

Green Mark 2021 (GM: 2021)

Since 2005, the Green Mark (GM) scheme has been a key lever and performance benchmark for various green building policies. Today, Green Mark has become one of the world's leading green building certifications and is the go-to standard for green buildings in the tropics.

BCA and SGBC have engaged key stakeholders to revise the GM framework to raise energy performance standards and place greater emphasis on other sustainability outcomes including health and well-being.

GM: 2021 is aligned with the United Nation's Sustainable Development Goals, incorporates the principles of the World Green Building Council's Health & Wellbeing framework, and takes reference from leading international professional standards such as the Whole Life Carbon calculation methodology developed by the Royal Institution of Chartered Surveyors.



Released as a pilot version in April 2021, close to 30 projects and more than 50 industry practitioners have come onboard to pilot the framework. BCA had fine-tuned the criteria incorporating industry feedback. The BCA Green Mark 2021 (GM: 2021) was then launched by Minister Desmond Lee, Minister for National Development & Minister-in-Charge of Social Services Integration, at the International Built Environment Week (IBEW) in September 2021. From 1 November 2021, all new Green Mark applications made will be under the GM: 2021 framework.



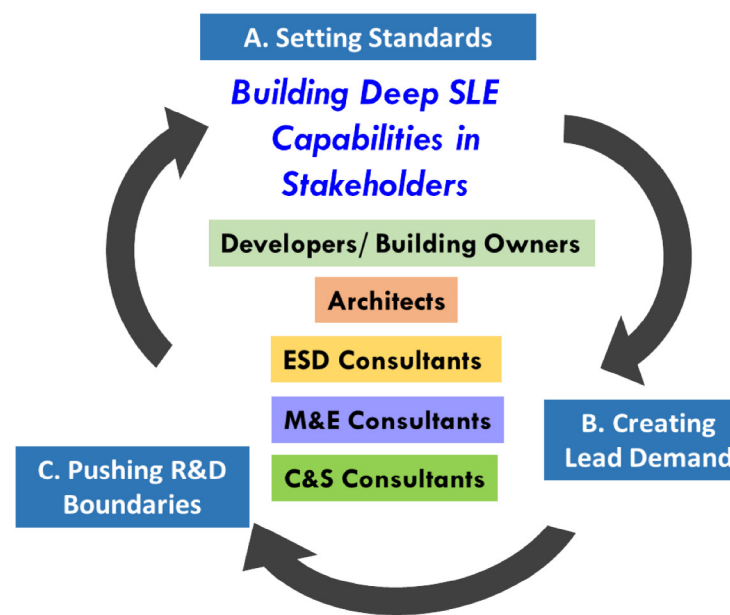
80% OF NEW DEVELOPMENTS BY GFA TO BE SUPER LOW ENERGY (SLE) FROM 2030

2nd OUTCOME

The Super Low Energy (SLE) programme⁵ was launched in 2018 to encourage the industry to achieve best-in-class building energy performance in a cost-effective manner. The SLE Challenge was also launched to invite developers to undertake at least one SLE project within 5 years. Under the GreenGov.SG initiative, the Government will continue to take the lead in bringing SLE buildings into the mainstream. BCA will also introduce further measures to drive adoption of SLE buildings in the private sector.

KEY INITIATIVES

- GreenGov.SG
- Raise Environmental Sustainability Standards for projects under GLS programme
- Built Environment Transformation GFA incentive scheme
- Develop SLE standards for residential buildings



GreenGov.SG

Since 2006, the public sector has been taking the lead on environmental sustainability for their buildings under the Public Sector Taking the Lead in Environmental Sustainability initiative.

In line with the [Singapore Green Plan 2030](#), the GreenGov.SG sets ambitious sustainability targets⁶ and measures to steer the public sector to peak its carbon emissions around 2025, ahead of Singapore's national target. The Government will continue to take the lead in bringing SLE buildings into the mainstream and drive the public sector towards a low carbon Built Environment, in tandem with our Singapore Green Building Masterplan. We hope to drive greater demand for SLE buildings, build up use cases and industry capabilities in developing SLE buildings.



⁵ SLE buildings refers to buildings that have achieved at least 60% improvement in energy efficiency compared to 2005 levels

⁶ Under the GreenGov.SG initiative,
 o All new and existing public sector buildings (upon major retrofit) are to achieve Green Mark Platinum Super Low Energy (SLE) standards.
 o Government data centres to achieve the Green Mark Platinum standard by 2025.
 o All new and existing public sector buildings (upon Additions & Alterations) are to achieve the Maintainability (Mt) Badge.

Raise Environmental Sustainability Standards for building projects developers on land sold under the Government Land Sales (GLS) programme

Today, selected developments on Government Land Sales (GLS) sites are required to achieve minimum productivity and sustainability outcomes under the BCA's Building Control Regulations.

BCA and URA have enhanced the requirements for sites sold under the [Government Land Sales \(GLS\)](#) to drive higher Construction Industry Transformation Map (ITM) outcomes. This includes the adoption of Integrated Digital Delivery (IDD), level-up adoption of refabrication and Design for Manufacturing and Assembly (DfMA) and raise the minimum environmental sustainability requirement to Green Mark Platinum SLE, effective from 2Q 2022.



Photo Credit: Ministry of National Development

Built Environment Transformation Gross Floor Area (BE Transformation GFA) Incentive Scheme to encourage buildings to strive for best-in-class GM and SLE standards

To drive adoption of SLE buildings in the private sector, BCA and URA launched the [BE Transformation GFA Incentive Scheme](#) to incentivise the BE sector to adopt and deliver the ITM outcomes in the areas of digitalisation, productivity, and sustainability transformation in the BE sector. The incentive was first announced by Minister Desmond Lee, Minister for National Development & Minister-in-Charge of Social Services at the REDAS 62nd Anniversary Awards Presentation and Dinner.

Under this scheme, developers/building owners of private projects will enjoy up to 3% additional GFA beyond the Master Plan Gross Plot Ratio (GPR) for delivering the stipulated ITM outcome requirements (e.g. GM Platinum SLE standards) in their building development on private sites of at least 5,000 sqm GFA⁷.

Develop SLE standards for residential buildings

As residential buildings make up a significant portion of our building stock, BCA had also extended and calibrated the [SLE standards for Residential Buildings](#) with industry associations and agencies as part of GM: 2021. This new standard will be awarded to best-in-class energy performing residential buildings that achieve at least 60% improvement in energy efficiency over 2005 levels.



⁷ The qualifying criteria of 5,000 sqm in GFA considers the fact that larger developments tend to achieve sizeable productivity and sustainability outcomes. Smaller developments of less than 5,000 sqm GFA may be considered on a case-by-case basis if agencies determine that sizeable productivity and sustainability outcomes relative to the development proposal can be achieved based on ITM measures proposed.

80% IMPROVEMENT IN ENERGY EFFICIENCY FOR BEST-IN-CLASS BUILDINGS BY 2030

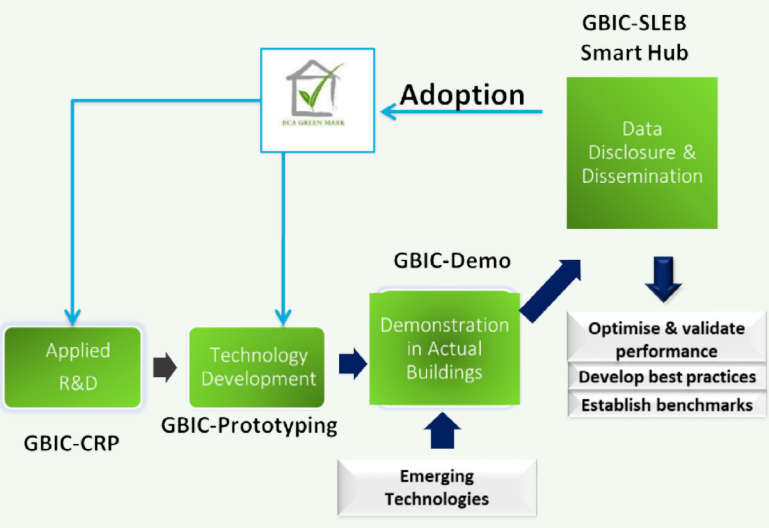
3rd OUTCOME

Currently, we have achieved 65-70% improvement in energy efficiency compared to 2005 levels, for best-in-class buildings. BCA will continue to push the boundaries of energy efficiency through technology development and demonstration under the Green Buildings Innovation Cluster (GBIC) programme.

Established in 2014, the programme serves as a one-stop research, development and demonstration platform for technologies and innovations that lead to highly energy efficient buildings. To date, GBIC programme has supported the development of more than 60 innovative technologies from more than 50 firms. Moving forward, BCA will enhance funding for GBIC with a further \$45 million.

KEY INITIATIVES

Green Buildings Innovation Cluster (GBIC) Programme



GBIC Research and Development (GBIC R&D)

GBIC R&D aims to build deep research and development (R&D) capabilities for industry and academics. This is achieved through supporting innovative proposals that would lead to significant improvement in energy efficiency with high potential for adoption.

GBIC Prototyping

GBIC Prototyping is a scheme that helps firms to engineer R&D outcomes into commercial solutions and bring technologies from the lab to the marketplace.

GBIC Demonstration (GBIC Demo)

GBIC Demo is a dedicated building demonstration scheme that allows innovative technologies to be integrated in actual buildings at a commercial scale to deliver exemplary best-in-class buildings.

SLE Buildings (SLEB) Smart Hub

SLEB Smart Hub is a national database for technologies and solutions that improve energy efficiency. Its online portal and embedded resource tools allow for the creation and dissemination of actionable knowledge to the industry and research community. The various energy efficient assessment tools available help home, building and business owners to predict and improve buildings' energy consumption. Industry engagement workshops are carried out periodically to train end-users on the functions and features of the SLEB Smart Hub.

GBIC 2.0

To further push the boundaries of energy efficiency, BCA will enhance funding for the [GBIC programme](#) with a further \$45 million. The enhanced programme (GBIC 2.0) will focus on three key areas with significant impact on energy and carbon emissions - alternative cooling technologies, data-driven smart building solutions and advanced ventilation technologies. BCA will also accelerate the commercialisation of these solutions through industry partnerships.

GREEN-TECH DIRECTORY



BUILDING ENERGY-EFFICIENT DATA



OTHER MEASURES

We will also leverage on the following enablers to encourage the adoption of green buildings:

Green Financing

Singapore can play a useful role in catalysing green finance in the region. Monetary Authority of Singapore (MAS) is steering the financial sector towards a strong sustainability focus by launching its Green Finance Action Plan. This will support a sustainable Singapore and facilitate Asia's transition to a sustainable future. Green Finance is a key enabler to encourage adoption of green buildings.

To facilitate companies' access to green financing, the Monetary Authority of Singapore (MAS) launched the Green and Sustainability-Linked Loans Grant Scheme (GSLs) in January 2021. The scheme helps companies defray the cost of conducting independent assessments to validate the sustainability credentials of a loan. It also supports banks in the development of green and sustainability-linked loan frameworks. Such frameworks

provide standardised criteria and processes for the assessment and issuance of loans to finance activities that contribute to sustainable development, such as the construction of green buildings.

BCA and MAS are also working with BE Trade Association and Chambers (TACs) (e.g. SGBC, Real Estate Developers' Association of Singapore (REDAS)) to build green financing capabilities in banks/financial institutions (FIs) and BE firms. This includes engaging banks/FIs on the Green Mark scheme and recognition of green building certification standards for meeting green financing requirements, and conducting workshops to raise awareness on green financing schemes for BE firms.

Moreover, building owners who need financial assistance to improve the energy efficiency of their buildings may tap on the Building Retrofit Energy Efficiency Financing (BREEF) scheme, up to March 2023.

Workforce Development

BCA targets to train 25,000 green professionals to support the Green Buildings pillar of the Construction ITM by 2025. As of September 2021, more than 22,000 green professionals have been trained through courses conducted by IHLs, TACs and BCA Academy.

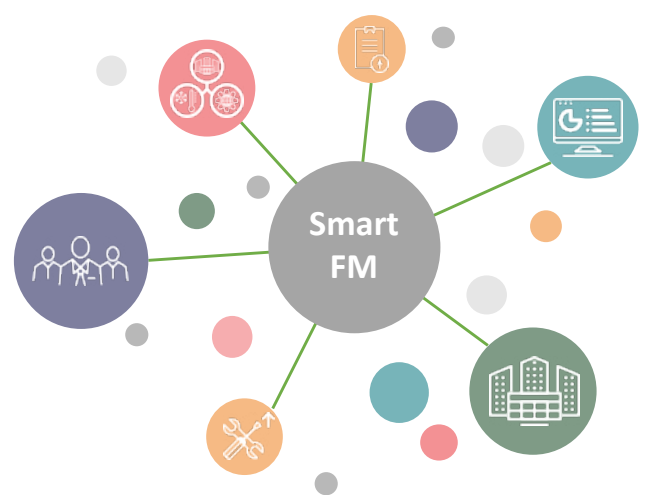
The Green Mark Professional Qualification Scheme recognises professionals with specialist knowledge in the design and operation of environmentally friendly buildings. BCA also works with SGBC on the Continuing Professional Development certification renewal framework to ensure that certified Green Mark Specialists continue to keep their knowledge and skills current with industry and regulatory developments.

As we shift towards a low-carbon Built Environment, there will be an expected need to grow in quantity and quality of green professionals to deliver our key sustainable outcomes in SGBMP and beyond.

Facilities Management (FM)

Design for Maintainability (DfM)

Buildings must be designed for maintainability to perform optimally and sustainably. DfM is the practice of integrating operations and maintenance experience into project planning, design, and construction processes to achieve ease, accuracy, safety, and economy of maintenance tasks throughout the life of the facility.

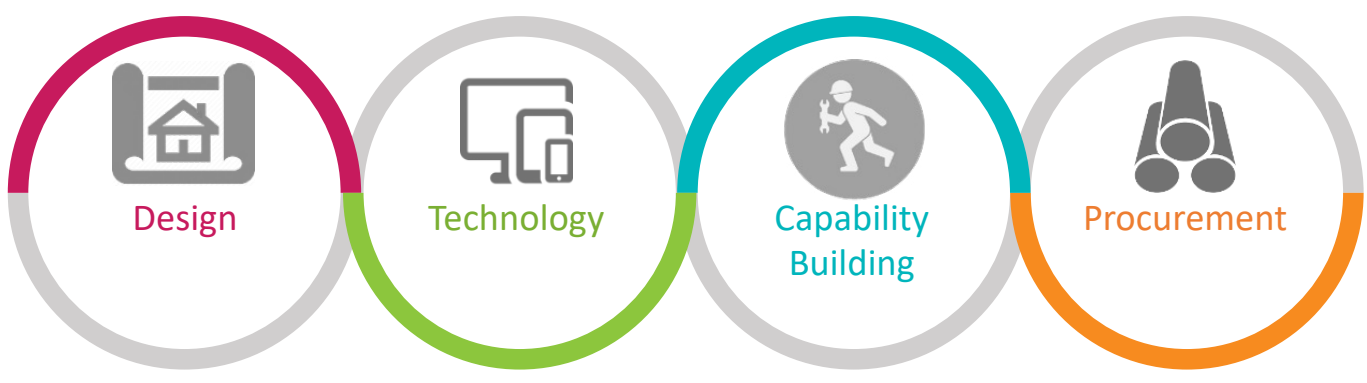


Smart FM

Maintenance capabilities can be enhanced through adoption of Smart FM to raise productivity, improve quality and efficiency, reduce labour intensity and enhance FM service delivery. This can be achieved through data analytics, predictive maintenance, and smart technology solutions. Find out more in the [Guide to Smart FM](#) that serves as an easy-to-use reference to facilitate the implementation of Smart FM to various building typologies and FM operations models.

Integrated FM and Aggregated FM (IFM & AFM) Grant

BCA will introduce a \$30 million [IFM & AFM Grant](#) to support projects with up to 70% of the qualifying costs in the adoption of progressive FM procurement and strategies, processes and technologies. The scheme seeks to get leading Facilities Management Companies (FMCs) and service buyers to collaborate as partners to deliver multiple FM services in an integrated manner across at least 3 buildings and various building typologies (e.g. offices, retail malls, hotel, educational institutions, light industrial, healthcare). The scheme is available in 3Q 2022.



HOW CAN YOU CONTRIBUTE TO OUR GREEN JOURNEY



Sustainability in Singapore programme (SiS)

You can have the most energy-efficient cooling system with smart controls in place, but people may still change the temperature settings, leave the doors wide open, or block the sensors so they do not work as efficiently as intended. This is where behavioural change comes in.

The [Sustainability in Singapore \(SiS\) programme](#) trains individuals (Green Ambassadors) to design and implement scalable campaigns in their building premises to educate, engage and change behaviours of fellow building users to be more sustainable. It supports organisations to achieve their sustainability ambitions and helps to reap energy savings and reduces waste, decreasing the building's overall impact to the environment. Achieving these goals also help with monetary savings in the long run. Sign up for the SiS programme to effect behavioural change in your workplace today.

GREENBUILDINGS.SG

A resource hub dedicated to help homeowners and the general public have a better understanding of green buildings and their benefits to human health and well-being, GREENBUILDINGS.SG condenses sustainability outcomes into the three action-oriented pillars of 'Go Natural, Go Healthy, Go Smart'. The content contained in the resource hub provide a starting point for homeowners and the wider community to build green into their homes, with a variety of tips, tools and interactive games to meaningfully convey sustainability messages. With the increasing emphasis on the effects of climate change, green buildings are in a prime position to not just accelerate decarbonisation efforts but also provide healthier, more equitable spaces for everyone, everywhere.

Green Home, Healthy Home, Happy Home.

