50TH ANNIVERSARY
Schneider Electric Singapore

Going Green from the Inside Out

Accelerating Green Building Adoption in Singapore

April 2023

A joint report by

Schneider Electric and Singapore Green Building Council

Message By Singapore Green Building Council

Building a greener future from the inside out

Studies from around the world show that the average person spends around 90% of their day indoors. With so much time spent on the inside of building spaces, creating the cleanest and greenest built environments possible is vital for fostering healthy communities.

When also considering projections by the United Nations that the global population could increase by over 20% to 9.7 billion people and that 68% of the world population is projected to live in urban areas by 2050, the case for greening our built environment becomes even stronger as the quality of life and livelihoods will very much be shaped by people's living environments.

Today in Singapore, at least 49% of buildings are considered green. The "80-80-80 in 2030" goals set out in the Singapore Green Building Masterplan (SGBMP) which comes under the Singapore Green Plan 2030, targets for 80% of Singapore's buildings (by gross floor area) to be green by 2030; for 80% of new developments to be Super Low Energy from 2030; and for an 80% improvement in energy efficiency for best-in-class buildings based off 2005 levels by 2030.

These are unquestionably ambitious targets, but with Singapore's buildings accounting for over 20% of its carbon emissions, drastic action is needed to preserve and protect the environmental health of our city-state and its people, and to meet our commitments as a signatory to the Paris Agreement, which Singapore ratified in 2016.

Beyond doing our part to reduce carbon emissions, green building features can also be employed to help reduce waste, conserve water usage, adopt better construction materials and approaches, and provide healthier living and working environments with aspects such as better air quality and reduced exposure to toxins.

However, none of this can be achieved in isolation. Realising Singapore's green building targets will require concerted efforts by both public and private stakeholders, working in collaboration with the best

Message By Singapore Green Building Council

global experts in science and technology to help guide us towards our goals.

We hope that this joint report prepared in partnership with SGBC Founding Member Schneider Electric will provide useful insights in moving the green building agenda forward.

For example, from the findings, we can see that growing awareness about what constitutes a green building is important given that most business leaders in Singapore (51%) only have a general understanding of this area. The study also reveals that perception issues around 'costs and ROI' are still the biggest barrier for organisations for green building adoption. We must act to increase education and alleviate these concerns.

At the same time, it is encouraging that sustainability considerations and energy efficiency have been identified as the top two drivers for the adoption of green buildings, and most organisations are still highly supportive of the 2030 targets. These are promising trends that bode well for Singapore's journey to realise a greener future.

With just seven years to go, the 2030 goals are not impossible. To accelerate progress, stakeholders - building owners, developers, construction companies, tenants as well as corporates must commit to the green agenda and forge a concerted private-public sector partnership to achieve a world-class and sustainable built environment in Singapore. Indeed, stakeholders must share in this common goal and take the necessary and aggressive steps to reduce their carbon footprint.

As a nation, we have always strived to be leaders globally in any challenge or task we set our efforts to, and I believe that with this same spirit and a firm focus on innovation, we can achieve the same with the sustainability of our building sector.

At SGBC, we remain committed to advocating for green building design, best practices, and technologies. We will also continue to advocate for regulatory support from the government and foster innovative industry solutions across the entire building and construction value chain. I'm certain that by sharing our industry knowledge and with more research data on green buildings, we can empower more organisations to make efficient and strategic decisions for a greener tomorrow.

I would like to thank all SGBC Board and Technical Committee members who have taken the time to contribute their valuable insights to this report. Last but not least, on behalf of SGBC, I would also like to convey my heartiest congratulations to Schneider Electric on marking its 50th anniversary in Singapore this year. SGBC looks forward to working closely with industry partners like Schneider Electric to realise a greener built environment sector and to profile Singapore as a leading Sustainable Hub in the tropics.

Lee Ang Seng
President
Singapore Green Building Council

Foreword by Schneider Electric Singapore

Catalysing action with the right technology and partnerships

Efforts to combat the effects of climate change have been gaining momentum in recent years, with public and private stakeholders across every sector committing to sustainability targets and decarbonisation goals to make a difference. The built environment sector itself is responsible for 40% of global carbon emissions, and highly-developed countries such as Singapore recognise that green building adoption is one of the most effective ways to mitigate climate change.

In line with this, it is heartening that our joint report with SGBC finds that momentum around green buildings is gathering pace. Over half of business leaders surveyed say their organisation has plans to increase its investment in using green buildings in the next one to two years.

At Schneider Electric, we believe that buildings of the future must be sustainable, resilient, hyper-efficient and people-oriented. They should be all-digital and all-electric – having minimal or no negative impact on the environment, while also enhancing the well-being of their occupants. Technology is an enabler and stakeholders – from building owners, developers, operators to companies – must harness the immense potential that existing smart and innovative solutions can already offer to accelerate progress towards the goals under the Singapore Green Plan 2030. Building owners and operators, for example, can already leverage big data and AI to greatly lower operating costs and improve productivity by addressing space management, operational efficiency, and the occupants' experience.

We recognise that there appears to be stumbling blocks in achieving progress with 61% of respondents indicating that "cost and return on investment (ROI)" is their biggest concern when looking to increase the use of green buildings in the next one to two years. While there may be pressures amidst the current energy crisis and inflation, stakeholders must persevere and not scale back on their sustainability efforts. It is important for organisations to work with the right partner to deploy the right technological solutions that empower them to make greater strides in their sustainability journeys.

Foreword by Schneider Electric Singapore

Partnerships are key in moving from ambition to action and in making a collective difference.

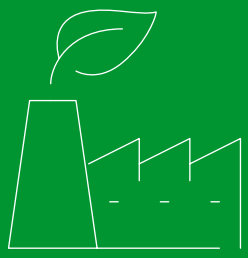
It is truly a delight to bring to you this report developed in collaboration with SGBC which I hope will be useful in inspiring stronger climate action within the built environment sector.

As Schneider Electric marks its Golden Jubilee in Singapore this year, this report also reflects our strong commitment to advancing Singapore's journey to net zero and fostering impactful partnerships to make it a reality. Together, we can build a greener Singapore for generations to come.

Yoon Young Kim
Cluster President
Schneider Electric Singapore,
Malaysia, Brunei

Introduction

This report presents and analyses the findings of a survey by Schneider Electric involving **500 business leaders** across 340 Large Corporates/ MNCs and 160 Small and Medium Enterprises (SMEs) in Singapore, as well as findings from a qualitative study conducted with members of the Singapore Green Building Council (SGBC) on the state and perceptions of green buildings in Singapore. The field work was undertaken between October 2022 and February 2023.



The business leaders surveyed in Schneider Electric's survey represent a broad range of industries including **Commercial Real Estate**; **Consumer Goods**; **Construction and Buildings**; **Energy**; **Finance and Banking**; **Food & Beverage**; **Education/School Administration**; **Government**; **Healthcare**; **Hotel, Hospitality and Tourism**; **Industries and Manufacturing**; **Media/Communications**; **Mining, Metals & Minerals**; **Non-Profit Organisations/NGOs**; **Oil and Gas**; **Professional Services**; **Retail & Apparel**; **Technology, Cloud, Data and Telecoms**; **Transportation**; and **Utilities**.

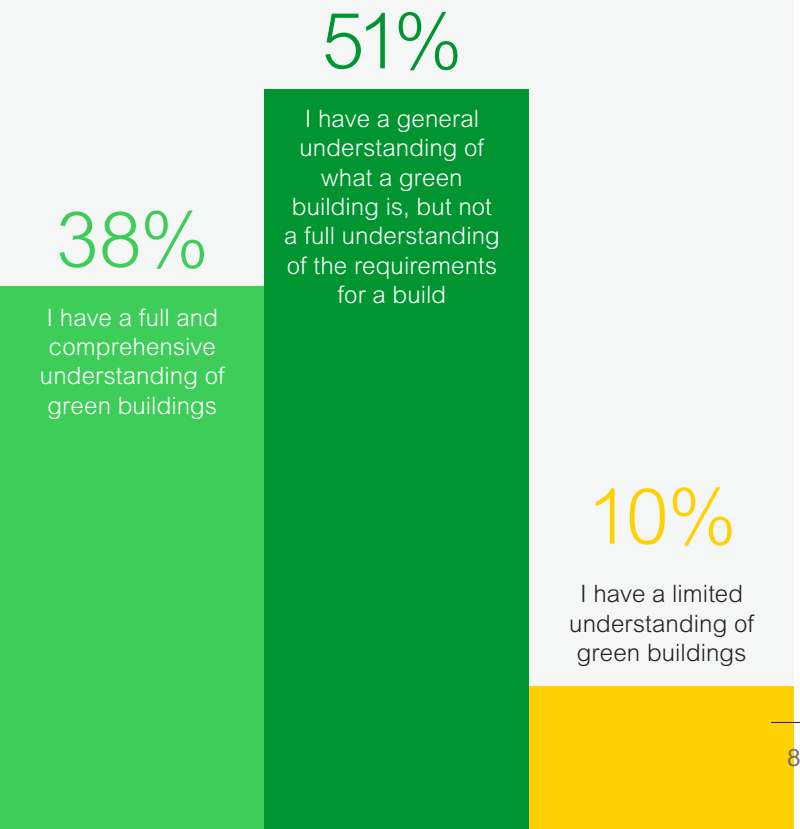
Stakeholders who participated in the qualitative study are SGBC's Board as well as Technical Committee members. They include representatives from the **Building and Construction Authority (BCA)**, **DP Green**, the **National University of Singapore's Energy Studies Institute**, **Lendlease**, and the **National University of Singapore (NUS)**.

Given the extensive range and backgrounds of respondents who participated in the survey, any references to "use of" or "utilising" green are being applied broadly. Depending on the context, these terms can refer to either investing in, developing, owning, adopting, or simply leasing green buildings. Percentages reflected in this report have also been rounded off to the nearest whole number.

Most business leaders in Singapore have only a general understanding of green buildings

Singapore has been pushing to realise a greener and more sustainable built environment for over a decade, particularly in 2005 with the introduction of the Building and Construction Authority (BCA) Green Mark scheme – a comprehensive framework and rating system aimed at driving sustainable design and best practices in the construction and operations of buildings. Such efforts are instrumental in raising awareness and understanding of what green buildings are.

What is your level of understanding of green buildings?



Our survey indicates that such efforts have made some impact, with most business leaders (51%) in Singapore saying they have at least a general understanding of green buildings. However, to achieve greater progress, it is crucial to strengthen this understanding so as to spur stronger action. In fact, with only four in 10 (38%) having a comprehensive understanding, the opportunity to help more business leaders develop a deeper knowledge of green buildings is clear.

Sharing their views on these findings, SGBC members broadly concurred that more must be done to raise the level of understanding around green buildings. Some suggested that a higher level of understanding can be achieved through stronger engagement with stakeholders, including building owners and tenants, so that they can better grasp the importance of green buildings and their role in tackling climate change.

"While green buildings tend to be of key interest to building developers, business owners who are renting the premises may be more concerned about cost than the "greenness" of the building," reflected **Alvin Ee, Research Fellow, NUS Energy Studies Institute**.

One participant, **Yvonne Tan, Director, DP Green**, also highlighted that it is particularly important to provide the business community with better clarity and feasibility on how they can go about greening older and existing buildings, as "it is easier to have newly built green buildings."

Nonetheless, awareness is simply a means to an end, reminds **Dr. Stephen Tay, Senior Lecturer, National University of Singapore**. "Knowledge is important, but if it is not accompanied by meaningful action, there will not be any change in the industry."

Low awareness may be holding back adoption, but momentum is expected to pick up

Through their design, construction and operations, green buildings not only mitigate negative effects on our climate and natural environment, but they can also leave a positive impact on corporate image, leasing and the resale value of buildings. Such buildings also provide better indoor environmental qualities for the health and well-being of their occupants.

However, the survey indicates that in line with the lack of a comprehensive understanding of green buildings, low awareness of these benefits may be holding back greater adoption of green buildings. This is because when asked about their organisation's position in relation to using green buildings for operations in Singapore, only 12% of those surveyed said all of their operations already utilise green buildings.

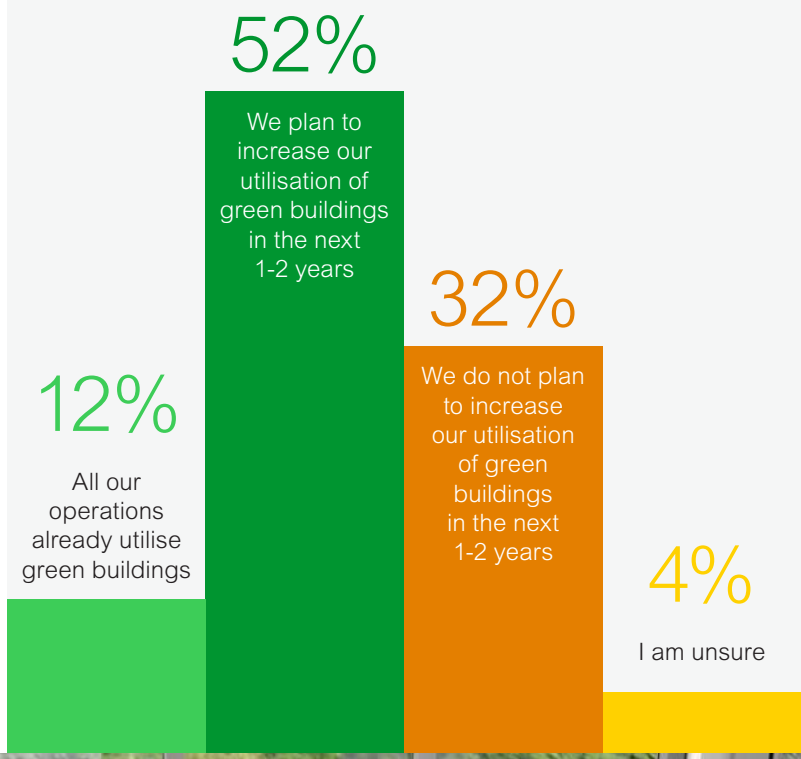
To drive greater adoption of green buildings, some SGBC members suggested facilitating targeted advocacy efforts and more knowledge-sharing sessions and workshops to highlight the benefits of green buildings.

Looking ahead, the adoption of green buildings is expected to gain momentum in the coming years, with over half (52%) saying their organisation has plans to increase its investment in utilising green buildings in the next one to two years.

A direct correlation is also seen between an organisation's current utilisation of green buildings and plans to increase this. Those with more than 50% of their operations already utilising green buildings are the most likely group to have plans to increase their utilisation of green buildings over the next one to two years.

Broadly, SGBC members found these findings encouraging and are optimistic that the ambitious "80-80-80 in 2030" target has and will continue to set an important vision and direction for stakeholders to invest in utilising green buildings.

What is your organisation's position in relation to using green buildings for its operations in Singapore?

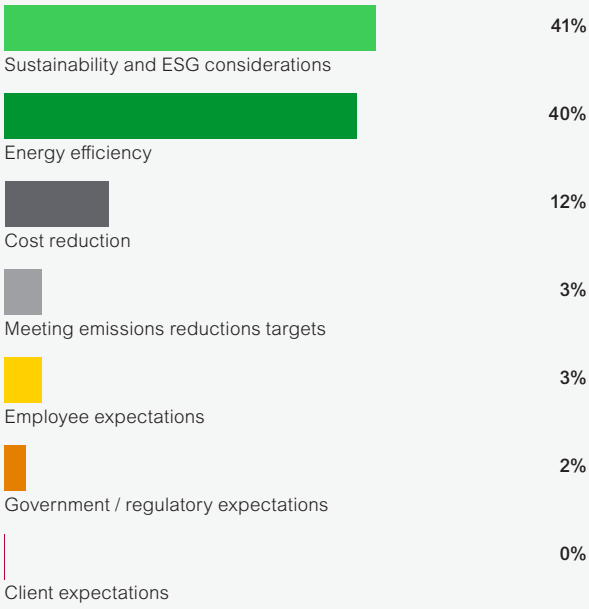


Sustainability considerations and energy efficiency are the top drivers for adoption

Among those who are looking to invest in utilising green buildings in the next one to two years, the survey showed that the top two drivers to do so are “sustainability and ESG considerations” (41%), followed by “energy efficiency” (40%).

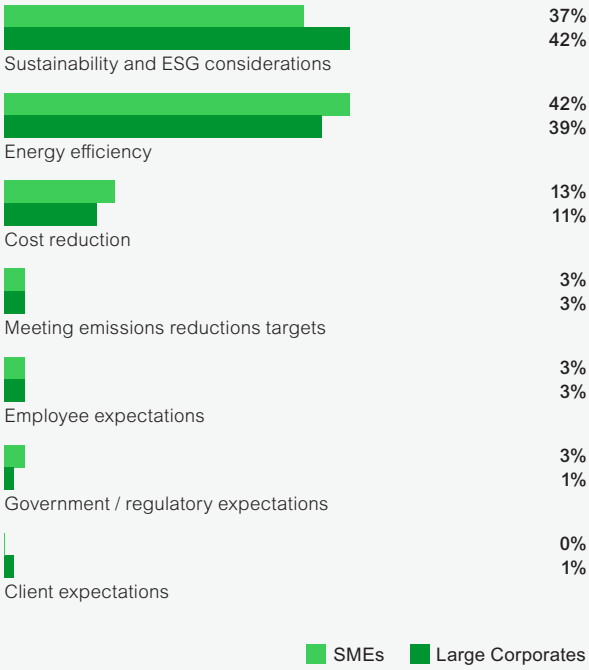
SGBC members generally concurred with these findings – with some highlighting that “sustainability and ESG considerations” emerging as a top driver shows how organisations can be value-driven, which bodes well for Singapore’s journey of realising its net zero ambitions.

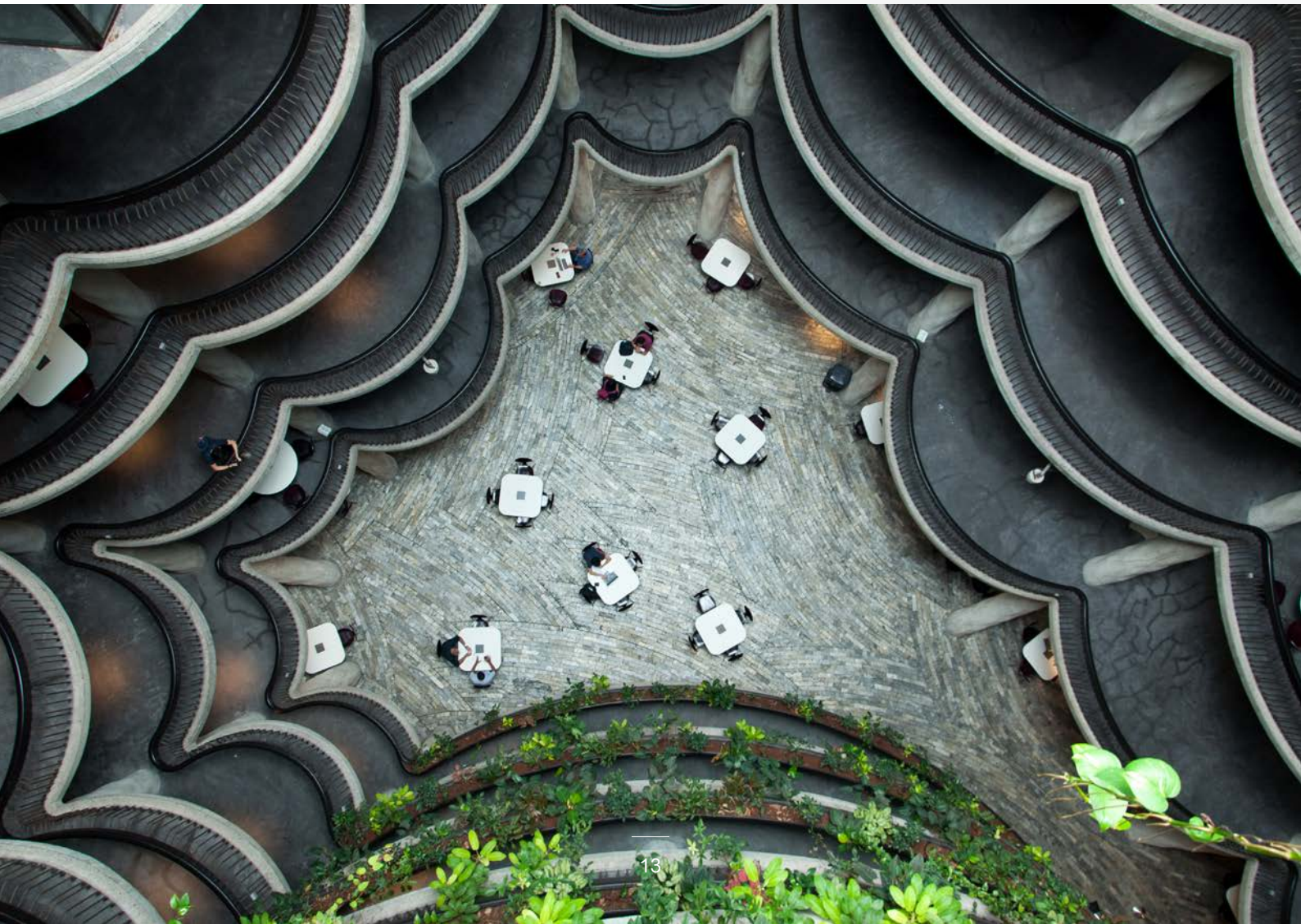
What is the top driver for your organisation looking to increase use of green buildings in the next 1-2 years?



Nevertheless, there are some slight differences between large corporates and SMEs. Of the top two drivers, large organisations were more likely to rank “sustainability and ESG considerations” as their top driver (42%), compared to SMEs (37%); while SMEs were more likely to rank “energy efficiency” as their primary driver (42%), compared to large organisations (39%).

What is the top driver for your organisation looking to increase use of green buildings in the next 1-2 years?





Cost and ROI seen as the biggest barrier to increasing access to green buildings

61% of survey respondents cited “cost and return on investment (ROI)” as their biggest barrier when looking to increase the use of green buildings in the next one to two years. This highlights the opportunity to convince more organisations to tap on the various support schemes available and reap the benefits.

For example, in order to build greater emphasis on not just the overall building performance but the quality of the indoor environment as well, BCA introduced the Green Mark for Healthier Workplaces (GM HW) scheme to strengthen the business case for energy-efficient, resource efficient and healthier interior spaces. GM HW would appeal to companies that place emphasis on both health and well-being in addition to environmental sustainability in the office and also aims to provide a clearer and stronger business case for office sustainability by placing occupants health, well-being and comfort at the forefront of office design and daily operations. There is also the $63-million Green Mark Incentive Scheme for Existing Buildings 2.0, to raise the energy performance of existing buildings and step up the pace to green 80% of our buildings by 2030. The Scheme particularly offers grant support to building owners on their goals to attain higher energy performance by lowering the upfront capital costs for energy efficiency retrofits and improving the returns on investment, particularly for buildings meeting Super Low Energy or Zero Energy standards.

SGBC members agreed that more can be done to raise awareness of such schemes and to demonstrate their clear impact through the sharing of past participants’ success stories. In sharing these success stories, it is also important to highlight how existing energy-efficient solutions can have good ROI and that the barrier of any upfront costs can be alleviated.

Venky Solaimalai, Regional Head of Technical Management at Lendlease, said "We want to achieve more, but the market, in general, is not mature enough to aid us in doing that. Take embodied carbon for instance. We want to actively seek out for alternatives to help us reduce our embodied carbon percentage. But we generally see a lack of product availability and option to aid us in doing so."

A senior leader from a technology solutions provider, said "Many cost-effective solutions with good return-on-investments exist today," he explained. "Benefits and ROI can be quantified efficiently through digital means including Artificial Intelligence and digital simulation."

What are the top three barriers for your organisation when looking to increase use of green buildings in the next 1-2 years?

61%

Cost / concern about return on investment

39%

Other barriers

Lack of public / government funding available	15%
Lack of resources	8%
Difficulty to transition our current building locations to be green buildings	6%
Lack of expertise	5%
Lack of adequate building space available for relocation	1%
It's not regulatory requirement at this time	1%
It's not a priority for our organisation at this time	1%

There were also suggestions for greater collaboration between stakeholders, including financial institutions, to better facilitate green investments.

Dr. Stephen Tay, Senior Lecturer, National University of Singapore, said "What an organisation considers a healthy return on investment or even what makes something cost-effective varies widely among industries, sectors, and stakeholder groups. Therefore, engaging stakeholders in common platforms and mediums to coordinate the transfer of knowledge and technology is imperative for meaningful green building adoption. He added that "workshops and industry engagement conferences that bring together participants from academia, industry, public sector agencies and regulators, such as the Singapore International Energy Week are incredibly useful for stakeholders to share best practices and realise that cost-effective solutions exist out there for their application."

Varied applications of green building features – with large gaps between those with intention and those who have adopted the features

Apart from concerns over costs and ROI, the survey showed that there is a varied application of green building features among those surveyed. The most common green building features currently in use are for “efficient energy use and management” (60%), with the next features for good indoor air quality (44%), followed by features for employee well-being (42%). Notably, 32% of those surveyed said they have no plans to or knowledge in using renewable energy sources.

But most crucially, the survey indicated that large gaps exist between those who intend to use and those who have adopted green building features. For instance, while 53% responded that they intend to onboard environmental impact minimisation features, only 29% of respondents currently adopt such features. In the same vein, while 43% said they intend to onboard features that use non-toxic, ethical and sustainable materials, comparatively only 33% currently adopt such features.

What are your intentions in relation to these green building design and functionality features?

Design and functionality features	Currently use	Intend to use	No plans or knowledge to use
Efficient energy management	60%	26%	14%
Efficient water management	34%	50%	16%
Use of renewable energy sources	36%	32%	32%
Environmental impact minimisation	29%	53%	19%
Use of non-toxic, ethical, sustainable materials	33%	43%	24%
Pollution/waste reduction	32%	41%	27%
Considerations of wellbeing/quality of life	42%	30%	27%
Consideration of good air quality	44%	29%	27%

Weighing in on this, some SGBC members shared that budget constraints, perceived high costs, resistance to change, a lack of in-house capabilities as well as a lack of quantifying the benefits at the decision-making level are some likely reasons for the gaps between those who intend to use and those who have already adopted green building features.

Others said the gaps will eventually narrow as it would take some time for implementation to take place and that leadership must see it as a priority to effect change faster.

Most business leaders are highly supportive of Singapore's Green Plan 2030 targets

The study also found that most business leaders are highly supportive of Singapore's Green Plan 2030 targets, with 95% agreeing that 80% of Singapore's buildings should be 'green' by 2030, and a whopping 98% agreeing that 80% of Singapore's buildings should be 'Super Low Energy' by 2030. That said, of those who indicated support for the latter goal, 56% believe the target should be lower in order for it to be more realistic and achievable.

While SGBC members recognised that these are ambitious targets that would require significant improvements and investments to infrastructure, they were encouraged by the strong support thus far, and noted that providing additional guidance like stronger policy tools could help organisations make the transition more effective.

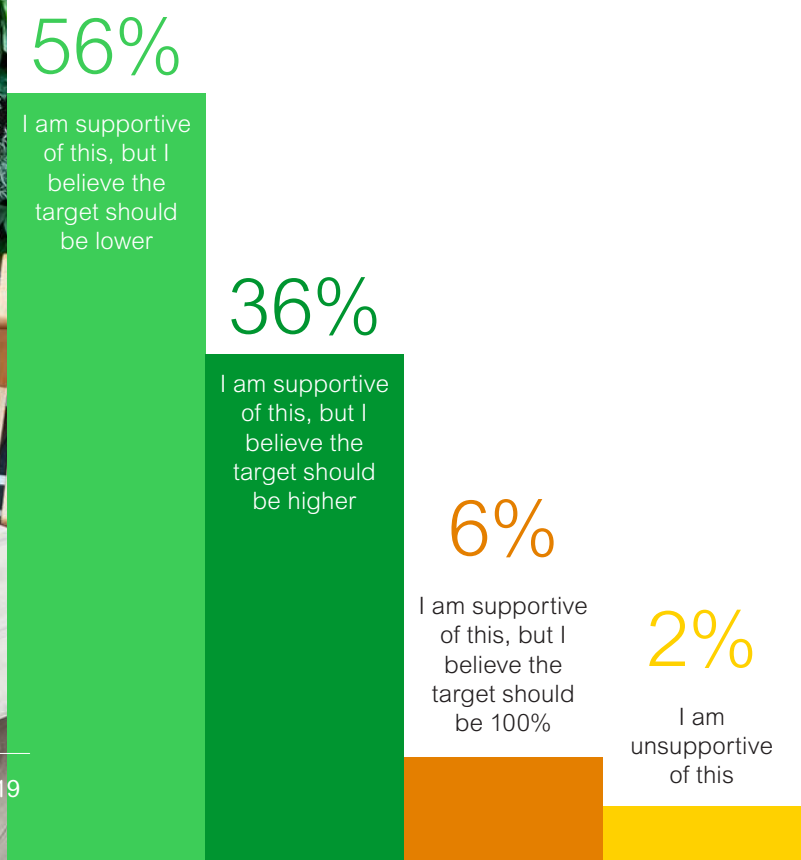
For example, **a senior leader from a technology solutions provider** said that making the Green Mark certification mandatory for all buildings could be a viable option. Some also took a broader whole-of-market approach, noting that implementing policy alone would not make meaningful change if the market does not grow alongside environmental needs.

In fact, **Joelle Chen, Head of Sustainability (Asia), Lendlease**, said: "I hope it will be a matter of time before we see the Green Mark certification become mandatory, even as energy efficiency standards are being raised in the latest version. I believe that a holistic approach for sustainability taken at the regulation level would be more meaningful, to ensure that all aspects of building operations can be lifted."

In the Singapore Green Plan 2030 there is a target for 80% of Singapore's buildings (by Gross Floor Area) to be 'green' by 2030. What is your view of this initiative?

Yes, I am supportive, and I believe it is possible	42%
Yes, I am supportive, but I have doubts about whether this is possible to achieve by 2030	38%
Yes, I am supportive, but I do not believe this can be achieved by 2030	15%
No, I am not supportive, but I do believe it is possible	2%
No, I am not supportive, and I have doubts about whether this is possible to achieve this by 2030	2%
No, I am not supportive, and I do not believe this can be achieved by 2030	1%

In the Singapore Green Plan 2030 there is a target for 80% of Singapore's new buildings (by Gross Floor Area) to be 'Super Low Energy' buildings by 2030. What is your view of this initiative?



Recommendations

1 **Stakeholders, particularly developers and building owners can take the lead to advance the green agenda:** Realising a greener and more sustainable built environment will require concerted efforts from both the public and private sectors. Within the private sector, developers and building owners especially play a critical role in ensuring that green features are accounted for from the onset in upcoming developments or by retrofitting existing buildings. For example, they can opt to eliminate fossil fuel use during the construction process, and incorporate renewable energy and use low-carbon, reused, or recycled materials in construction. By taking the lead, they can take the opportunity to engage and educate their supply chains and bring all companies onboard their sustainability journey.

2 **Promote greater awareness to leverage technology and tap on support schemes:** To enable the scalability of green buildings, upfront costs and doubts over potential cost savings from green solutions must be clarified and addressed. For example, building owners can tap on the $63-million Green Mark Incentive Scheme for Existing Buildings 2.0 to lower the upfront costs of retrofits. Business can also potentially tap various schemes to support energy efficiency efforts. This includes NEA's Energy Efficiency Fund (E2F) which offers different grants to finance the implementation of pre-approved energy efficient technologies, as well as SGBC's Singapore Green Building Product (SGBP) certification scheme, which aims to help businesses better understand the range of products and solutions available, and the value that investing in greener infrastructure can bring. There is also the Resource Efficiency Grant for Emissions (REG(E)) aims to encourage improvement in energy efficiency of manufacturing facilities and data centres. SMEs looking to start on their green journey, can also tap on Schneider Electric's SME Kickstarter Decarbonisation Programme. Supported by Enterprise Singapore, the programme provides training and mentorship to help SMEs develop decarbonisation roadmaps and identify opportunities for energy efficiency.

Information campaigns to highlight success stories and case studies that clearly illustrate the benefits of the various technological solutions could also help generate greater buy-in. Solution providers could provide more experiential learning opportunities in partnership with SGBC to allow building owners, developers and consultants to develop a deeper understanding of solutions and to observe first-hand how they work.

For instance, Schneider Electric's Kallang Pulse building, which houses its East Asia and Japan headquarters, is a prime example of how green energy solutions can transform a brownfield environment into a smart and sustainable green building. The building, which was originally built in 1995, was retrofitted in 2018 with Internet of Things (IoT) solutions, energy-efficient features as well as solar power capabilities, amongst others. In 2021, it was certified with the Green Mark Platinum Award. Today, it has become a carbon-neutral and intelligent building that has won "The Building Project Leadership in Sustainability Award" at the 2022 SGBC-BCA Leadership in Sustainability Award. Kallang Pulse is also internationally recognised – having won the prestigious Leadership in Sustainable Design & Performance (Commercial) Award at the 2022 World Green Building Council (WorldGBC) Asia Pacific Leadership in Green Buildings Awards.

3 **Grow talent pool and pipeline of green building professionals:** There is also a need to grow the talent pool and pipeline of green building professionals who are equipped with deep technical knowledge and expertise. SGBC actively supports the professionals behind the greening of the Singapore built environment through the Green Mark Professional Qualification Scheme, with qualified professionals accorded the Green Mark Accredited Professional (GMAP) credential. The main objective of this scheme is to uplift, upskill and recognise green building competencies of professionals in the built environment sector. SGBC also recently launched the Green Mark Associate (GMA) foundation-level accreditation for new industry entrants or non-technical built environment-related

professionals seeking to pursue a career in the greening of the built environment or who demonstrate competency in the fundamentals of Singapore green building. As green buildings continue to gain traction, the demand for qualified professionals, including those who take on emerging roles such as energy and carbon specialists, will continue to increase. Institutes of higher learning can also support these efforts by grooming the next generation of industry leaders.

4 **Enabling greater access to green finance:** Green finance is a key enabler in building a green economy, and financial institutions in particular play an important role in engaging clients to adopt green solutions. More can also be done to drive sustainable financing in the broader real estate sector. For example, innovative green finance solutions for green buildings can also be extended to meet growing demands from building contractors and product manufacturers.

5 **Forging impactful partnerships and co-innovating solutions:** The most important factor that will determine the success of this pursuit is the nurturing of a meaningful partnership ecosystem. Public-private partnerships and supply chain collaborations will be vital to accelerate the pace of green building development and the adoption of green solutions. For example, in collaboration with BCA and SGBC, JTC has commissioned NUS-ESI to develop a unified Building Embodied Carbon Calculator (BECC) which has replaced the BCA carbon calculator. It is customised for local industry use and includes key features such as accounting for upfront carbon of materials used with adapted carbon emission factors to reflect the carbon footprint of projects within the local context. There are bound to be common priorities and the strengths of diverse stakeholders can be leveraged to co-develop new innovative solutions and uplift best practices for the industry.

There is also the enhanced Green Buildings Innovation Cluster programme or GBIC 2.0. Among others, the programme aims to serve as a one-stop integrated RD&D hub to experiment, exhibit and exchange knowledge of promising building energy efficient solutions with industry stakeholders, while coordinating and disseminating building energy efficiency-related activities and data. One of the initiatives under the GBIC 2.0 is the GBIC-R&D which aims to collaborate with the local and international R&D community, as well as industry stakeholders to develop innovative solutions to improve building energy efficiency.

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