SG Green I Issue 20.0

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SG GREEN

SINGAPORE GREEN BUILDING COUNCIL

BUILDING SUSTAINABLE CITIES OF TOMORROW

INSIDE:

GREEN MARK PROFESSIONALS

The SGBC Green Mark Professional Qualification Scheme aims to uplift, upskill and recognise green building competencies of professionals in the built environment sector. Through a robust Continuing Professional Development framework, GMPs are able to remain abreast of industry trends and stay ahead of industry developments.

SINGAPORE GREEN BUILDING COUNCIL

SG GREEN

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MESSAGE FROM THE EDITORIAL TEAM

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As we publish the 20th issue of SG Green, we find ourselves at a pivotal moment in the journey toward a sustainable built environment. This milestone edition, aptly themed Building Sustainable Cities of Tomorrow, reflects on how far we have come, the challenges that we have overcome, and what opportunities that lie ahead as we reimagine the way we design, construct, and operate our buildings.

The built environment is at the heart of global efforts to combat climate change, and Singapore has been a leader in driving innovation and sustainability in this space. From pioneering green building certifications to embracing cutting-edge technologies, the built environment sector has demonstrated a steadfast commitment to creating spaces that are not only functional and beautiful but also resilient and healthy.

In this issue, we explore what it means to build for the future. It is about more than just constructing energy-efficient buildings—it is about fostering ecosystems that prioritise people, planet, and prosperity. It is about leveraging digital tools to optimise performance and reduce environmental impact. It is about rethinking materials, embracing circular economy principles, and designing with adaptability in mind. And above all, it is about collaboration—bringing together policymakers, industry leaders, and communities to co-create sustainable cities.

As you read through the pages of issue 20.0, discover inspiring stories of innovation, thought-provoking insights from industry experts, and actionable strategies for shaping the built environment of tomorrow. Whether it is through the energy transition to net zero, smart facilities management, unlocking financial benefits, or accelerating the retrofitting of our existing buildings, one thing is clear: the future of building is green, and it starts with us.

Thank you for being part of the SG Green journey. Together, let's continue to push boundaries, challenge conventions, and build a legacy that future generations will be proud of.

Yours Sincerely,
SG Green Editorial Team

A SNAPSHOT OF GREEN BUILDING PROGRESS OVER THE PAST 25 YEARS

Mr. Ken Hickson, journalist, editor and sustainability advocate with deep experience in writing for green buildings since 2000, shares his thoughts on the green building movement for the past 25 years.

Rammed earth and Australian timber house on the Sunshine Coast, Australia

The Year of the Wood Snake is well underway and 2025 already looks like it will be a significant year for the built environment and green buildings in particular.

In providing this overview of the green building movement, I decided it would be literally, numerically, and horologically interesting to focus on "25" and come up with what I will call "25 Pointers to Progress".

In this personalised account of the green building movement, my 25 paragraphs cover encounters and events involving people and places in both Australia and Singapore.

Starting 25 years ago in the year 2000:

1. HILL RESORT HOME WITH AN EAST-WEST OUTLOOK

My first "green home" was on the Sunshine Coast of Queensland, Australia and for its time it was as green as it could possibly be when completed for occupation in December 2000. Built out of rammed earth and Australian timber, it was designed to be cool in summer and conveniently warm in winter.

Besides being very energy-efficient, we collected rainwater for use indoors and out, We also disposed our waste on site - including sewerage – in an eco-friendly fashion.

Designed and built as a large well-equipped family home with four pavilions, it was not long before we decided to make even better use of its three bedroom as a self-contained guest house, even before the days of AirBnB.

2. AUSTRALIA'S OLYMPIC EFFORT TO GO GREEN WITH BUILDINGS

In Australia, the green building movement gained momentum after the 2000 Sydney Olympics received worldwide recognition as the 'Green Games'. With venues and facilities that established new benchmarks in design excellence and best practice in sustainability, Australia's property and construction industry demonstrated that green buildings were indeed achievable and practicable. This was noted by the Green Building Council of Australia (GBCA), in its book 'Ten years of Progress: 2002 to 2012'.

Brisbane-based architect Mr. David Baggs was the sustainability, eco-materials, and energy consultant

for 10 of the 2000 Sydney Olympic Green Games venues. He went on to be praised by GBCA as 'a renowned sustainability and materials expert' and became Life Fellow of the Australian Institute of Architects.

3. SINGAPORE GETS MOVING ON GREEN BUILDINGS

The inaugural World Green Building Day kicked off on 24 September 2009 to focus attention on the huge potential of buildings to reduce greenhouse emission. At the time, according to Mr. Tony Arnel, the Chair of both the World Green Building Council (WGBC) and (GBCA), the potential of the built environment was not being fully utilised.

The Singapore Green Building Council (SGBC) was officially established on 28 October 2009 during the first-ever International Green Building Conference and Singapore Green Building Week. It was heralded as "the only non-profit organisation with a concerted private-public sector partnership to achieve a world-class and sustainable built-environment" in Singapore.

It was also in 2009 that the Building and Construction Authority (BCA) announced its commitment to make sure 80 percent of Singapore's buildings had a 'green mark' by 2030. The aim was and remains to make the urban landscape a more sustainable environment.

4. GREEN BUILDING LEADERSHIP FROM ER. LEE CHUAN SENG

It was soon after I arrived back in Singapore in October 2010 - after ten years in Australia – that I met Er. Lee Chuan Seng, the founding President of SGBC and head of the influential engineering business known as Beca in Singapore. I had known Er. Lee for some years as we were both active in the New Zealand Business Council (now the NZ Chamber) in Singapore in the 1980s and 1990s. Over the years, he has chaired a number of industry committees, including the BCA Green Mark Advisory Committee, which has helped to shape the direction of Singapore's green building rating system.

I distinctly recall him saying to me then (in late 2010) how making the built environment sector more energy efficient was necessary to cut emissions from the built environment and it was too early for Singapore to address the embodied carbon in buildings, coming from imported materials, like steel, glass, and cement.

He has also won many honours and awards over the years. One of the most prestigious being made the inaugural iBuildSG Distinguished Fellow – by BCA – when he was Emeritus Chairman, Beca Asia in 2020.

5. BUILDING ENERGY EFFICIENCY IN ALL SECTORS IN SINGAPORE

From 2011, the National Environment Agency (NEA) was actively promoting energy efficiency "in the industrial, household, and public sectors through legislation, incentives, and public education". It worked with the BCA and the Land Transport Authority (LTA) to promote energy efficiency in the buildings and transport sectors, respectively.

NEA was also building 'strong capabilities in our industry partners who provide environmental services and solutions for Singapore, through incentive schemes to spur innovations for sustainable and cost-effective environment solutions'. Besides organising the National Energy Efficiency Conference (NEEC), NEA also started the National Energy Efficiency Partnership Awards.

I also reported on the International Green Building Conference 2012 - thanks to the BCA, the SGBC and all those involved – and this was covered in ABC Carbon Express, Race for Sustainability, NEA's website e2singapore.gov.sg and other media, including Eco-Business.

6. ASIA'S FIRST AND ONLY SUSTAINABLE LIGHT ART FESTIVAL

The Urban Redevelopment Authority (URA) joined other government agencies in Singapore – and the SGBC - to highlight the importance of energy efficiency, with its landmark event i Light Marina Bay, starting in 2010.

As I was asked to take on the role of sustainability consultant in 2012, to ensure all exhibits in the 10-day long event itself were as sustainable as possible, we also managed the Switch Off, Turn Up campaign for buildings, the achievements of which were set out in the case study: 'Asia's First and Only Sustainable Light Art Festival.'

This was widely reported at the time and Wikipedia summarised the 2012 campaign which 'saved more than 200,000 kWh, four times the energy saved in 2010. This equates to 100 tonnes of CO2 equivalent, enough to generate electricity for 762 4-bedroom HDB flats for three-weeks. 47 properties participated in 2012's Switch Off, Turn Up campaign, up from 16 properties in 2010.

7. PAGODA STREET BECOMES THE CENTRE FOR SUSTAINABILITY INITIATIVES

When Mr. Adrian Bukmanis and Mr. Adam Lyle shared space with my communications agency in a three storey shophouse in Pagoda Street, Chinatown, we started what became a collaborative private sector initiative to save energy and promote clean energy for Singapore and the region.

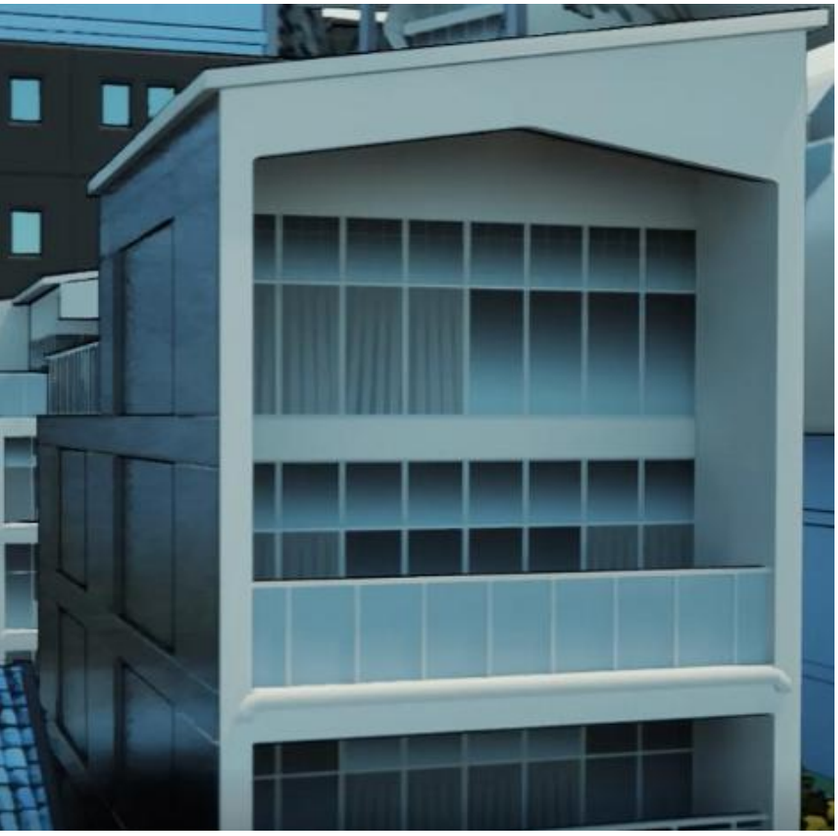
At least one outcome of this collaborative approach was set out as a case study, first appearing on the E2 Singapore website and in 'Race for Sustainability'. Mr. Adam Lyle, who was managing GreenBizCheck at the time and now runs Padang & Co, and Mr. Adrian Bukmanis of Energenz, which evolved into TEALE, managed the introduction of an energy management programme for HSL Constructor Pte Ltd, instrumental in helping the construction company to be among the first in Singapore certified under the new standard, ISO 50001 (Energy Management).

8. MARINA BAY SANDS LEADS IN SUSTAINABLE EVENTS MANAGEMENT

'Can a Luxury Hotel and Convention Centre be Sustainable?' That was the headline in an article about Marina Bay Sands (MBS) in 2012. I am pleased to note that MBS has become 'an advocate of all things clean and green', and 'embraced sustainability' in every direction and department.

In its amazing collection of awards and certifications is the BCA Green Mark Platinum award, but perhaps the one that impressed me even more than that – and one I had a bit to do with behind the scenes – is ISO 20121.

MBS was the first hotel and convention centre in South-east Asia to achieve what is often described as 'an achievement of Olympic proportions' because it was first used to certify the London Games in 2012. MBS has been very involved with i Light Marina Bay, acting as a host for many of the art installations as well as media events, and identified with all the sustainability initiatives of the festival.



9. SUSTAINABLE ARCHITECTURE AND GREEN BUILDINGS LEADER MR. TAI LEE SIANG

Following in the footsteps of Er. Lee Chuan Seng, was architect Mr. Tai Lee Siang, the second President of SGBC. He was an inspiration as well as a practical guide, drawing on his design and building knowledge. I heard him speak more than once – usually featured at SGBC and BCA events - and he went on to play a global role as Chairman of the World Green Building Council from 2016 to 2018.

Interviewing him was a pleasure and an inspiration. He was at his best at the Technology and Sustainable Landscape Design event, staged by Dr. Parvathy Subhadra and her Green in Future media group.

In the 10 years between 2007 and 2018, he was chairman of the WorldGBC and elected president for three industry/trade associations; the Singapore Institute of Architects (President 2007 to 2009), Singapore Green Building Council (President 2011 to 2013), and Design Business Chamber Singapore

(President 2012 to 2016). One key initiative actualised during Lee Siang's term as Chair of the WorldGBC was the Advancing Net Zero movement that results in the increasing adoption of Net Zero Buildings worldwide.

10. CDL PLAYS THE LEADING ROLE IN PRIVATE SECTOR GREEN BUILDING

A comprehensive profile of the late Mr. Kwek Leng Joo, who was Managing Director of City Developments Limited (CDL) in the 1980s and 1990s, appeared in 'Race for Sustainability'. I met Mr. Kwek and heard him speak on many important occasions, like the opening of the International Green Building Conference and the annual meeting of Singapore's UN Global Compact.

I have certainly admired him – and CDL - for the leadership and commitment provided in Singapore, and the region. He was also a very talented photographer and lover of nature.

My friend Ms Esther An, who is herself a leading light in sustainability — and CDL's chief sustainability officer - provided me with a tailor-made contribution in the words of Mr. Kwek himself.

CDL remains one of the world's most sustainable real estate management and development companies and is rightly recognised as Singapore's most sustainable company for the sixth consecutive year on Corporate Knights' 2024 Global 100 Most Sustainable Corporations in the World.

11. SINGAPORE'S FIRST ZERO ENERGY SUSTAINABILITY ACADEMY

CDL, Mr. Tai Lee Siang, along with Venturer Timberwork, Double Helix Tracking Technology, and other industry players, created the Singapore Sustainability Academy, a distinctive and well-utilised centre for sustainability training and awareness building.

One of its anchor tenants, the Sustainable Energy Association of Singapore (SEAS), describes it as 'the first major People, Public and Private (3P) ground-up initiative in support of the UN Sustainable Development Goals and Singapore's national goals to tackle climate change'. Not only is this zero-energy academy a certified BCA Green Mark Platinum building, it is also the first building in Singapore to have its construction materials, Cross Laminated Timber (CLT) and Glued Laminated Timber (Glulam), verified by Nature's Barcode as coming from responsible sources.

The 4,300 sq ft academy comprises classrooms, a veranda, an office, and an exhibition gallery. Jointly designed by CDL and ONG&ONG Pte Limited, it was built by Woh Hup (Private) Limited and officially opened on 5 August 2016.

I have visited the Academy and attended many events held there over the years and am aware that the academy was due for some expansion in 2024. This culminated in the Annex Opening Ceremony which was held on 25 July 2024, with Deputy Prime Minister Heng Swee Keat as the guest-of-honour.

12. KEVIN HILL AND VENTURER: MODERN AGE PIONEERS FOR TIMBER CONSTRUCTION

Mr. Kevin Hill and Venturer Timberwork can be regarded as the pioneering advocates for timber buildings in the modern age, in Singapore, regionally – even globally. He walks the talk. There are dozens of examples of his work – in Glulam, CLT and MET - in Singaporean buildings, besides the SSA.

I have worked with Kevin and his team to 'spread the word' about the incredible properties of timber for construction in the tropics. Even contributed personally to number of videos about his projects on the YouTube channel, irreverently entitled the 'Ministry of Tropical Construction' projects.

One of his most impressive works has been at Jurong Lake Gardens, involving six timber pavilions for the National Parks Board. This is one of the first projects to draw on the BCA incentive scheme to encourage the use of mass timber to reduce the carbon footprint of embodied carbon in a building.

13. HOW GREEN IS MY BUILDING? SINGAPORE'S DOUBLE HELIX COMES UP WITH SOLUTIONS

Beyond advocating and facilitating the use of timber in greening the built environment, Double Helix Tracking Technologies delivers practical solutions to help companies understand their supply chains and communicate their product's journey from source to construction site and onto the consumer.

But when Double Helix opened up shop in Club Street in 2008, it had no way of knowing what impact it would eventually have, playing such a key role in international collaboration to cut deforestation and illegal logging.

At its laboratory run by Chief Scientific Officer, Mr. Andrew Lowe at the University of Adelaide, Double Helix came up with a unique process to extract DNA from a log, or any piece of wood.

In 2013, Double Helix was called on by the United States Forest Service (USFS) to build a DNA profile to match seized logs to the stumps of illegally harvested bigleaf maple trees in the Gifford Pinchot National Forest. This was the first time that the US

Lacey Act had been applied to a case of domestic illegal logging, and the first case in the world where DNA forensics was used to successfully trace the origin of illegally logged timber.

Taking this further, the Singapore company is now involved in producing and testing a new digital "Due Diligence Management Platform", co-funded by Innovate UK and Enterprise Singapore, to help tackle deforestation which might be involved in the supply chains of commodities, including timber, pulp, paper, beef, cocoa, palm oil, leather, rubber, and soya.

14. TURNING THE TABLES: FOCUS ON FORESTS AND FURNITURE

Another Singaporean business enterprise which has been doing an amazing job at emphasising sustainability in all its does – particularly in the field of furniture – is Roger & Sons.

In 2019, Mr. Ben Gunneberg, PEFC International CEO, when launching accreditation for PEFC's Chain of Custody certification scheme, recognised by the Singapore Accreditation Council (SAC), and managed by Enterprise Singapore, drew attention to The Local Tree Project. This initiative by Roger & Sons, and supported by the National Parks Board, turns discarded logs into fashionable furniture, which is very much aligned with the principles of PEFC's Trees Outside Forests.

He pointed out at the time that by using already-felled trees that have been cut down for urban development instead of importing new raw materials, the project shows that good quality furniture can be made with not only imported wood but also local waste wood, and that local trees can have a useful afterlife.

15. REVOLUTIONISING THE BUSINESS OF ENERGY EFFICIENCY

It was an honour to work with Barghest Building Performance (BBP) and founder Mr. Poyan Rajamand in the early days – they started out in 2012 in Singapore - when we saw one of the best examples of energy savings in the built environment. Hired to produce content for BBP, I helped secure a cover story in the The Singapore Engineer magazine about their early achievements.

Instead of replacing the 14-year-old chiller plant, BBP was engaged to optimise the existing system, which led to Lumileds achieving chiller plant efficiency of 0.64 kW/RT and improving its performance by 27 percent, resulting in winning the BCA Green Mark Platinum Award in 2015. The first industrial plant in Singapore to achieve the highest platinum award while being an existing building. BBP now operates throughout Asia and has revolutionised the business of energy efficiency, benefitting hundreds of businesses.

16. ENGINEERING ENERGY EFFICIENCY EXCELLENCE

Never one to mince words, Mr. Lee Eng Lock, was forthright and informative when he spoke at the International Green Building Conference 2012. He did not hesitate to tell the industry regulators, developers, building managers, and energy managers present that not all energy consumption readings can be trusted.

This is what I reported in a profile of Mr. Lee in "Race for Sustainability", where I also referenced some of his significant work on energy efficiency for buildings, most notably the Green Energy Management (GEM) project for the Grand Hyatt which won the Bronze Award in the 2004 Asian Innovation Awards. It involved the hotel spending almost S$2.6 million, covering the heating, ventilating, and air-conditioning system. The redesign produced annual savings of more than S$1.1 million, paying for itself in just over two years.

In 2012, Mr Lee also received one of four Champion of Energy Efficiency Awards from the American Council for an Energy-Efficient Economy (ACEEE) in recognition of "his world-leading HVAC design and engineering", further demonstrating his professional and remarkable ability.

17. WHAT'S THE RETURN ON INVESTMENT IN GREEN BUILDINGS?

The survey undertaken by Schneider Electric in 2023 together with SGBC was something of a wake-up call for the entire construction industry, property developers and owners alike. Themed "Going Green from the Inside Out: Accelerating Green Building Adoption in Singapore", the survey involved 500 business leaders across MNCs and SMEs in Singapore.

Conducted between October 2022 and February 2023, the results indicated that most business leaders in Singapore only have "a general understanding" of green buildings.

The industry platform Futr Forward pointed out that sustainability goals and energy efficiency are the top drivers for green building adoption, but cost and Return on Investment (ROI) factors were seen as the biggest barriers to increasing access to green buildings.

But not all Singapore businesses were slow to act on greening the built environment. We reported on the enterprising Singapore green energy pioneer Mr. Allan Lim and Alpha Biofuels. He persuaded DBS to include clean bio diesel – made from Used Cooking Oil – at its Newton Green property and the bank agreed to use the clean and green fuel in all 16 of its backup generators in Singapore.

18. COOL SINGAPORE FOR THE URBAN HEAT ISLAND EFFECT

Singapore Management University Associate Professor Winston Chow is perhaps best known for his contribution to the Intergovernmental Panel on Climate Change (IPCC), but in September 2021, he talked to me about the "cooling qualities" of timber, the importance of dealing with embodied carbon and advocated the greater use of timber in buildings.

He admitted to me that Singapore has become hotter over a 40-year period, largely due to urban development, with the excess heat coming from buildings – mostly from "overuse" of air conditioning – as well as from traffic on the city's roads.

At the World Cities Summit in 2022, Prof Chow presented on the topic of "Enabling Climate-Resilient Development in Cities & the Singapore Green Plan 2030" and provided an overview of 'Climate Resilient Development', a solutions framework by the IPCC that takes a holistic approach towards reducing long-term climate risks. He shared that cities in particular face the risk of warmer temperatures due to the combination of climate change and the Urban Heat Island effect.

19. PROTOTYPE DESIGN FUTURE BUILD PROMOTES WHOLE LIFE CARBON

When I first met Singapore-based New Zealander Mr. Gregory Cornelius, he was showing me what he was doing to promote efficiency to train Facility Managers at Singapore Polytechnic. Not long after that he invited me to be part of his Protiotype Design Future Build project, to address Whole Life Carbon or embodied carbon, in buildings and energy efficiency at the same time.

Bringing together the talents and experience of a number of architects and designers, Protiotype came up with a smart and sustainable six storey shophouse design, hypothetically situated in the Geylang district of Singapore. The virtual exhibit "Protiotype 21-S" was live online at the London Design Festival in September 2021.

Mr. Cornelius started his Protiotype Design Science as an open research lab and de facto think-tank to test ideas and serve as a proving ground for concepts with potential for industry adoption, scaling, and commercialisation. In 2017, Protiotype developed a Smart Sustainable Building showcase at Singapore Polytechnic, integrating functioning products and services from technology vendors into the Lab showcase.

20. GREENING THE BUILT ENVIRONMENT IN INDONESIA AND MALAYSIA

While Singapore does not claim to directly influence neighbouring countries over the adoption of cleaner and greener practices, we have come across private sector enterprises in Malaysia and Indonesia whose commercial connections with Singapore are contributing to the uptake of sustainability, clean energy, and green building standards.

YTL is a good example. The Malaysian company is not only active as a major property developer and hotel owner at home and abroad but it also owns and operates Power Seraya, a registered electricity supplier in Singapore, which has commenced the development of a 600MW hydrogen-ready Combined Cycle Gas Turbine (CCGT) at its Pulau Seraya Power Station (PSPS) site in line with Singapore's move to make greater use of clean hydrogen in its energy mix.

YTL Cement is also producing eco-friendly building materials which contain less carbon and are designed with reusability and recycling in mind.

In 2024, I also came across the work of Singapore-based Australian Mr. Andrew Dixon, a former investment banker who has, in his words, become "an accidental hotelier" who does not just talk about sustainable development and responsible tourism but shows by example what can be done. I have seen for myself his two tropical island resorts – Nikoi and Cempadak - and interviewed Mr. Dixon about how sustainable and green these projects are, most notably in the use of locally available sustainable building materials, including driftwood and bamboo.

21. BUILDING SECTOR'S PATH TO DECARBONISATION HAS A LONG WAY TO GO

For many years, the WorldGBC has drawn attention to the fact that the built environment contributes a very high percentage of greenhouse gas emissions – up to 40 percent of global emissions.

In my ABC Carbon Express preview of the International Built Environment Conference 2024, I pointed out that "the buildings and construction sector is by far the largest emitter of greenhouse gases, accounting for a staggering 37 percent of global emissions. The production and use of materials such as cement, steel, and aluminum have a significant carbon footprint". This was quoting the United Nations Environment Programme (UNEP).

I also drew attention to the 2023 BCT report which shows "a stagnation of progress" since 2015. Since 2021, less than one decarbonisation percentage point was achieved. The building sector's path to decarbonisation still has a long way to go. The same report also noted that "investment in energy efficiency and construction of sustainable buildings represents less than 5 percent of total global investment in the buildings sector".

22. JEFF OBBARD, WITH NYAA AND ITE SHOWS SMES HOW TO DO IT

Among other projects, Mr. Jeff Obbard drew attention in December 2021 to his work as Climate Change Advisor to the National Achievement Award (NYAA) Council and the Institute of Technical Education (ITE) to cut carbon emissions and reduce business operational costs for small and medium-sized enterprises (SME) in Singapore.

ITE students and staff were trained to conduct environmental reviews at 15 SME companies and evaluate direct & indirect carbon dioxide (CO2) emissions. They also conducted practical experiments to prove the viability of innovative solutions to cut emissions. The SMEs were selected to represent a cross-section of the more than 220,000 SMEs in Singapore and included retail, food & beverage, manufacturing, landscape, freight, and educational service companies.

Solutions identified under the project reduced annual CO2 emissions by 144 tonnes and yielded savings of S$76,000 per annum in business operational costs. If extrapolated across the more than 220,000 SME companies in Singapore, then annual reductions of over 2 million tonnes of CO2 emissions could be achieved - with a saving of over S$1 billion in business operational costs.

The SME project has continued into 2024 and has achieved even more impressive results.

23. LEADERSHIP IN SUSTAINABILITY AWARDS RECOGNISE NOTABLE PEOPLE, PROJECTS, AND PLACES

Attending the SGBC-BCA Leadership in Sustainability Awards 2024 Awards Ceremony at the Orchard Hotel in June 2024 was a reward to appreciate the excellent work of a number of individuals and companies. I witnessed what was described by SGBC as "a surge of high-quality submissions, highlighting the industry's heightened commitment to sustainability".

The award winners received their trophies from the evening's guest-of-honour Ms Indranee Rajah, Minister in the Prime Minister's Office, Second Minister for Finance and Second Minister for National Development. The biennial Awards programme, first held in 2016, honours significant achievements by Professionals, Businesses and Building Projects in the development of a green and sustainable built environment.

All were well-deserved winners, but I cannot resist praising the Singapore Land Group. The owners of 42-year-old Singapore Land Tower, chose to modernise the building through an extensive asset enhancement initiative starting in 2021 instead of going for demolition. For its new sustainability features such as a low emissivity double-glazed curtain wall for the façade and upgrades to the air-conditioning and mechanical ventilation system, the building emerged a winner in the Carbon Performance category of the SGBC-BCA Leadership in Sustainability Awards 2024.

24. SINGAPORE HOTELS UP THEIR SUSTAINABILITY GAME

In 2022, I decided to do an informal survey for Asian Journeys magazine of six Singapore hotels, which I had become very familiar with since my first visit in 1981 and from living here since 1983. They are: Parkroyal Beach Road, formerly the Plaza; Marriott Tang Plaza, formerly the Dynasty; Parkroyal Collection, formerly Marina Mandarin; Grand Hyatt in Scotts Road; Shangri-La Hotel in Orange Grove Road; Raffles Hotel in Beach Road.

By my count, they had all made progress along the sustainability journey, but one hotel was a standout in more ways than one.

The owners of Parkroyal Collection, decided not to demolish the Marina Mandarin, but took it through a major retrofit inside and out, therefore

avoiding the production of 51,300 metric tonnes of CO2 emissions from de-construction, which they calculated would be like wiping out 10,000 hectares of forest, an area larger than all of Singapore's nature reserves combined.

An estimated S$3 million was spent replacing all the windows in the hotel with double-glazed glass, along with a new Atrium skylight to filter natural daylight into the indoor spaces. Together these measures reduced the ambient temperature by 2°C, leading to a 2 percent reduction of energy use, as the air-conditioning and chillers run at a lower fan speed, while maintaining the same ambient temperature.

The hotel also installed 210 rooftop solar panels to generate over 350 kwh of electricity per day, enough to power the hotel's 13 lifts and emergency lighting, thereby further reducing overall energy consumption.

25. WOOD CENTRAL MEDIA PLATFORM FOR THE BUILT ENVIRONMENT

Indoor air quality (IAQ) has become a crucial consideration in modern building design as people spend more time indoors, making the air we breathe inside buildings critical to our health. This was a clear message contained in a report I produced for Wood Central, which included comments from SGBC about what is being done in Singapore to address formaldehyde through an alliance for action in 2022-2023, which culminated in a set of indoor air quality guidelines for the industry.

This was just one outcome from my attendance as Media Partner at the International Built Environment Week (IBEW) and BEX in September 2024, which I covered in ABC Carbon Express Issue 260 and previewed in ABC Carbon Express (Issue 259).

Also with a strong built environment focus was the World Architecture Festival at MBS in the first week of November. I also met up with well-known Queensland architect and educator Mr. Mark Thomson – Director of Eco Effective Solutions – whom I had not seen for many years. He was quick to tell me his first port of call – even before WAF had started – was to inspect the amazing Mass Engineered Timber (MET) monastery at Bright Hill, which was the work of Mr. Kevin Hill and his team at Venturer Timberwork.

As a WAF judge, he pointed out to me that low-carbon materials and net-zero buildings were positively impacting many advanced developed markets. Despite worldwide political changes, reducing greenhouse emissions and addressing the changing climate are still global priorities.

There are definitely many more tales within the green building and built environment sustainability space, but this is a snapshot of the past 25 years through the lens of an individual active in reporting, writing and covering all things sustainable.

Article contributed by:
Mr. Ken Hickson
Author
"Race for Sustainability"


EXIT
EXIT

CITIES ADAPTING TO CLIMATE CHANGE: THE NEW INVESTMENT MAGNETS

There has been progress alongside ongoing challenges in the global climate agenda, but it's clear that adaptation is only becoming more critical as cities continue to face significant threats from climate change. Climate change is having an undeniable impact on livelihoods, so it stands to reason that it is also playing a bigger role in investment competitiveness.

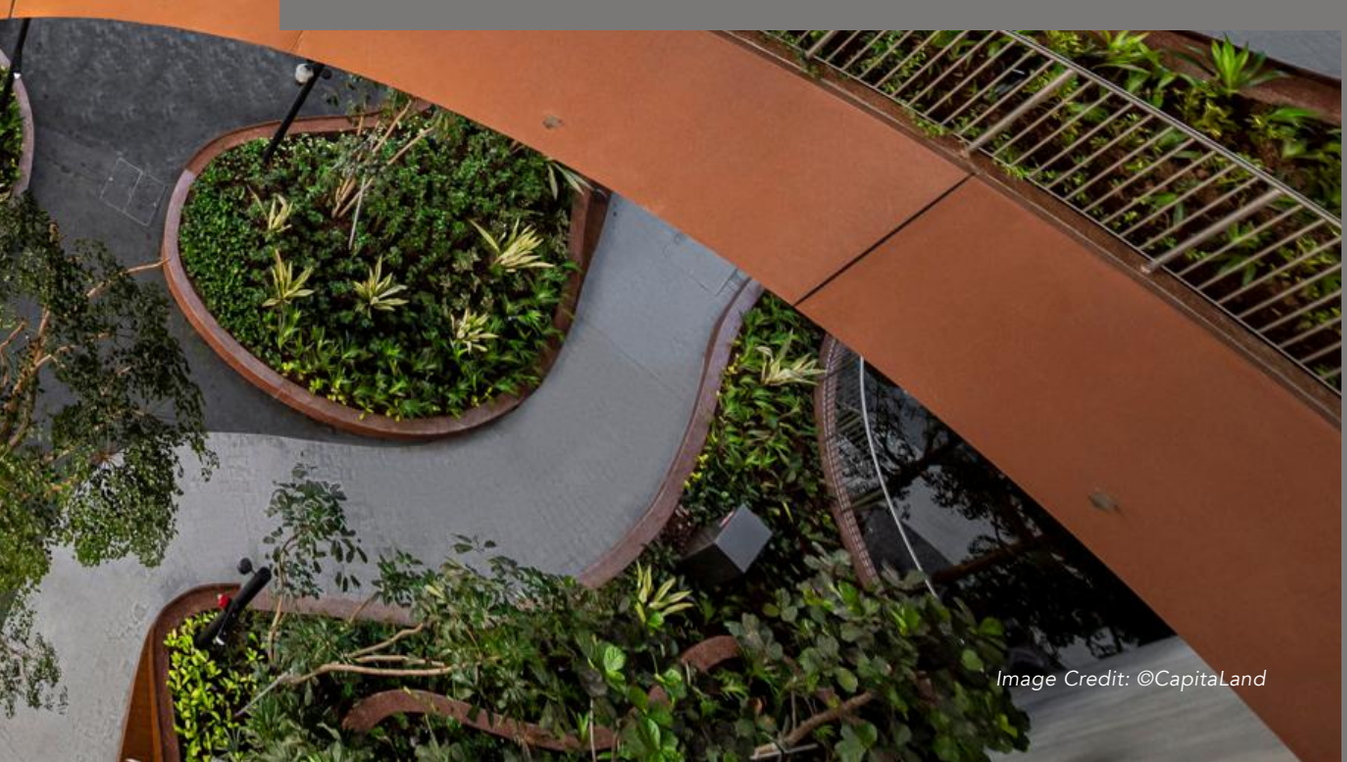


Image Credit: ©CapitaLand

The Pang Sua canal was enhanced to accommodate climate change whilst transforming the waterway into an ecological and community asset.

According to the World Bank, 1.8 billion people are at risk of flooding[1], and the number of cities experiencing extreme temperatures (35°C and above) is expected to triple by 2050[2]. It is therefore clear that climate change is having a huge impact on human lives and livelihoods.

Investment is the silver thread that ensures measures are in place to create sustainable, liveable, economically successful, compact, and

[1]World Bank Urban Development

[2]Around 200 million city-dwellers in over 350 cities live with summer temperature highs of over 35 degrees Celsius. The number of cities exposed to extreme temperatures will triple by 2050. C40 Cities – Heat Extremes

[3]Arup City Competitiveness Redefined Tracker

As part of the Kallang Alive Masterplan, we developed a concept framework for an 18,000-seat Indoor Arena which will serve as a premier venue for major sports events and world-class entertainment.

smarter environments. Cities that proactively prepare for climate shocks, including floods and heatwaves, are becoming more attractive to investors.

Traditional indicators like economic performance and transport infrastructure are no longer sufficient to attract long-term investment. Although 76%[3] of cities have well-developed climate strategy plans, these plans are yet to be implemented. The link between climate resilience and investment appeal is becoming increasingly clear. Cities that fail to manage climate risks effectively are likely to become less attractive to investors. Conversely, those that proactively address climate challenges are more likely to thrive.

Today, global CEOs and investors want to know that the city they choose to operate in has robust plans for the growing list of challenges cities face and provide a stable and secure environment for their investments.

Our multidisciplinary team is a key collaborator in the expansion of the iconic Marina Bay Sands Integrated Resort, which will feature a fourth hotel tower and a 15,000-seat entertainment arena.

This is easier said than done. Cities must focus on building resilience against the increasing risks of extreme weather events caused by climate change. Strengthening city resilience is central to managing such risks, thus keeping cities relevant, and attracting and retaining investment to enable their citizens and businesses to thrive. This can be done through implementing early warning systems, flood barriers, embracing sponge cities, or climate risk assessments. A fundamental shift is necessary in our processes, practices, government structures, and infrastructure development to ensure that a difference is made.

Singapore presents an interesting case study. It is assessed to be one of the cities best placed to be leaders of the future in Arup's City Competitiveness Redefined Tracker. This is due to clear action on critical factors for long-term success, like flood risk management and access to renewable energy, along with other major issues like demographic shifts and liveability. Singapore has implemented a robust plan through the Singapore Green Plan 2030, which takes a whole-of-government approach to guide urban development towards sustainable outcomes. Doing so encourages synergies and resource sharing by aligning all ministries and authorities in Singapore to common goals, such as developing a green economy or ensuring a resilient future.

'The Intersection' is a concept masterplan where innovation, industry, academia, community, and nature are integrated in a 72Ha brownfield site.

Changi Airport Terminal 5 will be able to handle up to 50 million passengers a year, in addition to the airport's current capacity of 90 million.

Singapore is continuously reimagining the attraction quotient for the region. This includes sports and entertainment venues, as well as new ways of working, making, and living .

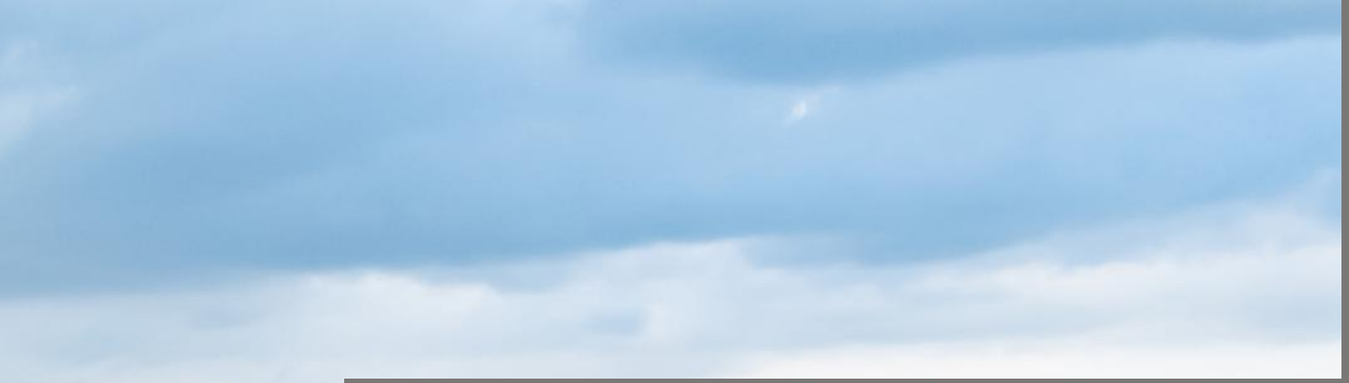
Singapore's strong brand is a result of significant and carefully considered investment into iconic architecture (e.g., the Merlion, Marina Bay Sands, Sentosa Island, Gardens by the Bay), infrastructure development (Changi Airport), and attracting international events (Formula 1 Singapore Grand Prix and concerts).

Traditional assumptions about globally competitive cities can no longer be relied on, and the analysis from Arup's City Competitiveness Redefined Tracker reveals that tomorrow's leaders could be quite different from today's successful cities. Future leading cities will be better positioned to thrive in

the long term by protecting their people and assets while attracting investment. Emerging cities are leading the way in building resilience to extreme weather, such as severe heatwaves and flooding, and challenging the traditional powerhouses.

This isn't something that will be achieved alone or overnight; collaboration is at the heart of this effort. Cities cannot tackle these challenges in isolation. Successful cities draw inspiration and confidence from each other, based on long-term engagement and the sharing of their experiences. It's through collaboration, building resilience and redefining processes and practices that can create a better sustainable future.

Article contributed by:
Andy Hodgson,
Global Advisory Services Leader
Arup



DRIVING SINGAPORE'S ENERGY TRANSITION TOWARDS NET-ZERO

Find out how Sembcorp is advancing Singapore's energy transition through innovation and technology.

Natural gas has been crucial in meeting the majority of Singapore's energy needs, with about 95 percent of the country's electricity generated from it. This reliance makes Singapore one of the world's most gas-dependent nations, with natural gas central to its energy strategy. However, as Singapore works towards carbon emissions reduction and achieving net-zero by 2050, it is transitioning to a more diverse energy mix.

Around 40 percent of Singapore's greenhouse gas emissions comes from the power sector, making energy transition a key focus of its climate strategy. To cut emissions, Singapore is expanding its use of cleaner, renewable energy and aims to reduce natural gas reliance to below 50 percent[1] by 2035 – while ensuring energy stability and reliability.

This transition will take time and requires a strategic mix of technologies, strategies, and policies. Working towards a future where energy is reliable, produced and consumed efficiently, Singapore will harness the "Four Switches" - Natural Gas, Solar Energy, Low-Carbon Alternatives, and Regional Power Imports to drive the nation's energy transformation.

SOLAR ENERGY – SINGAPORE'S EARLY FORAY INTO CLEAN POWER

As a small nation with limited land for large-scale renewables, Singapore initially did not prioritise clean energy, as renewables were not seen as essential to its energy strategy. However, progressively, solar energy proved the most viable. Singapore receives an average of 1,500 to 1,800 hours of sunshine annually, making solar energy a logical choice.

In 2018, Singapore's solar capacity stood at 210MWp. By 2024, it had surged past 1.3GWp[2], with a target of 2GWp by 2030. Solar adoption is now central to the country's renewable energy strategy, with the government maximising rooftop, ground-mounted, and floating solar installations.

Sembcorp, a leading renewables player in Asia, recognised solar power's potential early. The company began with small-scale rooftop installations in Singapore, progressively expanding to ground-mounted solar projects and floating solar farms. Today, as the country's largest solar player with a capacity of 949MWp[3], Sembcorp's growth mirrors Singapore's rapid solar adoption and technological advancements.

[1]Source: The Straits Times, 18 Nov 2023: What could Singapore's energy mix look like in 2035?
[2]Source: EMA | SES Chapter 6: Solar
[3]Capacity as of 31 December 2024 (for projects that are both installed and under construction)

The 285MWh Sembcorp Energy Storage System spans across two hectares of land in the Banyan and Sakra region on Jurong Island.

Sembcorp has been instrumental in advancing Singapore's energy transition through landmark projects that push innovation. A key achievement is the Sembcorp Tengeh Floating Solar Farm, a breakthrough in solar technology. The project is the first in the world to deploy advanced drone electroluminescence imaging technology on a utility-scale inland floating photovoltaic system. Despite COVID-19-related manpower and supply chain challenges, the project was completed on time with full safety measures in place.

Sembcorp has also expanded into Energy Storage Systems (ESS) in Singapore to address the intermittency of renewable energy. In 2023, it launched Southeast Asia's largest ESS on Jurong Island's Banyan and Sakra region, with a capacity of 285MWh. By integrating ESS with solar energy projects, Sembcorp can help enhance grid stability and reliability, supporting Singapore's progress toward its clean energy goals.

Sembcorp Solar Singapore is the first SkillsFuture Queen Bee for the Energy and Power sector. This recognition underscores Sembcorp's commitment to nurturing talent in the industry through skills training and mentorship and creating a vibrant ecosystem for sustainable growth.

HYDROGEN AND AMMONIA – THE NEW FRONTIERS OF LOW-CARBON ENERGY

While solar energy drives Singapore's clean energy transition, the nation is also exploring low-carbon alternatives like hydrogen and ammonia to decarbonise hard-to-electrify sectors such as heavy industry and transportation.

Green hydrogen, produced from renewables, is gaining traction as a clean fuel. Singapore aims to become a regional hub for hydrogen production, storage, and distribution, and companies like Sembcorp are actively exploring hydrogen projects locally and across Southeast Asia.

Sembcorp is advancing green hydrogen infrastructure development through key initiatives and partnerships with governments and energy players. It is developing a multi-utilities centre on Jurong Island, featuring a 600MW hydrogen-ready power plant expected to be fully operational by next year. In October 2024, Sembcorp entered into a joint development agreement with PT PLN Energy Primer Indonesia for a green hydrogen production facility in Sumatra, Indonesia, capable of producing 100,000 metric tonnes per annum. The project is poised to become Southeast Asia's largest green hydrogen development initiative and aims to create a regional green hydrogen hub connecting Sumatra, the Riau Islands, and Singapore.

The hydrogen sector is set for rapid growth, with Singapore targeting 1 million tonnes of low-carbon hydrogen production annually by 2030 to drive decarbonisation across various sectors. Alongside green hydrogen, green ammonia plays a key role as an efficient hydrogen carrier, helping to overcome storage and transport challenges, which are essential for scaling the global green hydrogen economy. With its strategic location and advanced infrastructure, Singapore is well-positioned to become a hub for ammonia imports and distribution, further diversifying its clean energy mix.

REGIONAL POWER IMPORTS – A GROWING TREND

A key development in Singapore's energy future is the rise of regional power imports. As the country expands its energy sources, importing clean electricity from neighbouring nations is vital to its energy strategy.

Singapore aims to import 6GW of low-carbon electricity by 2035, reducing reliance on natural gas while increasing renewable energy in the grid. This approach offers a reliable and cost-effective way to tap into the region's abundant solar and wind resources.

Singapore has begun exploring electricity imports from neighbouring countries such as Malaysia, Thailand, and Indonesia. Discussions on cross-border electricity trading agreements are ongoing, to enable a more sustainable energy mix.

In 2023, Sembcorp was granted Conditional Approval by EMA to import 1.2GW of renewable electricity from Vietnam to Singapore.

At the 2024 Singapore International Energy Week, Sembcorp signed a joint development agreement with PT PLN Energi Primer Indonesia for a green hydrogen production facility in Sumatra, Indonesia, which is expected to be Southeast Asia's largest green hydrogen development initiative.

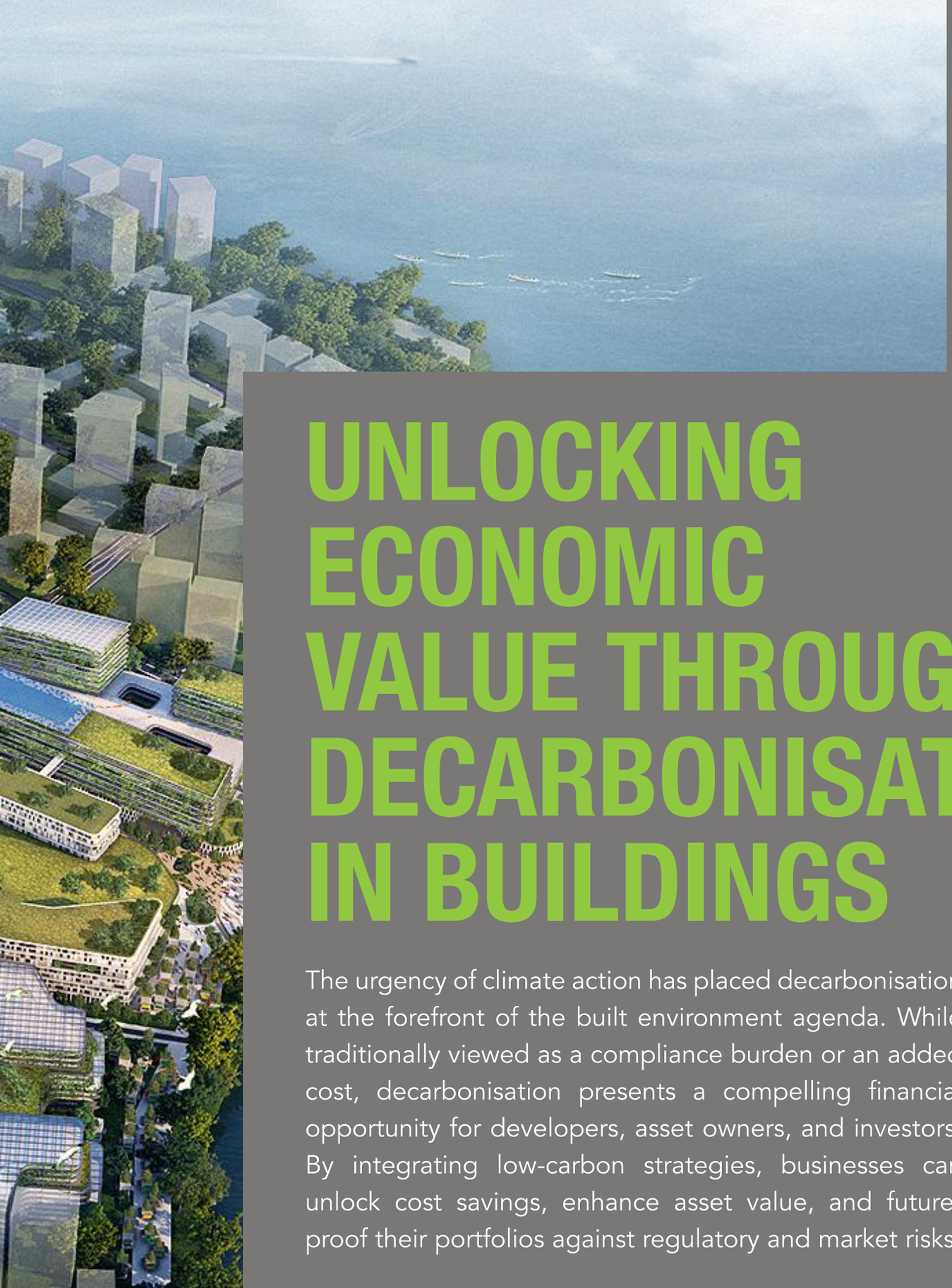
Sembcorp is playing a key role in regional power imports. It has received Conditional Approval by EMA to import 1.2GW of renewable electricity from Vietnam and is partnering Petrovietnam Technical Services to develop offshore wind farms in southern Vietnam for this purpose. Sembcorp has also signed an agreement with Tenaga Nasional Berhad to import 50MW of renewable energy issued with Renewable Energy Certificates, from Peninsular Malaysia to Singapore. The flow of renewable energy from Malaysia to Singapore began in December 2024.

These projects mark the start of a new era of energy cooperation in Southeast Asia, enabling nations to collaborate on clean energy goals. Through these regional partnerships, Singapore and its neighbours can share renewable resources, strengthen energy security, and accelerate the region's transition to clean energy.

THE PATH FORWARD

As Singapore advances toward its 2050 net-zero target, its energy mix will change. While natural gas remains essential in the short term, the future lies in a more diverse and sustainable energy system. Through continued investment in new technologies and collaborations, Singapore is making progress towards its climate goals. With expertise across all four energy transition pathways, Sembcorp is well-positioned to support this transformation. The journey to net-zero will be challenging, but with a strategic multi-faceted approach, Singapore can successfully transition to a cleaner, more sustainable energy future.

Article contributed by:
Sembcorp Industries



UNLOCKING ECONOMIC VALUE THROUGH DECARBONISATION IN BUILDINGS

The urgency of climate action has placed decarbonisation at the forefront of the built environment agenda. While traditionally viewed as a compliance burden or an added cost, decarbonisation presents a compelling financial opportunity for developers, asset owners, and investors. By integrating low-carbon strategies, businesses can unlock cost savings, enhance asset value, and future-proof their portfolios against regulatory and market risks.

Image credit: JTC Corporation

Image credit: JTC Corporation

Southeast Asia's rapid urbanisation and economic growth has driven unprecedented demand for buildings and infrastructure. However, the built environment is also a major contributor to carbon emissions, accounting for nearly 40% of global energy-related emissions. In Singapore and across the region, governments are tightening carbon regulations, introducing green financing incentives, and increasing sustainability requirements to push the real estate sector towards decarbonisation.

For building owners, developers, and investors, the shift towards low-carbon solutions is not just about meeting environmental goals—it presents significant financial benefits. By embracing energy efficiency, retrofitting existing buildings, and leveraging green financing, businesses can reduce operational costs, enhance asset value, and future-proof their portfolios against regulatory and market risks.

REDUCING OPERATIONAL COSTS THROUGH ENERGY EFFICIENCY

One of the most immediate and tangible financial benefits of decarbonisation comes from reducing energy consumption. Implementing passive design strategies, high-performance building envelopes, and smart energy management systems can significantly reduce energy consumption, leading to lower operational costs. Singapore's push for energy-efficient buildings, driven by its Green Mark certification scheme, has proven that investments in smart building technologies, energy-efficient HVAC systems, and solar power integration can yield substantial cost savings.

For example, a Green Mark Platinum-certified office building in Singapore can achieve up to 30-50% reduction in energy consumption, translating to significant savings in electricity bills over time.

ATTRACTING GREEN FINANCING AND INCENTIVES

Financial institutions and investors are increasingly aligning their portfolios with environmental, social, and governance (ESG) principles. With sustainability-linked loans, green bonds, and government incentives becoming more widely available, building owners in Singapore and

Southeast Asia can access capital at preferential rates, tax benefits, and grant funding, improving project feasibility and return on investment to support decarbonisation efforts.

- Singapore's Green Building Masterplan offers funding support for energy efficiency retrofits through initiatives like the Building Retrofit Energy Efficiency Financing (BREEF).
- Southeast Asia's growing green finance market, driven by institutions like the Asian Development Bank (ADB) and Monetary Authority of Singapore (MAS), is making it easier for developers to secure green financing for low-carbon buildings.
- Carbon credit and offset markets in Singapore and Malaysia are creating new revenue streams for companies investing in sustainability.

MITIGATING REGULATORY AND CARBON PRICING RISKS

Governments worldwide are tightening building performance regulations and introducing carbon pricing mechanisms. Owners of inefficient buildings face rising operational costs due to carbon taxes and stricter energy performance requirements. By proactively adopting net-zero strategies, businesses can mitigate financial risks and stay ahead of evolving regulations, avoiding costly retrofits in the future.

Singapore's Carbon Tax is set to increase from SGD 25 per tonne today to SGD 50-80 per tonne by 2030. While this currently applies to industrial emitters, the tax could be extended to commercial buildings as carbon policies tighten.

For building owners in Southeast Asia, future regulations are expected to follow suit, with cities like Jakarta, Manila, and Bangkok introducing more stringent energy efficiency and carbon reporting mandates. Retrofitting buildings with low-carbon technologies today can help mitigate future cost burdens associated with compliance and taxation.

ENHANCING ASSET VALUE AND MARKET COMPETITIVENESS

Sustainability-certified buildings, such as those with Green Mark, LEED, or BREEAM ratings, consistently command higher rental premiums and occupancy rates. Tenants and corporate occupiers are placing greater emphasis on ESG performance when selecting office spaces, driving demand for energy-efficient and low-carbon buildings. In the long run, decarbonised assets experience lower depreciation and higher market valuation compared to conventional buildings.

Sustainability is becoming a key differentiator in the real estate market. Investors and corporate tenants are increasingly prioritising green-certified buildings due to their lower operating costs, better indoor environmental quality, and long-term resilience.

- Singapore's Grade A office buildings with high sustainability credentials command rental premiums of 3-5% compared to non-certified counterparts.
- In cities like Bangkok, Ho Chi Minh, and Kuala Lumpur, green-certified buildings report higher occupancy rates, attracting multinational corporations with strong ESG mandates.
- Retrofitted buildings in Singapore are proving that energy efficiency upgrades lead to higher resale values.

RESILIENCE AND FUTURE-PROOFING INVESTMENTS

Decarbonisation strategies enhance the resilience of buildings against climate-related risks, such as extreme heat and energy supply disruptions. Adaptive designs, low-carbon materials, and nature-based solutions contribute to long-term asset durability, reducing maintenance and insurance costs. In an era of shifting investor priorities, buildings with strong sustainability credentials are more likely to attract institutional investment and remain relevant in a rapidly evolving real estate landscape.

ADAPTIVE REUSE AND RETROFITTING

While new developments are embracing net-zero strategies, the true challenge lies in existing old buildings, which form a substantial part of Singapore's urban fabric.

Older buildings, often plagued by inefficient air-conditioning systems, outdated facades, and high energy consumption, will be particularly vulnerable to increased carbon-related costs. Building owners who fail to act now risk higher operational costs, lower asset valuations, and financial penalties in the near future. However, those who proactively invest in adaptive reuse and energy-efficient retrofits can unlock significant financial benefits, ensuring long-term resilience in a rapidly decarbonising economy.

In a land-scarce city like Singapore, demolishing and rebuilding structures is not always the most sustainable or financially viable option. Adaptive reuse, the practice of repurposing old buildings for new uses, offers a cost-effective and environmentally responsible alternative.

Retrofitting an existing building instead of demolishing it significantly reduces embodied carbon, which is the carbon footprint associated with construction materials and processes. This aligns with Singapore's Green Plan 2030, which encourages resource efficiency and circular economy principles in urban development.

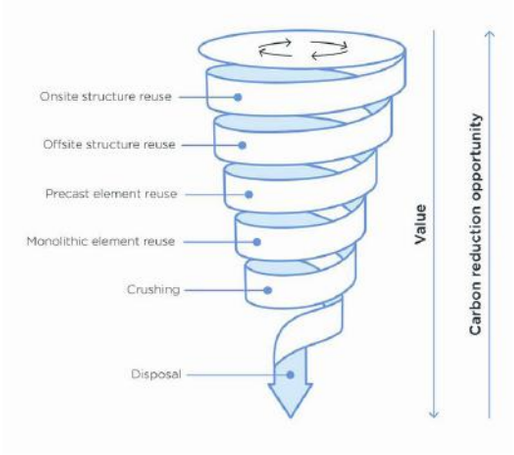
For building owners, adaptive reuse means:

- Lower redevelopment costs in most of the cases compared to new construction
- Enhanced heritage and cultural value, increasing tenant demand and asset appeal
- Higher sustainability credentials, attracting green financing and ESG-focused investors

Successful Ramboll projects in Singapore, such as Capella Hotel & Resort, 21 Carpenter Street, 137 Market Street, and InterContinental Singapore Robertson Quay, demonstrate how retrofitted buildings can thrive in a modern, decarbonized economy.

With over 80% of buildings in Southeast Asia expected to still be in use by 2050, the financial case for retrofitting and adaptive reuse is stronger than ever. Rather than demolishing old buildings and constructing new ones.

In Singapore, the government has committed to retrofitting 80% of existing buildings to Green Mark standards by 2030, creating a massive financial



opportunity for investors, building owners, and technology providers.

For building owners, the question is no longer "**Should we decarbonise?**" but rather **"How fast can we act to capture the financial benefits before regulations and market forces catch up?"**

By taking proactive steps today, Singapore's real estate sector can unlock long-term financial resilience while contributing meaningfully to the nation's sustainability goals.

CONCLUSION: DECARBONISATION IS A BUSINESS IMPERATIVE

Decarbonisation is no longer just a climate imperative, it is a strategic business decision that drives financial performance. By embracing energy efficiency, green financing, and market differentiation, the real estate industry can turn sustainability commitments into tangible economic gains. Forward-thinking stakeholders who invest in decarbonisation today will secure competitive advantages and unlock long-term financial resilience in the built environment of tomorrow.

For Singapore and Southeast Asia, decarbonisation is not just about meeting sustainability targets, it is a financial strategy for long-term success. As energy prices rise, regulations tighten, and sustainability-linked investments grow, the real estate sector must embrace low-carbon solutions to stay competitive.

The financial winners of the future will be those who act today, leveraging decarbonisation to unlock cost savings, attract capital, and enhance asset resilience in an evolving market.

THE BUSINESS CASE FOR

Image credit: Singapore Management University

DECARBONISATION

SMU Connexion: A Blueprint for Financially Smart Decarbonisation

Introduction

SMU Connexion (SMUC) is a pioneering Net-Zero Energy Building (Net-ZEB) that embodies financially viable decarbonisation in Singapore's built environment. Located within the Singapore Management University (SMU) city campus, this five-storey, institutional building demonstrates how energy efficiency, smart technologies, and renewable energy integration can drive long-term financial and sustainability benefits.

Designed to be both architecturally innovative and environmentally responsible, SMU Connexion has achieved BCA Green Mark Platinum (Zero Energy) certification while serving as a living lab for sustainable solutions.

Energy Efficiency: Lowering Operational Costs

One of the key financial advantages of SMU Connexion lies in its reduction in operational energy costs through smart energy management and efficient building design.

Optimized passive design

- An optimized facade design, strategic layout planning, and building orientation enhance the use of natural resources such as daylight and wind flow, achieving a 50% reduction in solar heat gain compared to a code-compliant building.
- Optimized Air-Conditioning System
- The magnetic chillers operate at 28% higher efficiency than standard requirements, reducing cooling energy consumption.
- Enhanced Passive Displacement Cooling (EPDC) eliminates the need for energy-intensive air handling units (AHUs) and fan coil units (FCUs), saving 91% of air distribution energy.
- Smart Lighting and Controls
- Dimmable LED lighting with occupancy and daylight sensors reduces lighting energy use by 45%.
- Responsive Smart Control System continuously monitors energy use and optimizes operations, ensuring efficiency at all times.
- These strategies contribute to significant reduction in energy demand, translating into significant cost savings throughout the building's lifespan.
- Renewable Energy: Self-Sufficient Power

Generation

- To achieve its net-zero energy target, SMU Connexion maximizes the use of on-site solar photovoltaic (PV) energy.
- High-efficiency PV panels were installed on rooftop space.
- These panels generate more than the building's total energy consumption, SMU Connexion eliminates electricity costs and secures energy independence for the university.

Future-Proofing Against Carbon Taxes and Regulations

SMU Connexion's net-zero carbon status effectively shields it from future tax liabilities, ensuring:

- Compliance with future regulations and Green Mark performance standards.
- Avoidance of rising carbon tax costs, which will impact high-energy-consuming buildings.
- Long-term financial resilience, as carbon pricing mechanisms become more stringent.

By proactively implementing decarbonisation strategies, SMU Connexion sets an industry benchmark for how institutions can future-proof assets while achieving financial stability.

SMU Connexion is more than just an efficient building, it is an innovation hub for sustainability, fostering partnerships and research opportunities within the built environment sector.

Sustainable Materials and Adaptive Reuse Benefits

Beyond operational efficiency, SMU Connexion embraces circular economy principles by integrating sustainable construction materials. The use of Cross-Laminated Timber (CLT) reduces embodied carbon while maintaining structural integrity.

By focusing on low-carbon construction, SMU Connexion demonstrates how net-zero goals can be achieved, making it a scalable model for other institutions and commercial properties.

Conclusion: A Financially Smart Approach to Decarbonisation

SMU Connexion stands as a blueprint for financially viable decarbonisation, proving that sustainability can go hand-in-hand with cost savings, energy independence, and long-term asset value enhancement.

- Lower operational costs through smart energy management.
- Self-sufficient energy generation, reducing electricity expenses.
- Carbon tax mitigation, ensuring regulatory resilience.
- Sustainable construction, reducing upfront redevelopment costs.

As Singapore and Southeast Asia move towards a low-carbon future, SMU Connexion serves as a leading example of how the built environment can unlock financial benefits through decarbonisation.

THE BUSINESS CASE FOR DECARBONISATION

The Punggol Digital District: Decarbonisation as a Financial Advantage for Tenants and Investors

Introduction

Singapore's real estate landscape is evolving rapidly, with decarbonisation at the forefront of future-ready urban developments. Punggol Digital District (PDD), Singapore's first integrated smart district, is a prime example of how sustainability-driven infrastructure can lower costs for tenants, attract investors, and leverage government incentives to create a financially resilient built environment.

How PDD's Decarbonisation Unlocks Financial Benefits for Tenants

Lower Energy Costs for Businesses

A major advantage of locating in PDD is the significant energy savings achieved through optimised passive design since master planning stage , smart infrastructure and district-wide energy management systems. The district's design enables tenants to operate in low-carbon, high-efficiency spaces, benefiting from:

- District Cooling Systems (DCS) – Reducing cooling costs by 30-40% compared to traditional air-conditioning.
- Smart Building Management Systems – Optimizing energy use, reducing waste, and lowering electricity bills.
- Solar Power Integration – Providing on-site renewable energy, cutting dependence on volatile grid energy prices.

For tenants, this means lower operational costs, making it an attractive location for companies looking to optimize their sustainability strategies while maintaining cost efficiency.

Future-Proofing Against Carbon Taxes and ESG Regulations

With Singapore's carbon tax rising and stricter Environmental, Social, and Governance (ESG) requirements becoming the norm, businesses must proactively reduce their carbon footprints to avoid financial penalties and remain competitive.

Tenants in PDD gain an advantage by operating in buildings that:

- Achieve low energy targets, minimizing carbon liabilities.
- Comply with Singapore's Green Mark Platinum standards, ensuring future-proof sustainability.
- Leverage renewable energy sources, mitigating exposure to rising carbon tax costs.

By choosing PDD, businesses can avoid the long-term financial burden of decarbonisation retrofits, which will become increasingly necessary in older buildings across Singapore.

These financial incentives help reduce upfront sustainability investment costs, making it easier for businesses to transition towards decarbonised operations without significant capital outlays.

Conclusion: A Model for Cost-Effective Decarbonisation

Punggol Digital District demonstrates that decarbonisation is not just an environmental commitment, it is a financial strategy that benefits tenants, investors, and policymakers. Through:

- Lower energy and operational costs, improving tenant affordability.
- Protection from rising carbon taxes, ensuring long-term savings.
- Higher asset value and rental returns, attracting ESG-conscious businesses.

PDD sets a new benchmark for smart, sustainable, and financially viable urban developments, proving that decarbonisation is the key to unlocking long-term profitability in Singapore's real estate sector.

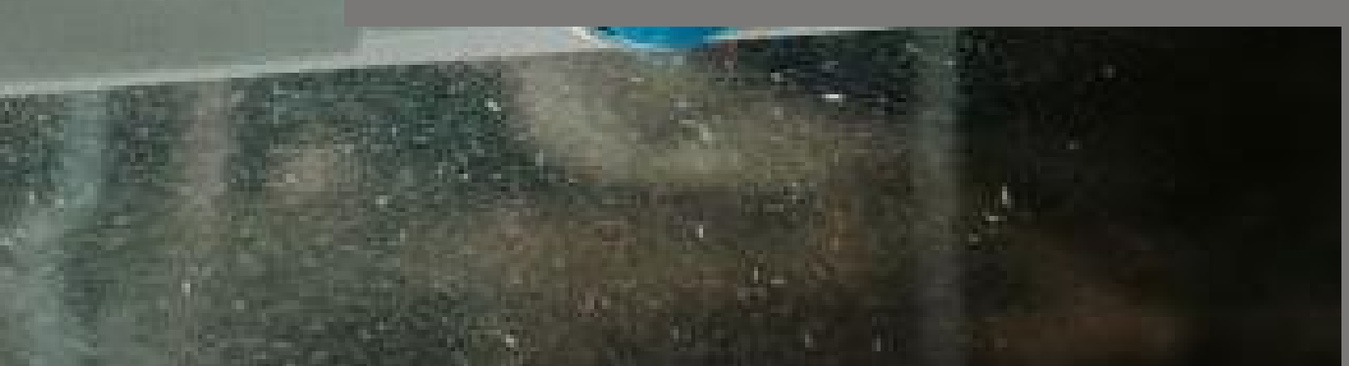
Article contributed by:
Mr. Sripragas Nadaraja
Director, Sustainable Design
Ramboll

Image credit:WOHA Architects


DZ.

DRIVING PERFORMANCE AND SUSTAINABILITY AT THE SINGAPORE GRAND PRIX

SGBC Member Signify, together with DZ Engineering, leads. innovative lighting solutions to enhance the fan experience while consuming 30 percent less energy and protecting the night sky.



Lighting the Marina Bay Street Circuit during the night races of the Singapore Grand Prix is a complex task, with teams of engineers and technicians working tirelessly to ensure that everything is perfect. But the results are worth it: it is now one of the most hotly anticipated and visually thrilling races in the Formula 1 calendar, and a unique opportunity for Signify and DZ Engineering (DZE) to showcase their joint capabilities.

PREPARATION

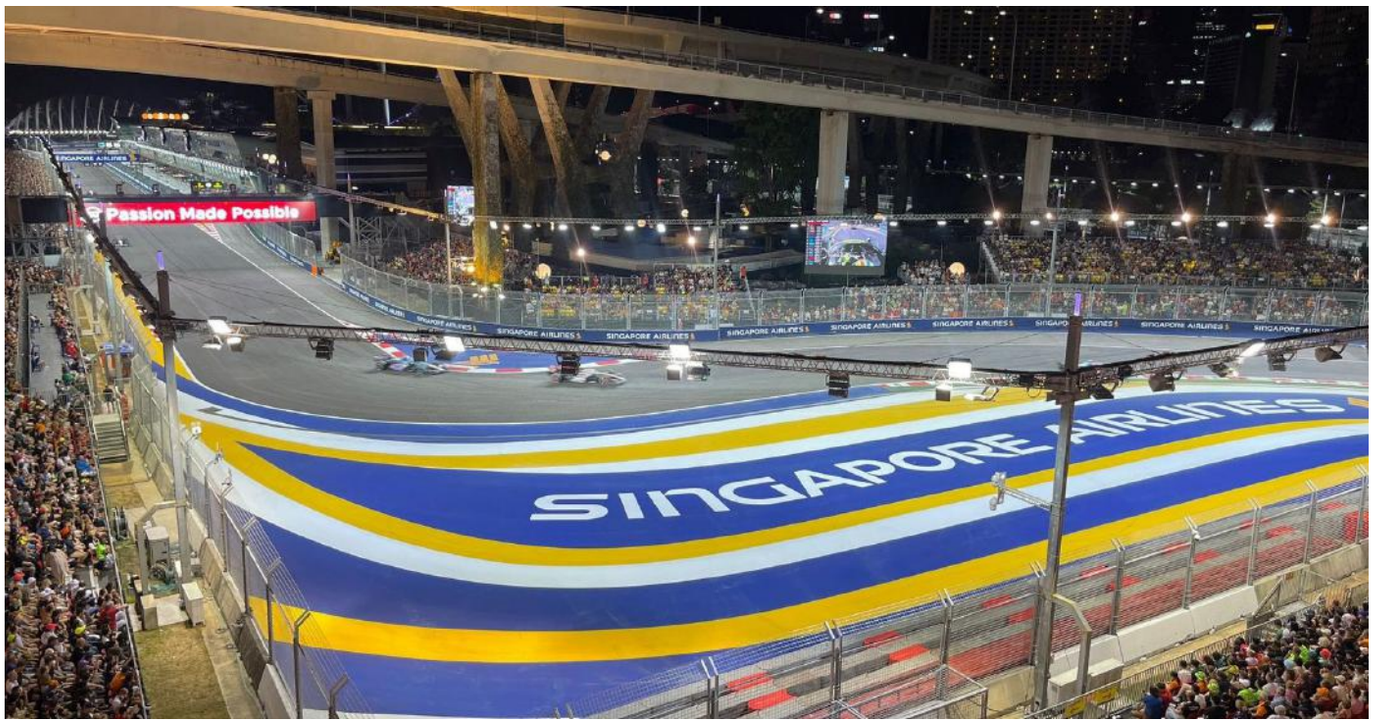
Given the temporary nature of the Singapore Grand Prix circuit, the lighting installation for the five-kilometer track needs to be set up from scratch every year. In order to arrange the infrastructure for over 1,600 floodlights and more than 220 km of cables in time for the race, DZE usually begins preparing for the installation months in advance.

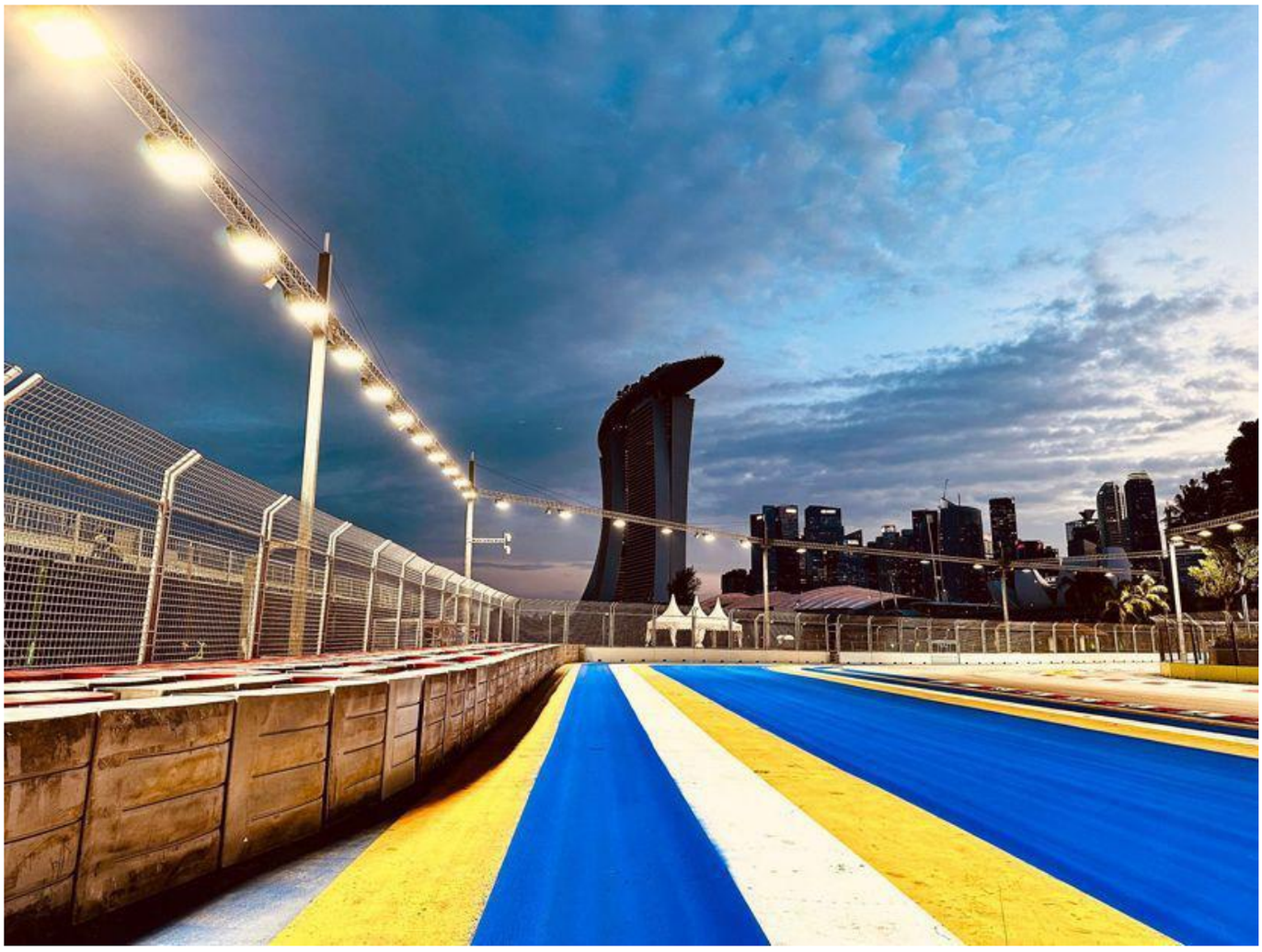
After a schedule is drawn up, a maintenance team conducts a thorough inventory check at a storage facility in Tampines. This ensures that all the necessary equipment from the previous race is still present and in working order. Installation typically starts in mid-June, with the first lighting tests taking place by the end of August, all in time for the Grand Prix which is usually held at the end of September.

SAFETY

Formula 1 cars can easily hit more than 300km/h. The Fédération Internationale de l'Automobile (FIA), the governing body of motor sports, created guidelines dictating that every track's lighting system must create a safe environment for drivers and officials. Visibility is key, so the right illumination is absolutely essential, which provides the perfect stage for Signify to demonstrate its expertise.

Assisted and supplied by Signify's lighting experts, DZE installed over 1,600 Philips ArenaVision LED gen3.5 floodlights on trusses around the circuit, producing 75 times more light than a standard road lighting installation. In contrast to standard racetracks with permanent lighting systems installed at heights of 30 to 40 metres, the Singapore Grand Prix uses a temporary installation on trusses at a height of 10 metres, which do not interfere with the city skyline as would tall masts. The floodlights are positioned at strategic intervals along these trusses to ensure that the track receives bright, comfortable, and uniform light. The location, direction, and angle of each floodlight are also carefully adjusted to eliminate any shadows or glare that could affect drivers' visibility.



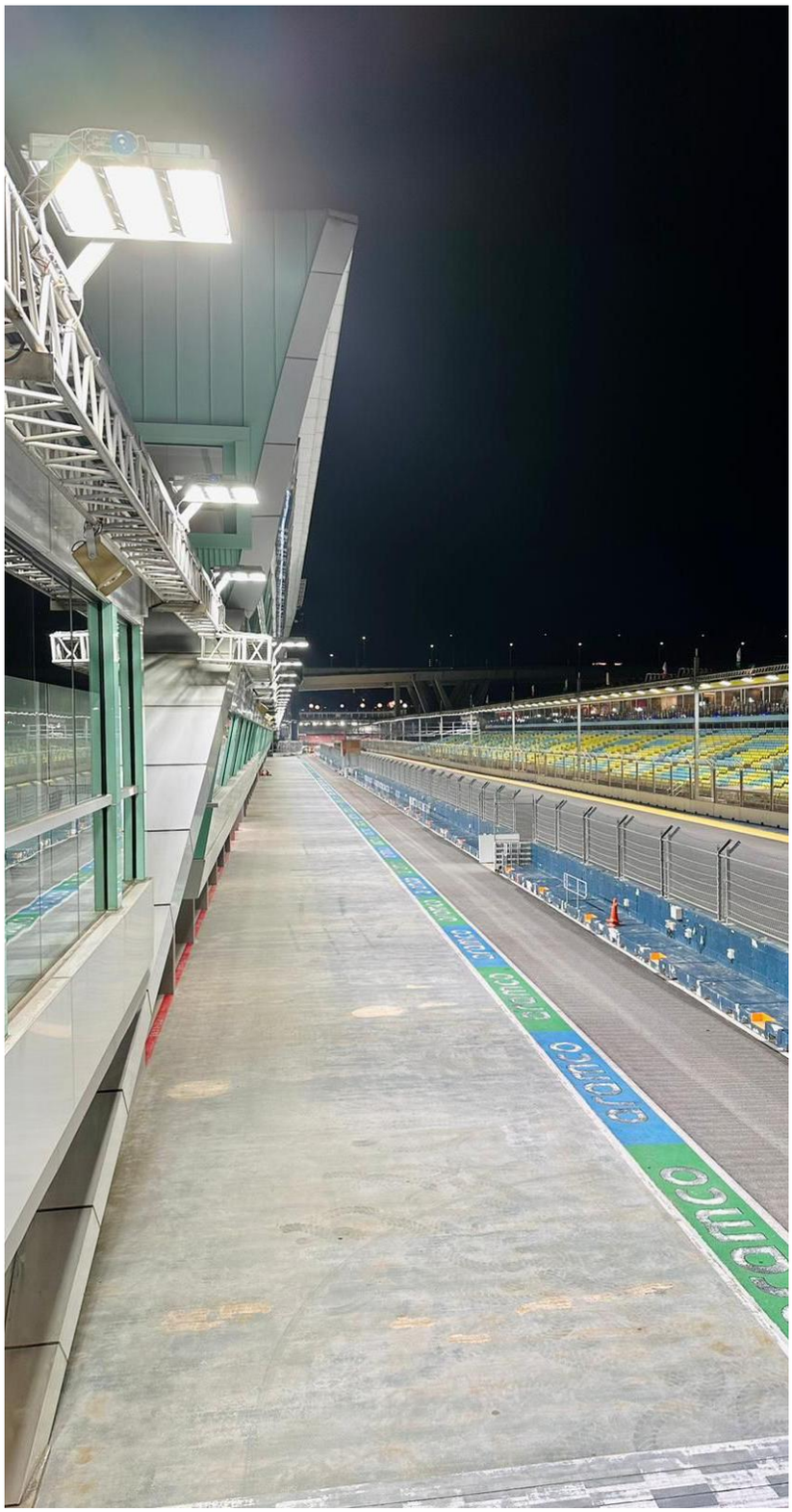


The race lighting system is designed to replicate the conditions of natural daylight, with a colour temperature of 5700 Kelvin (K) and an excellent color rendering score of 90. The right quantity, quality, and uniformity of light helps drivers to see the track clearly, without needing to wait for their eyes adapt to changes in brightness. In fact, given the incredibly high speeds at which drivers must react to their environment, the FIA considers uniformity of illumination to be more important than absolute illumination levels, as inconsistent lighting could hamper drivers' ability to accurately judge their speed and distance from other cars, increasing the likelihood of accidents.

QUALITY

The right light is not only essential for the safety of the drivers, but it also adds to the aesthetic appeal of the race, creating a stunning visual experience for spectators, both those watching live at the track and via television all over the world.

For televised events, consistency and quality of light are of utmost importance. Track lighting must be uniform and reliable so that broadcasters can capture high-quality images and video for audiences at home.



Signify's LED lighting system supports the latest TV broadcasting standards regarding glare and visible flicker. This allows broadcasters to perfectly capture the high-speed action against the backdrop of the city's unique skyline, ensuring that the view of the track can be enjoyed by Formula 1 fans everywhere.

EFFICIENCY

Due to the growing importance of sustainability in the world of motor sports, the event's race promoter Singapore GP Pte Ltd has announced plans to cut its energy emissions in half by 2028. Because night races depend on artificial lighting, this is one area where changes can be made to achieve incremental improvements in energy efficiency.

The track's lighting and control system, using floodlights and expertise provided by Signify and installed by DZE, is designed for maximum efficiency, with a guaranteed power supply to ensure safety and broadcasting continuity. Like lighting control systems for concerts and other entertainment venues, the Singapore Grand Prix lighting system is DMX capable. Although not currently in use at the track, this control system bridges the gap between functional lighting and show lighting, enabling technicians to create a unique and immersive experience.

The Philips ArenaVision gen3.5 LED floodlights, which replaced the previous Philips system of conventional metal halide lights in 2023, has reduced power consumption at the Marina Bay Street Circuit by 30 percent. In addition, the use of highly directional light beams

minimises spill light, glare, and sky glow, reducing light pollution and minimising negative effects on wildlife.

SUCCESS

The lighting system supplied by Signify and installed by DZE at the Marina Bay Street Circuit represents a remarkable feat of teamwork between two experts in their respective industries. The 1,600 Philips ArenaVision gen3.5 LED floodlights installed on low trusses enable drivers to race safely at night, while also providing a thrilling spectacle for fans watching at the track and on television.

Article contributed by:
Signify

Singapore International Gree Building Conferen

9-10 July 2025
Raffles City Convention Centre, Singapore

IGBC-SG 2025 will feature two days of insightful p compelling panels, tabletop exhibitions of sustain solutions and unmatched networking opportunit

Themes & Topics:

- *Beyond the Business Case*
- *Human-Centric Metrics for Green Building*
- *Regenerative Design & Nature-Based Solu*
- *Reimagine, Retrofit, Renew*
- *Smart, Data-Driven & AI-Optimised Buildi*
- *Whole Life Decarbonisation*

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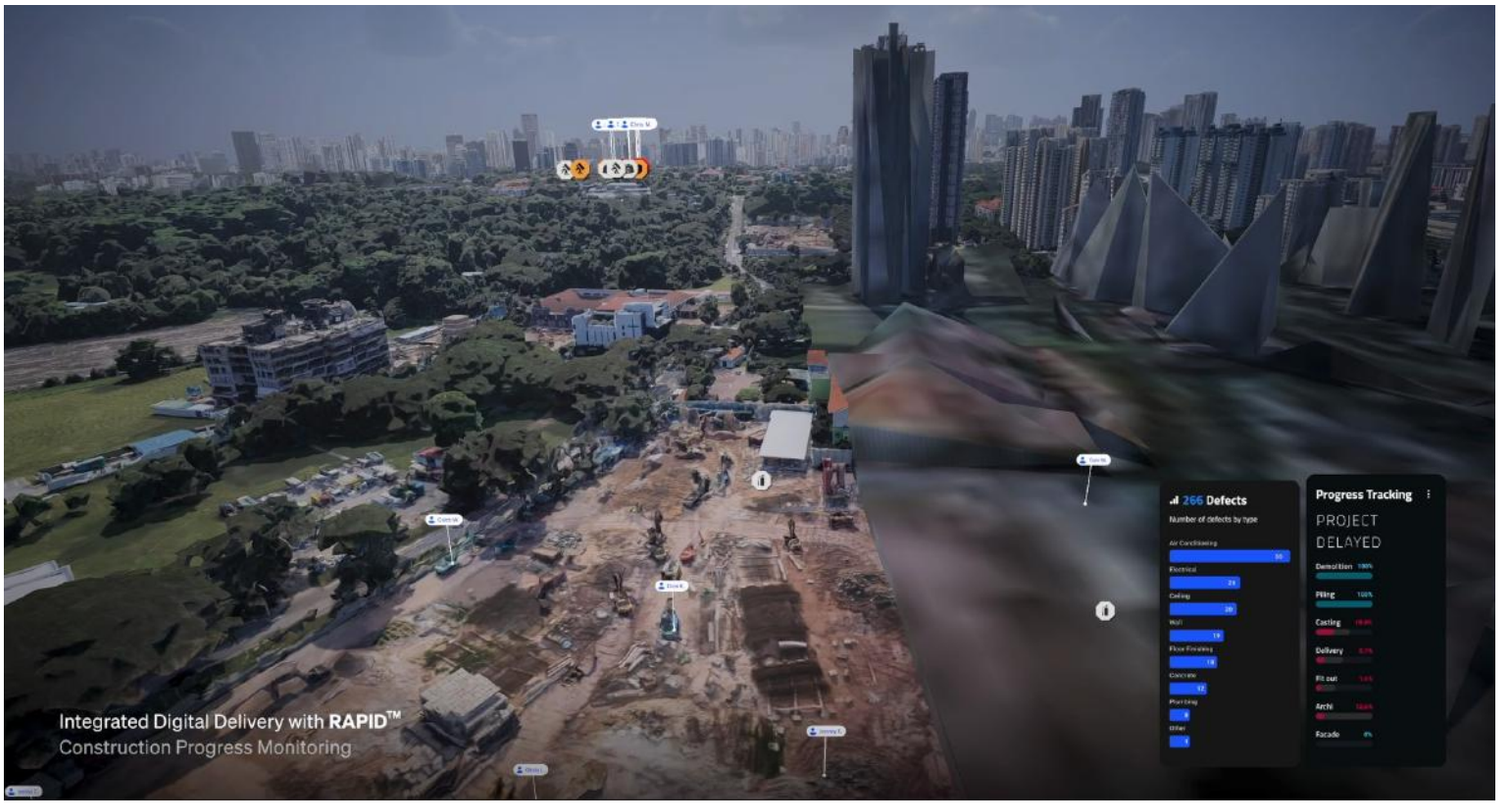
THE BIGGER PICTURE: A HOLISTIC APPROACH TO SMART FM

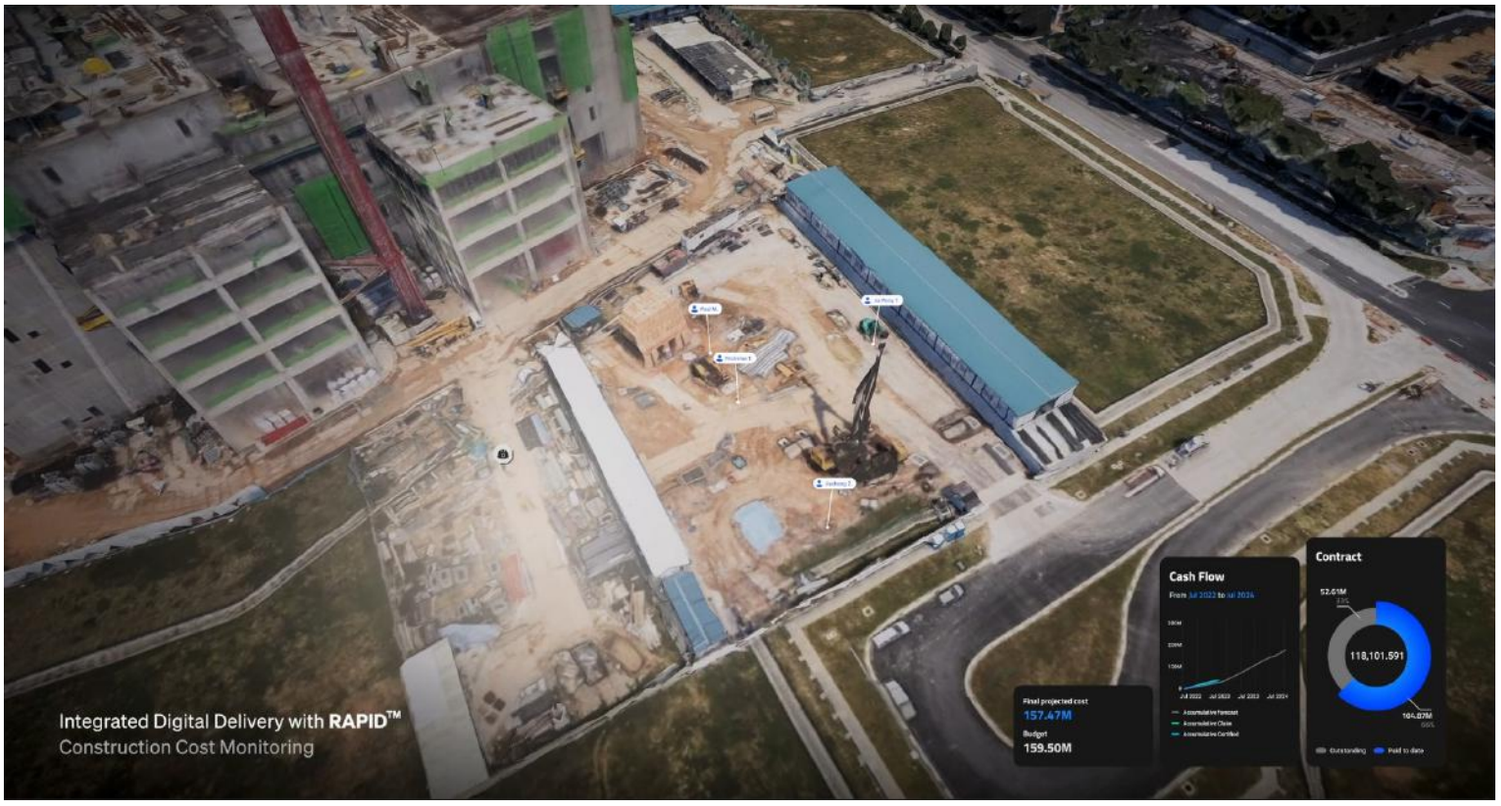
SJ Group explains why real estate owners must look beyond budgets and cost-benefit analysis when investing in smart facilities management

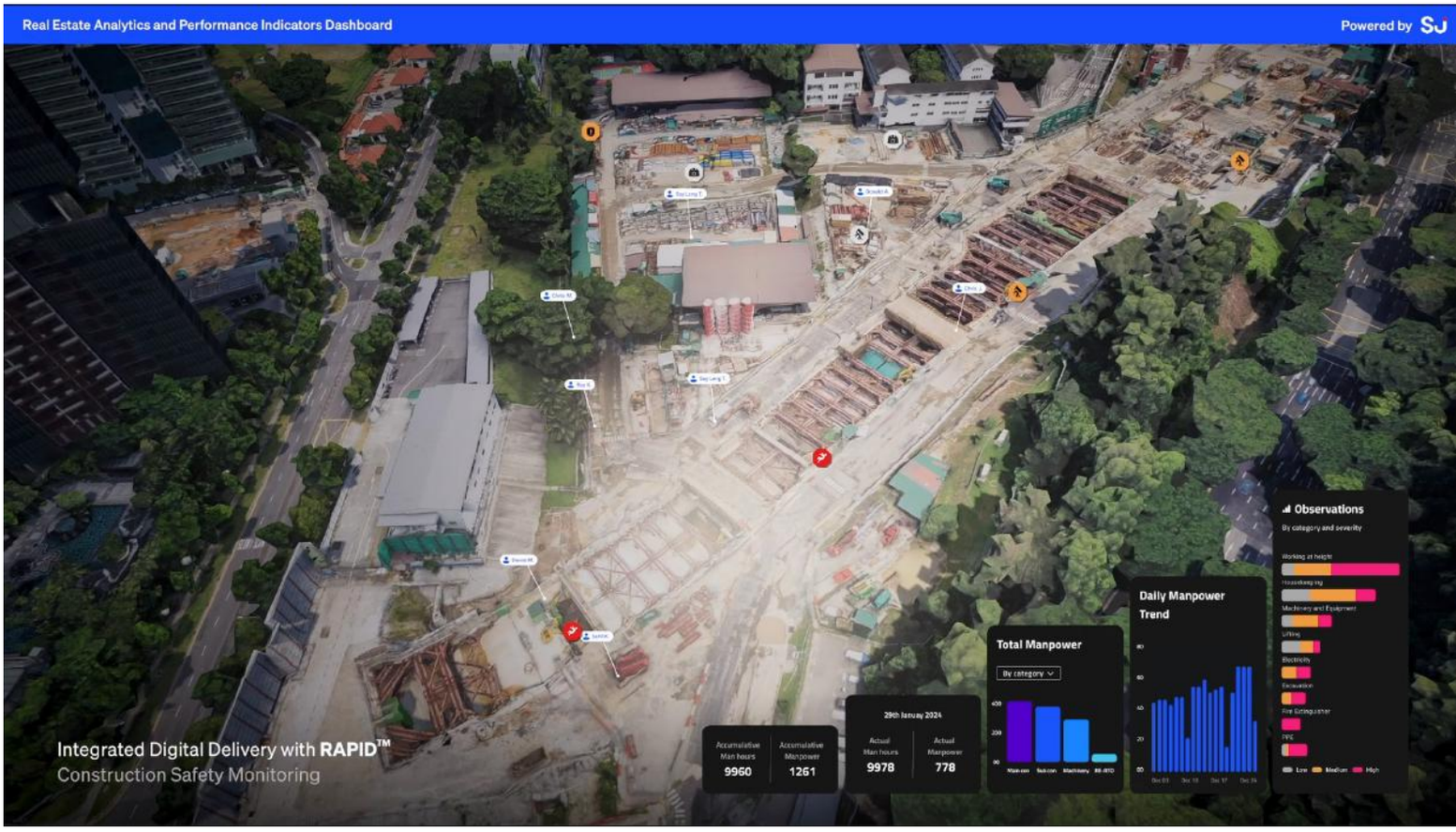
In today's rapidly evolving real estate landscape, smart facilities management (Smart FM) has transitioned from a luxury to a necessity. While cost savings and return on investment (ROI) remain critical, real estate owners must recognise that Smart FM's value extends far beyond financial metrics. To remain competitive and future-ready, a holistic approach is essential—one that aligns with emerging industry demands and stakeholder expectations. Here is why Smart FM is about much more than just cost containment.

THE BASELINE: COST SAVINGS, ROI, AND ASSET VALUE

At its core, Smart FM should deliver tangible financial benefits, such as reducing operational costs, improving ROI, and enhancing asset value. These outcomes are fundamental in an industry driven by efficiency and profitability. However, focusing solely on these metrics risks overlooking the broader strategic advantages that Smart FM can unlock.


Integrated Digital Delivery with RAPID™
Construction Progress Monitoring
266 Defects
Number of defects by type
Progress Tracking
PROJECT
DELAYED


Integrated Digital Delivery with RAPID™
Construction Cost Monitoring
Cash Flow
Contract
52.61M
118,101,591
Final projected cost
157.47M
Budget
159.50M



MEETING STAKEHOLDER DEMANDS: SAFETY, WELLNESS, AND SUSTAINABILITY

Stakeholders—occupants, regulators, and investors—are demanding more from real estate owners. Occupants seek safe, productive environments that promote wellness and enhance quality of life. Regulators are enforcing stricter sustainability standards, pushing for greener buildings and compliance. Meanwhile, financial markets prioritize resource stewardship and climate resilience, making environmental performance a key investment criterion.

Smart FM provides the technology-enabled solutions to meet these demands. IoT sensors monitor air quality and energy usage, while data analytics platforms audit building performance, enabling real-time responsiveness and continuous improvement. By addressing these priorities, property owners can future-proof their assets and enhance market appeal.

SMART FM CRITICAL FOR COMPLEX PORTFOLIOS

Investing in smart FM must make sense for asset owners who manage an expanding portfolio of varying typologies – mixed, commercial, residential, transit oriented developments, across various project life cycles, some more aged than others, and increasingly complex property portfolios is a growing challenge for many real estate companies and public agencies.

How does an owner of a portfolio of assets of varying technology stacks elevate service quality while managing costs?

The Bigger Picture: A Holistic Approach to Smart FM

For example, overlaying IoT sensors in aged properties help owners modernise an expanding portfolio without incurring too much capex on rehauling building management systems. Sensor data from all buildings, regardless of age or typology, in the portfolio can be aggregated on a Smart FM platform, and processed by AI and machine learning to identify patterns and predict potential problems.

IoT and cloud computing technologies have enabled pervasive and cost-effective sensing, transport, storage and analysis of building data. This has afforded us unprecedented data immediacy and situational awareness. Often the root cause of many FM issues is fundamental, e.g. flawed control logic, faulty sensors, inadequate data, commercial misalignment, process breakdown etc. Such issues are most optimally addressed with first-principle engineering or re-orientating the service or maintenance contract from one priced by "parts-n-labour" to one that is outcome-based. Our first instinct is thus not to look at Smart FM through the lens of any specific technology such as AI.

Smart FM is focused on client outcomes and operational excellence that translates to minimal downtime, extends asset lifecycles, and strengthens the owner's reputation for reliability and innovation.

The Smart FM solution must thus be agnostic, flexible and agile to deliver these key functionalities:

1. **Incident Management:** Detecting, dispatching, logging, and resolving incidents related to cleanliness, security, equipment, or occupants.
2. **Systems and Occupant Management:** Integrating systems and using data analytics to enhance performance and user experience.
3. **Performance Measurement:** Tracking outcomes like energy savings, incident resolution times, and occupant feedback to assess efficiency.

The solution is powered by:

- A **common data environment** that standardizes building data access and relationships.
- **Condition-based maintenance** to optimize equipment performance and reduce costs.
- **Automation** through workflows and robotic processes to streamline operations.

For example, SJ's common data platform 24K can monitor chiller plant efficiency, identify deviations, and trigger maintenance work orders to prevent energy waste and equipment degradation. These processes are tracked, logged, and continuously audited to ensure desired outcomes are met. The approach is practical, leveraging domain expertise in IT and OT to deliver measurable results.

EMPOWERING FM STAFF: A FORCE MULTIPLIER FOR TALENT RETENTION

The facilities management industry faces a talent crisis, with skilled professionals in high demand. Smart FM acts as a force multiplier, empowering FM teams to work smarter, not harder. By automating routine tasks and providing actionable insights, Smart FM allows staff to focus on higher-value activities, fostering job satisfaction and professional growth.


Township Happiness Index
Powered by
Feedbacks
Resolution time per Contractor per trade
Issues
Past 3 months
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21090
Total
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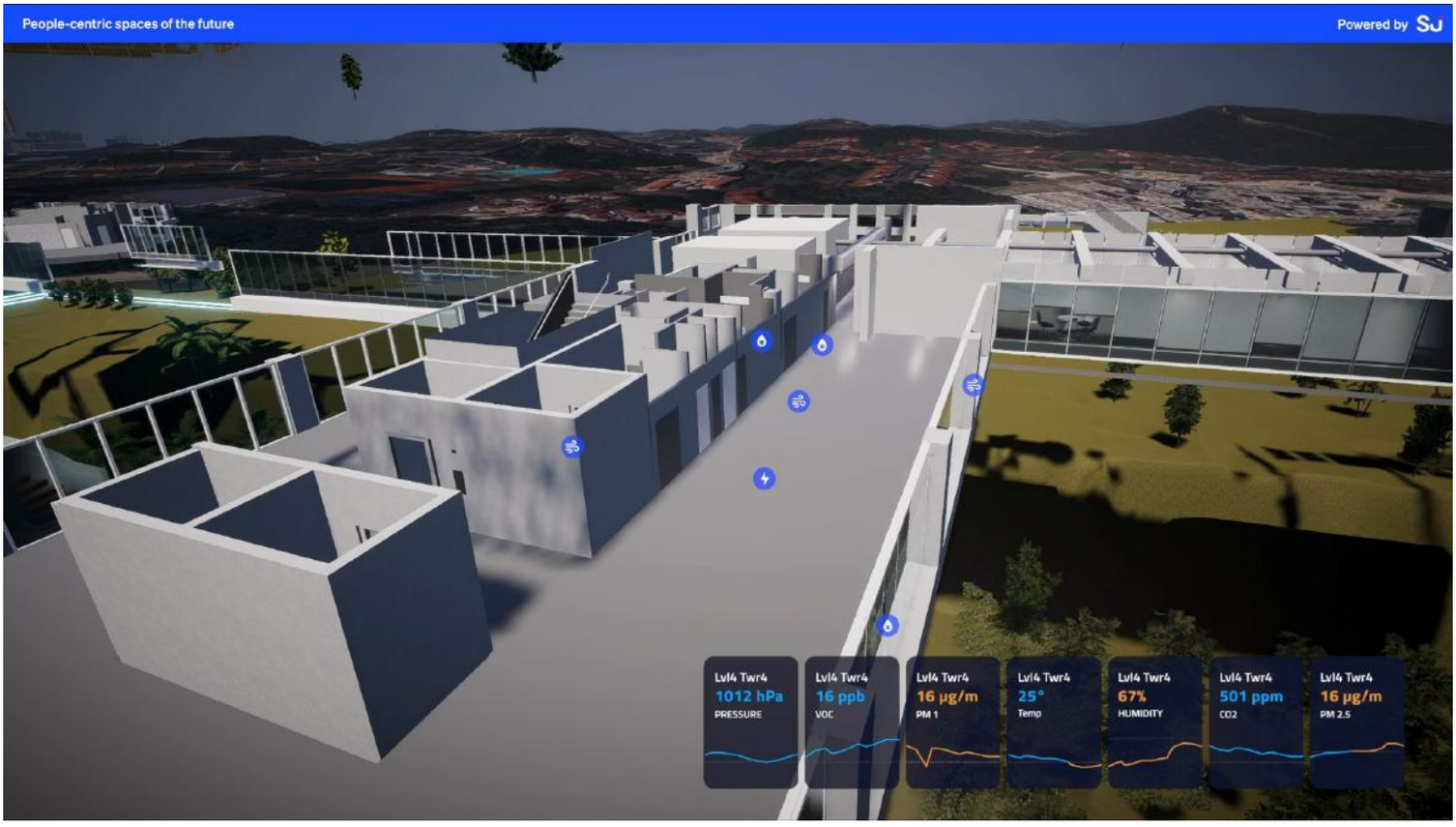
Ticket Resolution time in selected district
Feedback sentiment in selected district
Past month
District citizens Sentiment


People-centric spaces of the future
Powered by
Lvl4 Twr4
1012 hPa
PRESSURE
Lvl4 Twr4
16 ppb
VOC
Lvl4 Twr4
16 µg/m
PM 1
Lvl4 Twr4
25°
Temp
Lvl4 Twr4
67%
HUMIDITY
Lvl4 Twr4
501 ppm
CO2
Lvl4 Twr4
16 µg/m
PM 2.5


People-centric spaces of the future
Emission Profile
December 2023
4 SELECTED
200
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16
21
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31
Baseline Emission Factor (gCO2e/km)
Actual Emission Factor (gCO2e/km)
CO2 Emissions (kgCO2e)
Baseline Emission (kgCO2e)
CREATE REPORT
Monthly Water Consumption
Past 6 Months
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Investing in Smart FM also demonstrates a commitment to upskilling and rewarding FM staff, enhancing retention and attracting top talent. In an industry where human expertise is irreplaceable, this focus on staff development is a strategic imperative.

THE INTEGRATED OPERATION CENTRE (IOC)

Smart FM is about more than cost savings—it's about creating value across the entire real estate ecosystem. By addressing **stakeholder engagement, operational excellence, and staff development**, smart FM delivers outcomes that resonate far beyond the bottom line. It positions real estate owners to meet the demands of a rapidly changing industry while driving long-term sustainability and growth.

This is demonstrated in the Integrated Operation Centre (IOC) which has evolved from static, manual systems to one that integrate data and custom algorithms to create a dynamic, responsive environments. The IOC centralizes previously silo systems like BMS, security, fire alarm, energy monitoring etc, into a single platform to give FM managers the real-time business intelligence they need to make smarter, swifter decisions. Technicians are upskilled to maximise the utility of these decision support tools for higher operational efficiency.

THE BIGGER PICTURE: A HOLISTIC APPROACH TO SMART FM

Real estate owners must look beyond traditional budgets and cost-benefit analyses when evaluating Smart FM investments. The true measure of success lies in achieving a balance between financial performance, stakeholder satisfaction, operational efficiency, and workforce empowerment. By embracing this holistic approach, property owners can unlock the full potential of FM transformation.

Article contributed by:
Mr. Francis Tay
Principal Consultant, Digital Technology
SJ

THE RETROFIT ROADMAP: FROM INCREMENTAL TO TRANSFORMATIONAL

SGBC Member Cundall unpacks the challenges and opportunities in retrofitting our existing buildings.

WHY ARE EXISTING BUILDINGS NOT BEING RETROFITTED AT THE SPEED AND SCALE NECESSARY FOR CLIMATE CHANGE MITIGATION AND ADAPTATION?

This was the question anchoring Transform, a forum co-hosted by SGBC Member Cundall and Hassell, intended to disentangle the challenges and opportunities in accelerating retrofitting efforts within the built environment.

A key feature shaping the dialogue was a pre-event survey, completed by would-be attendees (building owners, investors, and asset managers) whose responses provided a real-world snapshot of the concerns, motivations, and roadblocks facing those responsible for transforming our urban landscape. The result was an insight-rich forum, complete with debate and a collective urgency to bridge the gap between ambition and action

THE CHALLENGE: OUR TRANSITION IS SLOW AND COMPLEX

The discussion opened with reflections on the shifting nature of the built environment, particularly in the post-pandemic period. While workplaces and city centres have for the most part stabilised, expectations for buildings have evolved – and for good reason. Tenants, employees, and investors demand **higher sustainability standards, better amenities, and greater resilience to climate risks.** Yet, the retrofitting response – specifically the **pace of transformation** – is handicapped by several challenges:

- **Disruption to Tenants** – Many landlords hesitate to undertake building upgrades due to concerns over tenant displacement and temporary revenue loss.
- **Regulatory Complexity** – The forum underscored that governments are introducing policies to drive energy efficiency, such as Singapore's MEI (Minimum Energy Improvement) Regime, requiring audits and improvements for underperforming buildings. Compliance, however, is not always easy to navigate, especially when regulations are ever-changing and expensive.
- **Financial Constraints** – While retrofits evidently yield long-term cost and carbon savings, the upfront capital expenditure can serve as a significant deterrent to asset owners. Investors with short-term horizons, such as certain REITs, hesitate to invest in retrofits that temporarily (though often significantly) reduce rental income and occupancy rates.
- **Market Expectations and Asset Valuation** – The real estate market often defines 'premium' buildings based on factors such as ceiling height, floorplate layout, and architectural specifications. Older buildings, even after upgrades, struggle to compete with new developments that set higher benchmarks. This is where building owners and policymakers must begin redefining value - a high-performing, sustainable building should not need to meet traditional 'Grade A' specifications to be recognised as a quality asset.
- **Lack of Scalable Financial Models** – Traditional funding mechanisms don't always support retrofitting at scale. Green bonds and sustainability-linked loans exist but are underutilised in the retrofit space.
- **Lack of Technical and Building-Specific Knowledge** – Attendees also recognised that retrofitting responses must be unique to the building, requiring a deep understanding of architectural, structural, and engineering constraints (and opportunities). Many asset owners lack the technical expertise to make informed decisions on the most effective interventions for their buildings.

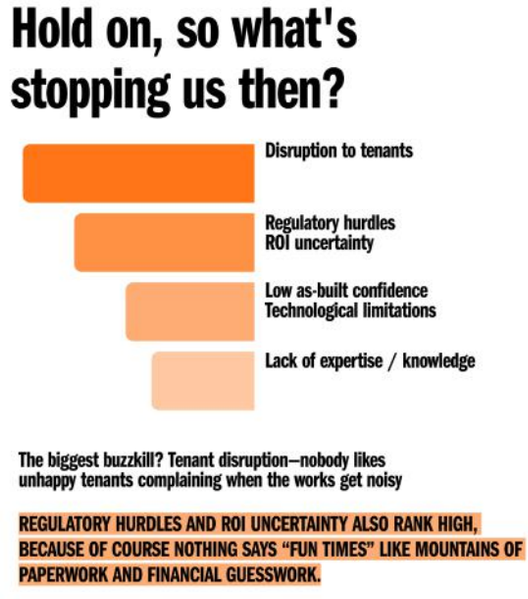

Image credit: Hassell

The GFA Conflict – Increased Gross Floor Area (GFA) incentives can inadvertently disincentivise retrofits and instead encourage demolition and new construction. For instance, older buildings may have design constraints or structural limitations that make integrating additional GFA challenging. Retrofitting such buildings to meet new GFA allowances can be technically complex and costly, leading developers to opt for demolition and new construction as a more feasible and straightforward alternative.

THE CASE FOR RETROFITTING: WHAT ARE THE CONSEQUENCES OF INACTION?

Notwithstanding these barriers, the forum emphasised that not retrofitting is a far greater risk - financially, environmentally, and competitively. It further highlighted why retrofitting (and doing it early) should be a priority:

- **Energy and Cost Efficiency** – Retrofitting early can significantly reduce energy intensity, emissions intensity, and future costs. The discussion referenced data showing that even moderate upgrades – implemented strategically throughout the life of a building - can yield substantial reductions in emissions and operating costs.
- **Policy Shifts from Incentives to Penalties** – Regulatory frameworks are evolving from rewarding sustainability to penalising underperformance. In Singapore, buildings that fail to meet energy efficiency requirements face valuation discounts and increased compliance costs. As one participant noted: "A rising tide lifts all boats."
- **The Carbon Trajectory of Demolition vs. Retrofitting** – Demolishing and rebuilding generates substantial carbon emissions. Retaining existing structures and upgrading their performance is, in most cases, the less carbon-intensive pathway.
- **Market Competitiveness and the Tenant Paradox** – Although the survey results spotlighted tenant disruption as the greatest retrofitting obstacle, tenants are simultaneously one of the greatest drivers for building retrofit and transformation. Corporate occupiers and investors are increasingly prioritising ESG-aligned properties, clearly signalling that sustainable, energy-efficient buildings are a market expectation rather than just a differentiator.

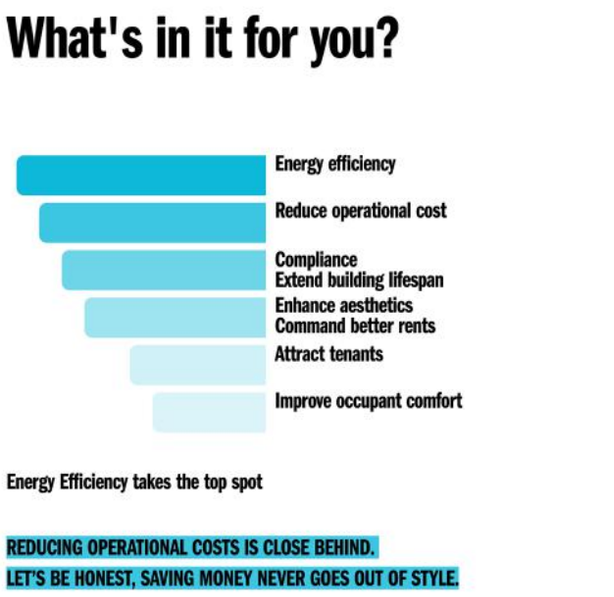

Image credit: Hassell

But little of this is new information. Owners have been aware of these challenges, incentives, and penalties for some time now. More importantly, they have always known of the existence of solutions. So, what explains the sluggish transformation? The forum distilled some critical factors – an incomplete understanding of how to align the right retrofit solutions with a building's specific needs and a limited awareness of funding requirements and available alternative funding mechanisms. With this, the dialogue reinforced that building transformation cannot and does not need to happen overnight.

A ROADMAP FOR TRANSITION

A salient takeaway from the discussion was that retrofits do not have to be an "all or nothing" process. The perception that retrofitting requires deep, large-scale modifications often results in delays or inaction. There is a spectrum of interventions that can be deployed based on budget, urgency, and asset type. Cundall and Hassell proposed a gradient of transformation, ranging from light-touch interventions to deep repositioning projects. An incremental and iterative approach lowers the barrier to entry and is based on trigger points unique to the building. Regardless, getting started is the wisest strategy.

FINANCING THE TRANSITION

The forum also underscored that financial barriers, while significant, are not insurmountable. Financial instruments such as sustainability-linked loans and green bonds are increasingly available to support building upgrades. However, the challenge lies in increasing their adoption within the retrofit space. Tailored financing mechanisms that reflect the unique challenges and payback periods of retrofitting projects is a capital-unlocking strategy that can be co-developed by owners and financiers. Governments and regulatory bodies can also play a crucial role in incentivising green finance adoption for retrofits, beyond new developments.

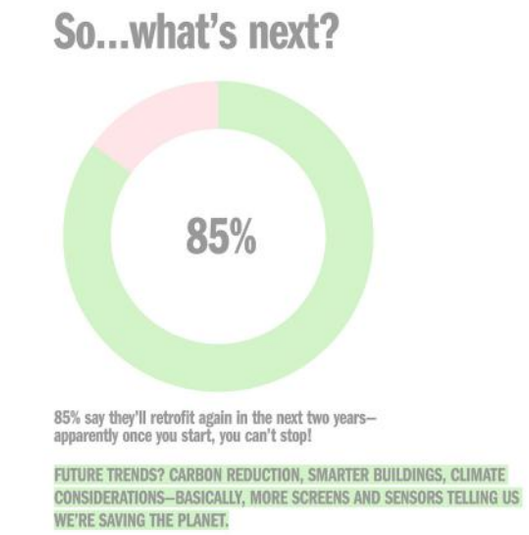

Image credit: Hassell

THE RETROFIT ROADMAP: FROM INCREMENTAL TO TRANSFORMATIONAL

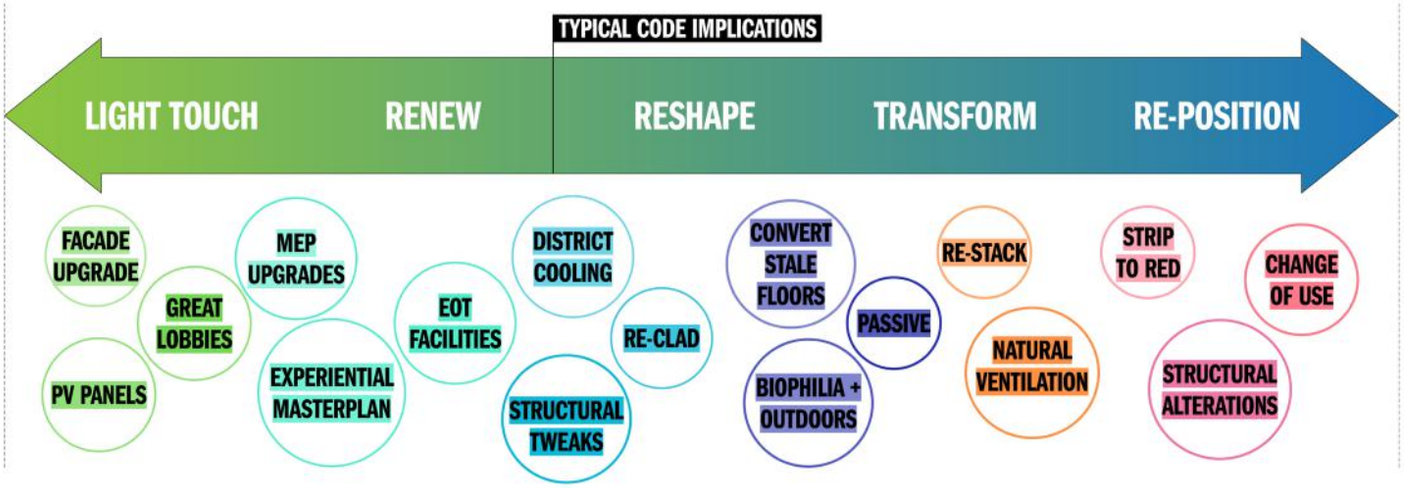

Image credit: Hassell

SHIFTING THE MINDSET AND THE ACTION

The forum ended with a call to rethink what makes a building 'Grade A.' Traditionally, premium office spaces were defined by height, views, and specifications. The future of real estate, however, will be shaped by sustainability, flexibility, and tenant experience. Phased and stepwise retrofits offer a path to modernising buildings in ways that balance financial, environmental, and social value. To accelerate retrofitting at scale, a fundamental shift in approach is required:

- **From Cost to Value** – Retrofitting should be framed as an investment in long-term asset performance, rather than a short-term financial burden.
- **From New to Renewed** – The most sustainable building is the one that already exists. Instead of demolishing and rebuilding, owners should reimagine existing assets.

- **From Isolated to Integrated** – Engineering, architecture, finance, and policy must collaborate and harmonise to develop scalable, building-specific retrofit solutions.
- **From Sprint to Marathon** – Retrofitting does not require an immediate, large-scale overhaul. Instead, asset owners should pursue phased interventions, ensuring continuous progress toward net-zero targets.

Transform was not merely a call to action—it was a blueprint for scalable transformation. The barriers to retrofitting are well understood, and the solutions are available. The challenge now lies in swiftly and adaptively harmonising financial, regulatory, and technical efforts so that they are responsive to each building's unique context, achieving asset-relevant and high-impact transitions.

As one participant put it:

"If we do not start today, we cannot transform tomorrow."

Article contributed by:
Cundall Singapore

SINGAPORE GREEN BUILDING PRODUCT CERTIFICATION SCHEME

The Singapore Green Building Product (SGBP) Certification Scheme evaluates building products based on scientific principles and industry expertise, ensuring certified products meet stringent environmental standards. SGBP-certified products are highly recognised under the Green Mark Scheme, allowing for the accrual of points that count towards a project's Green Mark rating.

SINGAPORE GREEN BUILDING COUNCIL

SGBC MEMBERSHIP

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