

SG GREEN



MCI permit number (MCI (P) 095/06/2019)

The Future of Building

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THE FUTURE
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REVOLUTIONISING
ENERGY
MANAGEMENT**

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PUBLISHER

Singapore Green Building Council

DESIGN & PRINTING

SC (Sang Choy) International Pte Ltd

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MESSAGE FROM THE EDITORIAL TEAM

The warning of climate change is getting louder and more unmistakable, its effects making their presence felt on all human beings around the world with no discrimination against any race, language or religion. This is an issue that impacts all of humanity, not just individual countries or continents.

As articulated by Minister for the Environment Mr Masagos Zulkifli during the Partners for the Environment Forum 2019 held on 17 July 2019, "Time is running out. Last year, the Intergovernmental Panel on Climate Change issued one of the starkest warnings from the scientific community – an increase of 1.5 degrees Celsius in global warming could occur as early as 2030. The warning is loud and unmistakable: We must act now or we may well face the ultimate threat to human survival that Mr Lee Kuan Yew wrote about - the end of 'life as usual'".

Singapore as a small country is particularly vulnerable to the negative impact of climate change. It is therefore pertinent to invest time, resources and collective effort to address the effects of climate change to ensure a future for the next generation. The built environment and infrastructure are in a prime position to address climate challenges. By working together to make our buildings and infrastructure more environmentally sustainable while inculcating more responsible user behaviour, we can help mitigate what is the single most pressing issue we as a nation will ever face.

The way we build, maintain and operate buildings will have to be climate-resilient, futureproof and also healthy for both the natural environment and the building's occupants. Essentially, the future of building lies at the very heart of our buildings: the occupants who live, work and play in buildings of every shape, size or typology.

In this issue of SG Green, we gaze into the not-too-distant future of the built environment. In fact, the future is already upon us, embodied by the new Funan, quite literally a mall of the future with its sustainability features and occupant-centric emphasis. We also take a look at the future of workplaces, how the changing office environment has given rise to new layouts that are wired for maximum efficiency and engagement.

We hope this issue of the magazine will give you insights into how the future of building will be like and look forward to collaboration from every sector – essentially an "all hands on deck" approach – to ensure a green, healthy and sustainable future for the next generation and beyond.

Yours sincerely,
SG Green Editorial Team



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Funan

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Funan

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↑ 907



FUNAN : THE FUTURE OF RETAIL

Funan, a building so deeply entrenched in the local social consciousness, recently reopened its doors after a complete makeover. Find out what makes the new Funan the future of integrated developments in this article.



Funan: The Future of Retail

Ask any Singaporean on the street about Funan and chances are they will tell you that the familiar building was where many got their information technology fix: from high-performance computing solutions and gaming peripherals to photography paraphernalia and printing accessories, Funan was the place to be. Nestled in the heart of the Civic District with excellent connectivity to virtually anywhere, Funan was officially reopened in July 2019.

The brand new Funan has undergone a tremendous facelift, shedding its antiquated skin for a modern, vibrant and inviting design. The metamorphosis also extends to the building's function: from a shopping centre with office and coliving elements, Funan is now an integrated development fully equipped to enable people to live, work and play in a creative and sustainable environment.

In order to remain attractive and appealing to the modern consumer, Funan had to reimagine itself for the future. As Mr Chris Chong, Managing Director, Retail, of CapitaLand Singapore, puts it, *"As the retail landscape undergoes disruptions, the formula for a successful mall has to evolve as well. While a decade ago a mall could succeed largely on the merit of its tenant brands, today it must be able to anchor its own community of supporters and followers. Consumers of today don't just buy products or services, they invest their time and effort in understanding brands and supporting relevant causes."*



"Against this backdrop, CapitaLand has conceptualised Funan differently right from the onset. We envisioned Funan as a new-gen integrated development comprising retail, office and coliving components to appeal to digitally savvy consumers pursuing quality of life in a creative and sustainable environment."



REIMAGINING SUSTAINABILITY

The design thinking behind the reimagined Funan is anchored on sustainability, with its architecture and construction firmly rooted in green building as well as universal design principles. The development incorporates many sustainability innovations throughout its premises, all of them working in tandem with the forward-looking building design to create a healthy, sustainable and energy-efficient space. In fact, Funan expects to achieve an estimated energy savings of 6,447,787kWh per year. This is equivalent to the reduction of approximately 3,224 tonnes of carbon dioxide emissions to the atmosphere per year.

1 Energy Efficient Chilled Water Plant

The first to be used in a retail mall in Singapore, Funan uses a next-gen refrigerant (R1233zd) to minimise energy consumption and reduce the emission of greenhouse gases. The development is designed with an energy efficient water-cooled chilled water plant system, which is able to achieve 0.557 kW/rton weighted plant efficiency over a 24-hour period. The design of higher chilled water supply temperature also further improves the chiller efficiency.

On top of that, the building's chilled water distribution pumps, condenser water pumps and cooling towers are driven by variable speed drives in order to conserve the power consumption according to the building's cooling requirements. Auto condenser tube cleaning is also incorporated to ensure continued chiller performance during day-to-day operations.





2 Low Energy and Energy Efficient Design

Funan incorporates an energy efficient façade designed to minimise solar heat transmission. All retail common areas, office corridors, the coliving property's front of house (guestrooms, corridors & lobbies) are fully fitted with energy efficient LED light fittings to achieve optimal energy savings while ensuring good illumination. The lights are designed with an intelligent scene control system, which is able to turn off or dim the lighting levels according to different hours of the day.

All lifts in Funan are also regenerative in nature. The movement of the lifts generates kinetic energy, which will be converted to electrical power to be distributed back to the lift system. This will result in savings of up to 18 percent in power consumption compared to other buildings without a regenerative system.



3 Extensive Greenery and Rainwater harvesting

Greening on the development's roof using trees and urban landscaping creates a conducive environment for public use. Funan boasts the largest area for urban agriculture in the city with a 18,000-sq-ft food garden and a 5,000-sq-ft urban farm, where visitors can learn more about the origins of their food and even 'adopt a plot' to grow their own produce. Operated by Edible Garden City, farmers will work with chefs to curate, grow and harvest pesticide-free produce, supplying the produce straight to



restaurants in Funan. Singapore's Spa Esprit will launch its first Japanese restaurant, Noka, situated next to the Urban Farm.

There is also a seven-storey green wall adorning Funan's façade at the junction of Coleman Street and North Bridge Road, right beside the immersive Kinetic Wall art installation. Rainwater is harvested to irrigate the extensive greenery, which will result in estimated water savings of approximately 12.8 million litres a year.

4 Encouraging More Sustainable Lifestyles

Funan's central location, well-connected transport links and design features encourage urban public connectivity and a car-lite mindset amongst shoppers and tenants, further enabled by an underground linkway that will connect Funan to City Hall MRT by 2021. An added convenience for Funan's office community who cycle to work, Funan features an indoor cycling path that allows cycling and riding of devices from 7.00am to 10.00am, taking cyclists straight to the Bicycle Hub, where end-of-trip amenities can be found. These include 174 bicycle bays, shower cabins, lockers, and a bicycle repair and pump station. There are also fast-charge stations for electric vehicles and electric bicycles.

For its efforts and onus on sustainability, Funan has received the Building and Construction Authority Green Mark Gold^{PLUS} Award, the Universal Design Mark Design Gold^{PLUS} Award in 2018 as well as the Interior Design Awards 2019 - BCI Asia Awards 2019, Mixed-Use Architecture (Singapore).

Funan: The Future of Retail

REIMAGINING CONSTRUCTION

The new Funan was also built speedily: from groundbreaking to completion, the construction of Funan took 27 months – a feat for a development of its scale. Despite challenges such as a tight site with limited access, time savings were achieved through innovation in construction methods, the choice of building materials and equipment to avoid redundancies and inefficiencies in Funan’s construction process.

These include applying Virtual Design and Construction at the onset, and adopting a top-down construction method, which allows for the building’s basement and superstructure to be built concurrently. Precast concrete structural building components are also used to further reduce the construction time.

In addition, the construction of the underpass that will connect Funan to City Hall MRT station (to be completed in 2021), will deploy the Rectangular Tunnel Boring Machine as it saves time and manpower, and minimise traffic disruption.

REIMAGINING THE RETAIL EXPERIENCE

The reimagined Funan serves as a social retail space for discovery, learning and shopping, underpinned by a digital layer of customer experience to enhance satisfaction. With this configuration, CapitaLand aims to support retailers in embracing opportunities in the brave new world of bricks-and-clicks by attracting and growing a responsive and vibrant community, powered by an ecosystem of sensors and analytics to deepen consumer insight.



Funan: The Future of Retail



One of the most striking features within Funan is the aptly named Tree of Life: a 25-metre tall design centerpiece that “grows” from Basement 2 all the way to Level 4. Commanding an impressive presence within the retail space, the Tree of Life also functions as Funan’s source of life, enlivening the atmosphere through the 20 retail pods that brands can utilise for a variety of functions. From showcasing new products to holding classes and workshops, these pods work together with the rest of Funan’s creative retailing formats and experiential offerings to keep consumers engaged all day, every day.

The new Funan goes beyond selling IT products to incorporating the tech experience throughout the entire development. Executives entering Funan’s twin office blocks enjoy the convenience of facial recognition turnstile access. Using one of the about 40 smart directories in Funan, shoppers can browse and search for trending merchandise before mapping the shortest route possible to reach a store with the wayfinding system. Enabled by sensors, these smart directories can also make product recommendations based on the shopper’s demographic profile.

Tenants of Funan are also enabled and encouraged to run their own digital initiatives and innovations, such as:

- Golden Village at Funan features Virtual Reality pods in its foyer, showcasing popular games and cinematic content for customers.
- Kopitiam has launched its latest concept KOPItech, setting a new standard for food court dining in Singapore – where patrons can place their orders via one of the 17 self-service kiosks or through the Facebook messaging app.
- COURTS’ first IoT-themed store in Singapore retails the latest smart home, AI and voice-control technology from leading brands, and incorporates interactive in-store experiential concepts and robotics.
- Fashion retailer Love, Bonito’s largest physical store offers an electronic queueing system for its fitting rooms, and an augmented reality walkway photo spot for digitally-native customers to share their shopping experiences on social media.

“At the onset when we engaged retailers about CapitaLand’s vision for Funan, many were inspired to leverage Funan as their own innovation platform,” said Mr Chris Chong on the mall’s onus on reimagining the retail experience. “Today we see many retailers breaking new ground at their stores in Funan, whether in incorporating digital innovations to enrich their in-store experience, or through new concepts and offerings. This shows the depth of Singapore’s retailers and the innovations that Funan as a social retail platform have inspired and supported.”



REIMAGINING LYF

Following the opening of Funan’s retail and office components, CapitaLand’s wholly owned lodging unit The Ascott Limited (Ascott) is opening lyf Funan Singapore in September 2019. This is Ascott’s first coliving property under the “lyf” brand designed and managed by millennials for millennials and the millennial-minded. It is set to be the largest coliving property in Asia. Spanning about 121,000 sq ft in gross floor area, it will provide 279 units with the flexibility to offer up to 412 rooms.

lyf (pronounced ‘life’) signifies a new way of living and collaborating as a community, connecting guests with fellow travelers and change-makers such as technopreneurs, start-ups as well as creative professionals from the music, media and fashion industries. lyf properties enable guests to ‘Live Your Freedom’ in a dynamic environment and will provide flexible communal spaces that facilitate collaboration, community building and social activities among its guests. The social kitchen and pantry can be a networking spot while the communal lounge can double up as a space for activities. Social programmes will be held regularly to foster a new way of community living, building connections and being inspired by the exchange of ideas. The lyf properties are designed to cater to both long and short stays.

REIMAGINING THE FUTURE

With its sleek, creative architecture, clear onus on sustainability and positioning as a new-generation live-work-play hub, Funan is set to invigorate the Civic District and become an iconic building for the current generation, much like how the older Funan holds a special place in the hearts and minds of earlier generations. As consumer patterns continue to change, the buildings we live, work and play in must keep up as well, and Funan is an arresting representation of the future of our buildings. ✔

- Developer: CapitaLand**
- Design Consultant: Woods Bagot**
- Executive Architect: RSP Architects Planners & Engineers Pte Ltd**
- Quantity Surveyor: Arcadis Singapore Pte Ltd**
- Mechanical & Electrical Engineer: Alpha Consulting Engineers Pte Ltd**
- Civil & Structural Engineer: RSP Architects Planners & Engineers Pte Ltd**
- Landscape Designer: Grant Associates**
- Lighting Designer: Nipek**

Text and Images courtesy of CapitaLand

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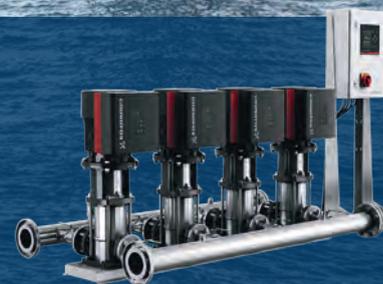
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STAY SAFE AND GREEN

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Don't take your surfaces — floors and walls — for granted especially in the context of public spaces in industries such as healthcare, commercial, education and hospitality.

Surfaces of this nature take the daily beating of feet and machinery wheels. A high-traffic area also increases the risk of accidents happening.

Then there is the daily maintenance of cleaning, wiping, and disinfecting them. As owners of such public zones, you also want surface materials to be rigorous to constant usage while ensuring it does not disintegrate to release toxic by-products. So, what is your approach when creating the right and safe environments in these industries? If you're scouring the market for such products, Goodrich has some of the best solutions to tackle these concerns.



Patients Room (Flooring)



Hospital Lobby (Flooring)

FLOORINGS FOR PATIENTS' AND TREATMENT ROOMS

Armstrong products may not be household names to some, but it is one of the leading brands when it comes to high-tech, high-performance flooring.

For example, Armstrong Medintone provides the highest scratch, stain, and scuff resistance in the industry which is suitable for patient's rooms and treatment rooms which often endures the worst beatings from the daily grind.

One can also consider Armstrong Medintech Plus – a unique homogenous vinyl sheet flooring. The product offers a layer of UV-cured coating which is anti-Betadine; perfect to avert staining and inhibits the growth of bacteria.

This high-tech flooring is the number one choice for many hospitals worldwide and it's no surprise that it is the brand's best-selling homogenous vinyl!

FLOORINGS FOR COMMERCIAL PROJECTS

In public areas such as lobbies and gyms, Armstrong also has product offerings to make it resistant to stains and scratches.

The Armstrong Starlux sheet flooring has Diamond 10 technology integrated into the coating. It makes it resistant to scuffs, scratches, and dreadful stains.

Best of all, its durable and easy-to-clean properties makes it a breeze to clean and maintain.



Gym (Flooring)



Lounge Area (Flooring)



Scan here to
download Goodrich
Flooring Catalog



Laboratories (Flooring)



Classroom, USA (Flooring)

FLOORINGS FOR EDUCATION PROJECTS

When it comes to high-traffic areas such as education rooms and high-susceptibility to stains and corrosion such as laboratories, then Armstrong Startlux sheet flooring is your best solution.

More than just being durable, their resilience to scratches and stains make it a standout product. All this is possible because of Diamond 10 technology coating which also makes it a cinch to clean, lessening manpower in maintenance and saving you money!

FLOORINGS FOR HOTELS AND RETAIL

There's always pressure to look good when it comes to managing hotels and retail spaces. You want to create a good impression on your guests and customers. Armstrong ColorArt Medintech and Meditone with Diamond 10 technology coating is your best bet.

This amazing product is bent on tackling high-traffic spaces such as hotel lobbies and retail shops. A product to withstand the heavy footfall while being a low-maintenance product is clearly Armstrong ColorArt Medintech and Meditone with Diamond 10 technology. Unique to this product is the through-pattern construction found in ColorArt homogenous sheet which can prevent abrasions while looking aesthetically pleasing with its spectrum of colours, tones, and patterns.

For retail owners, Armstrong Timberline brings a slice of outdoors indoors. The realistic timbre wood offers detailed wood grains to add warmth to interiors. The Timberline collection is part of its Continuum Solutions which can harmonise with other products in Armstrong's flooring portfolio.



Boutique (Flooring)

Best of all, Armstrong is committed to saving the earth by creating products that will allow business owners to construct sustainable-built environments. Ultimately, this will contribute credits for Green Building Rating Systems such as the Collaborative for High Performance Schools® (CHPS®), WELL Building Standard®, Leadership in Energy and Environmental Design (LEED®), and Green Globes®.

All their flooring products also meet the requirements for the California Building Code (CALGreen®) and the International Green Construction Code (IgCC).



Hotel Lobby (Flooring)

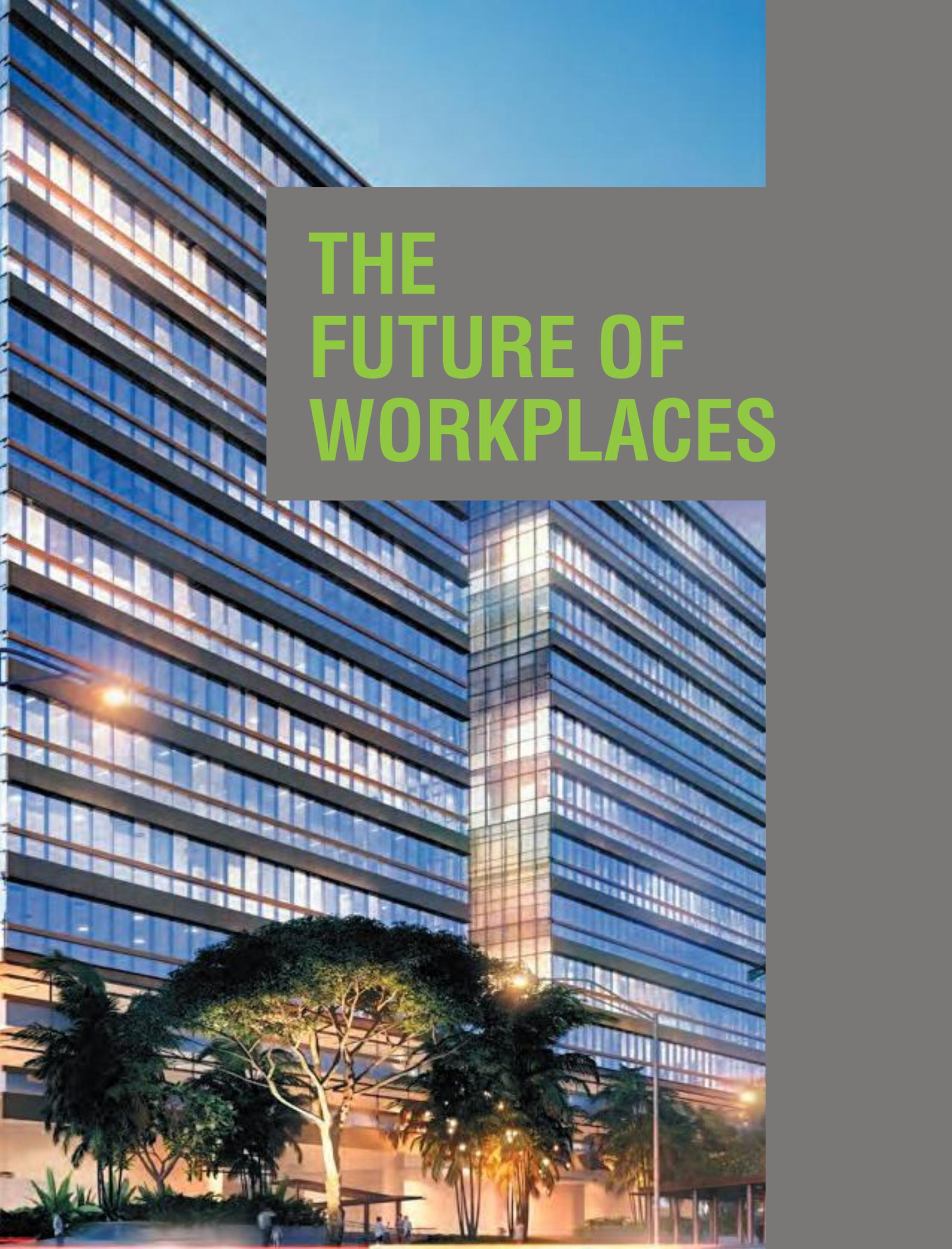


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A photograph of a modern glass skyscraper at dusk. The building's windows are illuminated from within, creating a warm glow against the darkening sky. The building's facade is composed of horizontal bands of glass and dark structural elements. In the foreground, there are several trees, including palm trees, and some streetlights. A grey rectangular box is overlaid on the right side of the image, containing the text 'THE FUTURE OF WORKPLACES' in a bold, green, sans-serif font.

THE FUTURE OF WORKPLACES

The Future of Workplaces

IT'S NOT IN THE KOOL-AID: YOUR OFFICE SPACE CAN MAKE YOUR EMPLOYEES MORE INNOVATIVE

While there has been a lot of talk and research into how companies can create sustainable workspaces through design and technology, there's increasingly rising interest on how the same principles can be applied to other more intangible aspects like innovation.

Innovation is a highly valued trait in today's digital economy. Companies are talking about disrupting themselves. Leaders are keen to ensure employees stay nimble and think out-of-the-box. Innovation has become a key priority for companies to become more productive, enhance performance and ultimately improve the bottom-line.

The good news is that innovation can be nurtured – beginning with where and how you work. Already, the traditional office is being transformed with technologies such as high-speed Internet, analytical sensors, cloud storage, meeting management software, collaboration tools and even wearables.

People can now work from wherever they are. Meetings with colleagues located in various cities are made more convenient and direct. File-sharing and communications are seamless. Walls are coming down as the cubicles of old make way for a more fluid, collaborative and people-centric configuration.

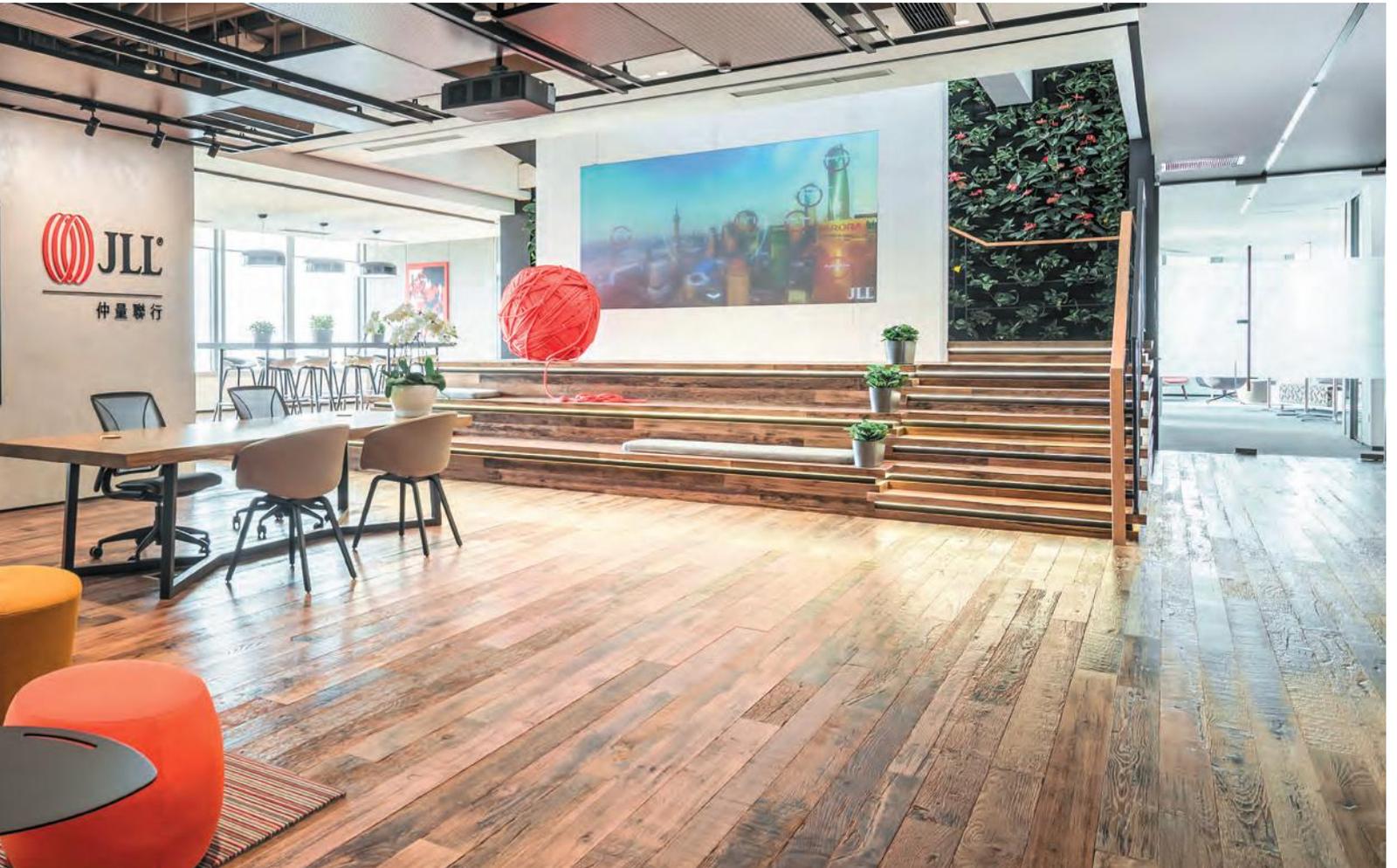
GETTING THE LAYOUT RIGHT

But having an open office does not necessarily make employees more productive or innovative. Research by the Harvard Business School and University of Queensland reveals that not everyone benefits from that type of set-up. The former indicates that face-to-face interaction declines as much as 70 percent as people prefer to send emails, while findings from the latter show that employees suffer from stress and insecurity from the lack of privacy.

Rather, creating spaces that engender positive behaviour through thoughtful office layout can foster innovation in organisations in addition to being more efficient and space-saving. A white paper by office furniture brand Haworth suggests that an office can be designed to boost cognitive



The Future of Workplaces



function and creativity by giving employees space to focus, rest, and transition between the two.

Through JLL's own **Future of Work** research, we further discovered how real estate can be used strategically for workplace transformation. Our Human Experience survey of more than 7,000 employees from 12 countries globally reveals that nearly 50 percent of respondents feel that being able to concentrate on their tasks in the office is a top priority; and that it is necessary for companies to let employees decide how, when and where they work.

The same survey shows that a third of respondents want creative spaces for brainstorming, design thinking or workshops, while 28 percent favour a dedicated room for running incubators - where they can work with external collaborators to develop projects that tap onto company infrastructure.





support and advice.

Companies therefore need to think about flexibility in their workspaces to accommodate such a variety of functions for all worker types: from rooms for isolated or quiet, focused work, to casual lounges for impromptu meetings and spontaneous conversations with collaborators that could lead to a bountiful exchange of ideas.

Even formal meetings rooms can be reconfigured to be dynamic and multi-use to meet the varying demands and requirements of different teams. This can be achieved by having modular furniture that can be shifted around easily or moveable walls to create (or remove) partitions. Offices that allow for flexible layouts and activity-based working will also maximise space utilisation.

Triggered by the influence of technology firms, the rise of agile meeting modes such as sprint planning and the huddle mean companies should ensure the right conditions for them. In the JLL Shanghai office, we created a 15-minute meeting room, designed for a brief scrum or huddle-like session. To ensure that users keep to the limit, the lighting system of the room switches off automatically so meetings do not stretch beyond the stipulated 15 minutes. Interiors are also thoughtfully done up – walls are cushioned for participants to lean comfortably against them



WIRED FOR EFFICIENCY AND ENGAGEMENT

Likewise, technology can be harnessed to enhance the workplace experience. Take the earlier example in the Shanghai office where the lighting in the huddle room is switched off after 15 minutes. Smart lighting can also optimise the office environment continuously. For instance, it can brighten and dim throughout the day, improving levels of concentration or creativity. What was once a routine task has been made intelligent, intuitive and automated.

It will not be long before technologies such as Artificial Intelligence (AI) will become commonplace in the office environment, taking over tasks such as managing a diary, ordering office supplies, filtering emails or searching for files and documents. This

freed up time for the office worker to focus on more complex and creative tasks.

Many companies are also investing in enterprise applications for their employees. These could come with time-saving features such as locating and booking meeting rooms, a link to food delivery services or catering options, or product management and productivity tools for team members and management to be kept in the loop, track plans and communicate in real-time. Collaboration devices are another way to spark innovative ideas and foster employee engagement. Think digital whiteboards that can easily capture your ideas and notes and store them in the cloud, easily retrieved whenever required.



These are just some examples of how technology can be employed in the workplace to facilitate innovation. However, every company's needs will be unique: it is just as important to decide how much technology is required and develop a layout that fits the company's culture and resources.

For instance, JLL envisions a workplace that would set a new benchmark for the industry at our new regional head office at Paya Lebar Quarter. The design of the space and technology solutions deployed were carefully conceptualised and implemented to add value to the working experience of employees, while supporting our culture of building a strong and collaborative community.

An engaging office environment for more engaged employees will go a long way in fostering a spirit of innovation. When companies decide to invest in their workspaces, they are really investing in their people and the capabilities of the firm to stay robust in fast changing times. ✔



By Wu Xuchao
Head of Energy and Sustainability Services
JLL South Asia

South Beach Singapore incorporates unique eco-friendly features including a microclimatic canopy engineered to provide naturally ventilated shelter, a rainwater harvesting system and more than 1,600 photovoltaic cells.



COMMITTING TO SCIENCE-BASED CARBON EMISSION REDUCTION TARGETS

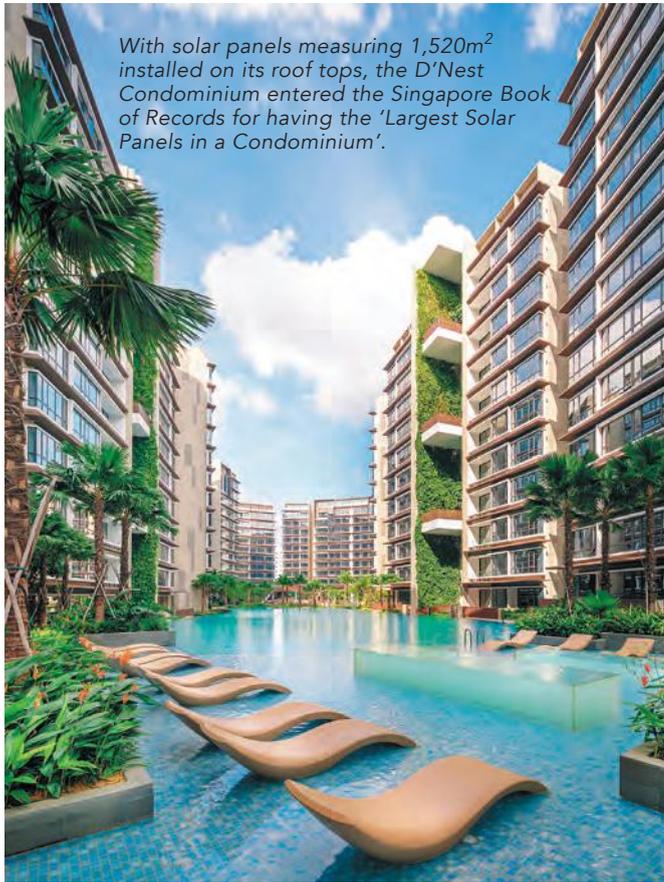
STEERING AMBITIOUS CORPORATE CLIMATE ACTION THROUGH CLIMATE SCIENCE

The science is clear about climate change:

In order to limit global temperature rise to within 1.5°C, we need to tackle the upward trajectory of greenhouse gas emissions now. The worldwide building and construction sector is responsible for 40 percent of global greenhouse gas emissions in 2018. The industry must change the way it designs, builds and operates its buildings to redress the balance.



Committing to Science-Based Carbon Emission Reduction Targets



MAKING SENSE OF CLIMATE ACTION PROGRESS

Today, we experience unprecedented climate change events as intense wildfires and extensive melting of glaciers continue to escalate around the globe.

Traction for science-based targets has been growing against the backdrop of the 2015 Paris Agreement and 2018's release of the 1.5°C Special Report by the IPCC. Businesses in various industries have begun adopting frameworks such as that developed by the Science Based Targets initiative (SBTi), to validate their carbon reduction targets and align their policies with the latest climate science.

Besides enhancing positive climate action, validated science-based targets have been proven to help businesses reduce regulatory risks and uncertainty, bolster investor confidence, catalyse innovation and build resilience across the value chain.





PICTURING OUR FUTURE IN A CHANGED WORLD

In July 2018, City Developments Limited (CDL) became one of the 210 companies worldwide and one of the first two companies in Singapore to achieve SBTi's validation for its carbon reduction targets. With this commitment, CDL raised its carbon emission intensity reduction target from 38 percent to 59 percent by 2030 (against base-year 2007) across its Singapore operations.

These bold targets form the backbone for CDL's low-carbon strategy and enhances our robust, long-term targets under our CDL Future Value 2030 Sustainability Blueprint established in 2017. Prior to that, CDL voluntarily adopted global standards by achieving ISO 14001 and ISO 50001 certifications in 2003 and 2014 respectively. To further build on its carbon tracking and disclosures, CDL became the first developer in Singapore to achieve the ISO 14064-1 verification, a globally recognised standard for the quantification and reporting of Greenhouse Gas emissions. For CDL's steadfast action on climate change and robust climate strategy, CDL was the only organization in Southeast Asia and Hong Kong recognised in the 2018 CDP global A-list.

Responding to the call for more effective climate-related financial disclosures that inform longer term investment decisions, CDL was also among the first Singapore companies to pledge its support for the 2017 recommendations by the Task Force on Climate-related Financial Disclosures (TCFD).

Aligning with TCFD recommendations, CDL completed Phase 1 of our climate change scenario analysis in 2018. The report, which covered property development, investment properties and hotel operations in CDL's key markets of Singapore, China, and the UK, quantified the climate-related risks and opportunities the company will face if global temperatures in 2030 were to rise by 2°C and 4°C. In 2019, we updated our study to include a 1.5°C scenario and expanded the region covered to CDL's operations in the USA. These scenarios will guide CDL on how to stay ahead of climate-related regulations, mitigate and adapt to physical climate events, and unlock potential opportunities.



The zero-energy Singapore Sustainability Academy was launched on World Environment Day 2017 as a hub dedicated to sustainability training and capacity building.

VALUE CHAIN ENGAGEMENT TOWARDS LOW-CARBON

CDL has taken several major steps towards fulfilling SBTi's rigorous criteria. One of them was intensifying engagement of the supply chain. Recognising that embodied carbon will be responsible for almost half of all new construction emissions between now and 2050, the green building industry is increasingly bringing embodied carbon to the forefront of sector-wide discussions.

To holistically address its Scope 3 carbon emissions (indirect emissions that occur from sources not controlled by the organisation), CDL has been engaging with its builders and contractors to ensure alignment and progress. Since 2016, CDL has been measuring the wider carbon life cycle impacts of its projects by tracking and reporting

its top five building materials and the embodied carbon of construction materials used in its property development activities. To push the boundaries, CDL has committed and validated against the SBTi to reduce the embodied carbon of all its construction materials by 24 percent versus conventional equivalents by 2030.

In addition, CDL initiated in 2018 a comprehensive exercise of engaging its subsidiary Millennium & Copthorne Hotels plc (M&C), which contributes about 90 percent of emissions from our key subsidiaries, to set a science-based emission reduction target by 2025. This effort has already borne its first fruit: in March 2019, M&C received SBTi's validation for its target to reduce absolute Scope 1, 2 & 3 carbon emissions by 27 percent by 2030 (against 2017 baseline).



INNOVATING THROUGH PARTNERSHIPS

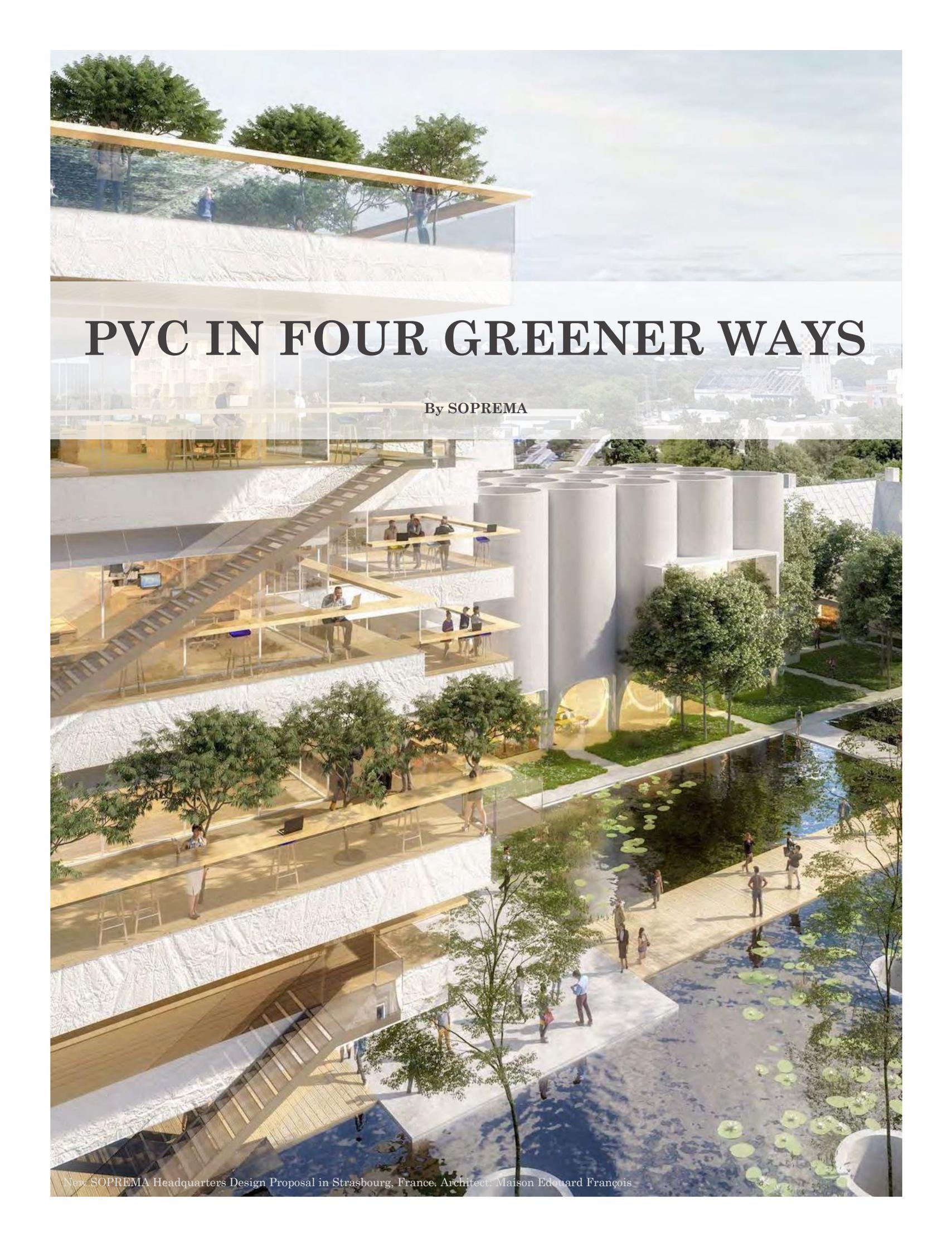
Collaborations and partnerships multiply impact and resources to accelerate sustainable development. CDL conceptualised and developed the Singapore Sustainability Academy, the first major People, Public and Private (3P) ground-up initiative to promote global and local climate agenda and the United Nations Sustainable Development Goals (SDGs). From June 2017 to June 2019, the SSA has reached out to over 11,000 stakeholders from more than 80 organizations.

Innovation is another key to realising CDL's low-carbon economic development. In 2017, the company ventured into the Renewable Energy Certificate (REC) marketplace marketplace to complement its low-carbon operations. In October 2018, CDL partnered with the SP Group to procure RECs through their ground-breaking blockchain-enabled platform. CDL has also invested S\$2.25 million in a R&D collaboration with the National

University of Singapore (NUS) on the NUS-CDL Smart Green Home and the NUS-CDL Tropical Technologies Laboratory to fuel research in climate resilience and the future lifestyle needs of communities.

By tapping onto such collaborations, CDL hopes to pave the way towards developing future buildings that are more dynamic, people-centric and climate-responsive.

Climate leaders and businesses are coalescing around a common theme: for climate action to be meaningful, targets backed by science must be established and acted upon. 'Conserving as we Construct' has been CDL's business ethos since 1995. As a leader for green infrastructure and sustainability integration, CDL hopes to send the signal that tackling climate change represents both a tremendous responsibility and a great opportunity for all businesses. 🌱



PVC IN FOUR GREENER WAYS

By SOPREMA

New SOPREMA Headquarters Design Proposal in Strasbourg, France. Architect: Maison Edouard François

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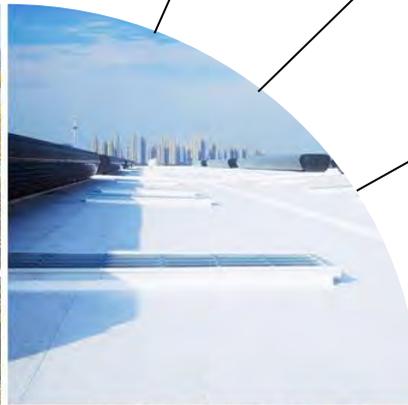
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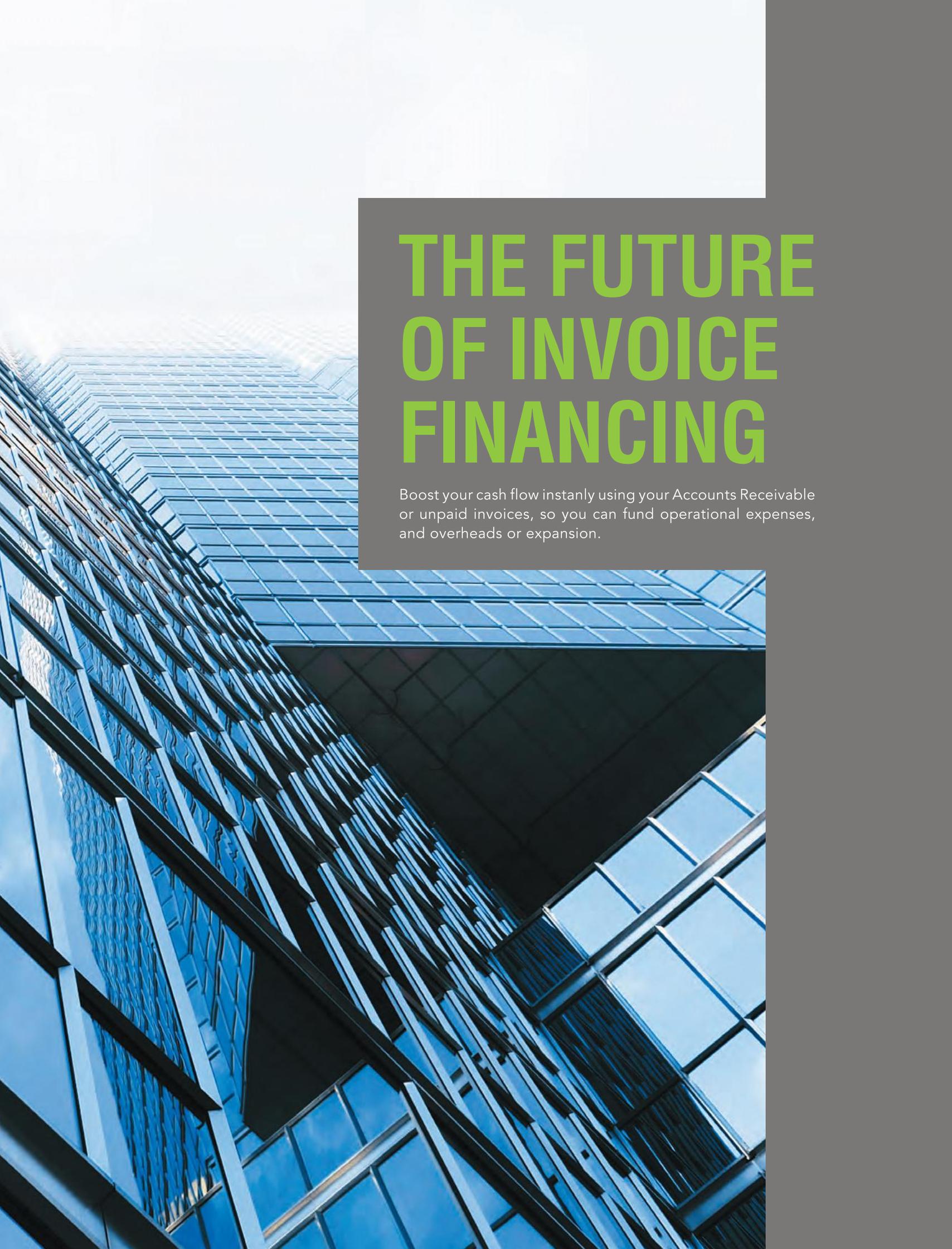
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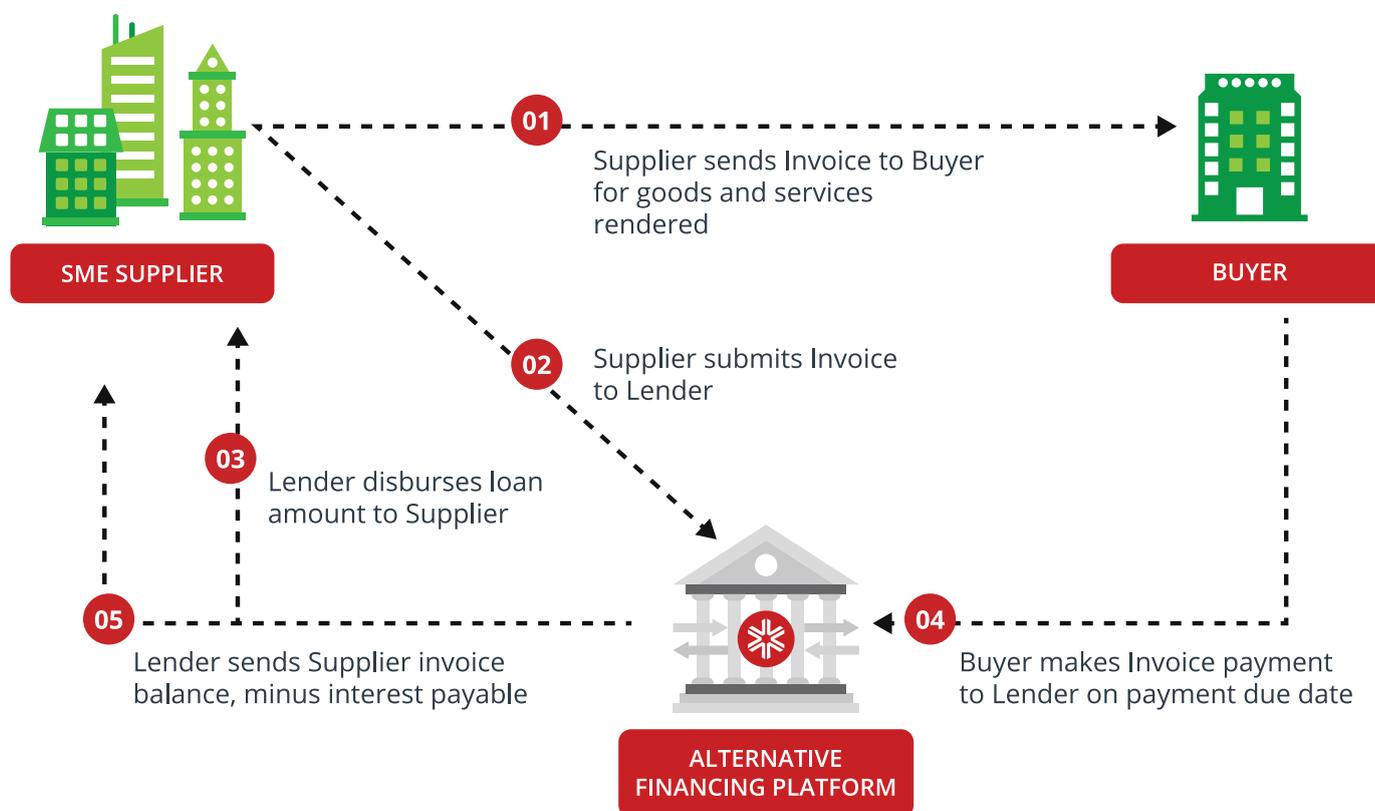
WHY ALTERNATIVE FINANCING IS A HIGHLY VIABLE OPTION FOR SMES IN THE GREEN CONSTRUCTION INDUSTRY

With quick turnaround and no collateral required, fintech-driven alternative financing solutions can better support small business owners.

Small and Medium Enterprises (SMEs) in Singapore are familiar with cash flow problems. These include delays in supplier payments and employee wages, just to name a few. When it comes to investing in new machinery, improving inventory, and expanding into new markets, the green construction industry might be discouraged from pursuing growth opportunities.

In fact, SMEs typically struggle with delayed customer payments. According to data from Xero, an accounting software provider, up to S\$4.146 billion worth of SMEs' invoices in Singapore are paid late. Small business owners in the green construction industry know it takes time to get an approval from a bank loan. Many SMEs may also not qualify for traditional business loans if they do not have sufficient credit history, or cannot put up enough collateral. This makes business expansion difficult.

How Invoice Financing Works



For illustration purposes only, based on Validus Invoice Financing.

1 Alternative Financing

Fortunately, fintech companies have identified gaps in SME financing, providing alternatives to better support small business owners. These include peer-to-peer lending, crowdfunding, invoice financing, and equipment loans.

Operating outside of traditional bank loans, willing investors are extending private credit lines to SMEs in a compliant manner. Through a regulatory sandbox, the Monetary Authority of Singapore works closely with fintech-powered alternative financing providers to develop and test out peer-to-business solutions. This incentivizes alternative financiers to comply with regulatory standards. The result is low default rates in Singapore.

2 No collateral required

As an SME in the green construction industry, you may not have real estate to put up as collateral.

It would not be practical to put up machinery as collateral either, as it is critical for operations. This is where invoice financing comes to the rescue.

3 Quick turnaround

As proof of earnings for the month, invoices are good enough for securing an alternative financing loan. Unlike traditional bank loans, these options can be approved within 48 hours, as invoice financing solutions allow SMEs to present invoices to the lending platform, and receive cash for almost 80% of their value.

Once the invoice is paid up, SMEs can pay the platform back. Other invoice financing providers also have suppliers pay them back directly. By containing financial risks within regulatory perimeters, the loan is executed in a compliant manner. They also typically don't tie up SMEs over a long borrowing period.

The Future of Invoice Financing



4 Powered by innovation

Fintech-driven financing firms use data science to assess a borrower's creditworthiness. Powered by innovation, they may also integrate lending platforms with accounting software, which make it easier and quicker for SMEs in the green construction industry to streamline financing processes. This in turn facilitates faster loan approval.

5 A highly viable option

For businesses that frequently face delayed payments, alternative solutions like invoice financing can help smoothen business operations. By considering business funding outside of traditional bank loans, peer-to-peer lending can improve cash flow, which gives business owners in the green construction industry opportunities to take on new projects, expand into new markets and grow sustainably. 🟢



By Jayanta Roy
Director, Risk & Compliance
Validus Capital

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SUSTAINABLE BUILDING WITH GEOSPATIAL TECHNOLOGY

Technology can help change the way we design and construct green buildings



Sustainability has become a bigger topic within the industry in the past twelve months as awareness has grown globally of both the macro and micro environment and the impact on our future. Earlier this year, Hexagon President and CEO Ola Rollén spoke about the importance of sustainability at the customer and partner conference HxGN LIVE in Las Vegas. Mr Rollén explained how, in order to achieve greater adoption within the industry, sustainability needs to be beneficial for both businesses and shareholders alike. According to Mr Rollén, with today's advanced technologies, the time to take the next step is now. In order to keep construction costs down for companies, having accurate data is vital and that is why reality capture and laser scanning technologies can make a huge difference especially in driving, for example, resource efficiencies.

Last year an estimated \$30.5 billion was awarded in building contracts in Singapore, a figure that is expected to be between \$27 billion and \$32 billion by the end of 2019, according to figures released by the Building and Construction Authority (BCA) in January. This growth is supported by innovation in geospatial technologies that can provide accurate and reliable data after an initial site visit, reducing investment in both time and energy. Sustainability can be ensured in every project by placing proven reality capture and laser scanning solutions in the hands of professionals.

BUILDING WITH BIM

Since first introduced and adopted by the construction industry, laser scanning and reality capture technologies have helped uncover a broader set of data, generating accurate 3D replicas of any given space. These digital records can be used, for instance, to update existing floor plans and guarantee that any future structural issues can be resolved more quickly and with less resource investment.

BIM (Building Information Modelling) plays an important role in the entire process. Deploying BIM means a site can be instantly captured and all its details immediately shared with other members of the team as well as stored for future reference - including for the benefit of other third parties that will later be involved in the build life-cycle.

In the long-term, having access to this data can directly impact energy consumption by allowing, for example, maintenance professionals to refer to previous phases of a project and review previous installations. Additionally, laser scanning technology can also help identify those buildings that can be renovated instead of demolished, which also has a significant impact on the environment and the way we approach and conceive sustainability in the industry.



THE RIGHT TOOL FOR THE JOB

Choosing the right technology can be an important challenge, but also make all the difference at the start and during the entire duration of a project. Factors such as design and simplicity come into play when reviewing options, but more importantly accessibility is key. With this in mind, there is a wide range of solutions that ensure construction is able to move fast, solutions range support all levels of experience. Whether it is a single scan or a detailed as-built survey, Leica Geosystem's wide range of devices are now empowering professionals across the region to execute projects with higher quality.

BLK360

At the push of a single button, the Leica BLK360 creates a full 3D representation with precision measurements, full colour rendering and thermal imaging. By combining 3D point cloud technology with panoramic photography, the BLK360 captures up to 360,000 individual measurements every second and rotates 360 degrees over the course of three minutes, resulting in a digital replica that's ready to access from an iPad or be transferred to a desktop computer.

Sustainable Building with Geospatial Technology

BLK2GO

This handheld imaging laser scanner is the latest addition to the Leica BLK series and is able to scan spaces with unprecedented efficiency and speed thanks to LiDAR, SLAM (simultaneous localisation and mapping) and edge computing technologies. It enables construction professionals to expand their reality capture capabilities and seamlessly capture 3D environments while in motion. With a one-button operation and a lightweight design the BLK2GO allows a much greater degree of mobility, as well as access to spaces and objects that may have been difficult or impossible to scan before.

Pegasus:Backpack

This wearable reality capture sensor platform combines five cameras and two Light Detection and Radar (LiDAR) profilers to deliver rapid indoor and outdoor documentation. The Leica Pegasus:Backpack is completely portable and designed to make progressive professional BIM documentation a reality.



Sustainable Building with Geospatial Technology

RTC360

The Leica RTC360 is a portable, automated and intuitive 3D reality capture solution that allows users to document and capture their environment in under two minutes, including 2 million points per second and advanced enriching High-Dynamic Range (HDR) imagery. The RTC360 augments data capture with information tags that allow teams the opportunity for better planning, reflect a construction site's reality and boost overall situational awareness.



DIGITALISING SINGAPORE

In order to keep up with the pace of Singapore's growing construction industry, Leica Geosystems works hand-in-hand with some of its most prominent building and construction businesses, independent architects and contractors to ensure they are able to optimise and maximise their projects as part of each phase of the process. This is made possible by combining innovative hardware with the latest software solutions - including analysis tools such as the Leica 3DReshaper, CloudWorx CAD plug-ins and Leica Infinity survey software - which help elevate digital construction capabilities and transform the industry's workflows.

The solutions are currently being deployed, for example, to build a wide-scale digital model of Singapore and its utilities - a continuation to the Singapore Land Authority's 3D national mapping project above ground.

Beyond terrestrial laser scanners, Leica Geosystems also provides unmanned aerial vehicles that help map entire cities and identify areas of excessive congestion and key energy needs to be able to distribute resources more efficiently and establish the best approach from a sustainability standpoint.

As Singapore strives to grow, advanced methods and technology must be put in place to grow building productivity and enhance sustainability. The BCA encourages both public and private sector firms to invest in technology and innovation in order for them to seize future opportunities. 🟢



By Chris Lee
Leica Geosystems

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BLOCKCHAIN: REVOLUTIONISING ENERGY MANAGEMENT





The digitalisation and development of new internet technologies shift the control of central authorities to decentralised participants. Blockchain technology currently counts as one of the biggest economic innovations in recent history.

The concept of blockchains already emerged back in 1991 when Stuart Haber and W. Scott Stornetta worked on tamper-proofing document timestamps. Blockchain is a type of distributed public database that keeps records of digital transactions. A distributed ledger has a network of replicated databases, synchronised via the internet.

It is based on a defined database structure into

which no single transaction or item of information is immutably entered and recorded unless the parties involved have consented. After a certain time, the transactions carried out to that point are combined into blocks and provided with a checksum – known as a hash value – and a timestamp. Once a verified entry has been made, it can never be changed.

By today's standards, that means this technology is considered especially secure. The new blocks are attached to a chain of blocks that are already established. Thus, the information chain grows, and all participants in the network always have the same copy of the encrypted data, which they can check anytime, in real-time.



Blockchain is a technology not only shifting the way we use the Internet, but it is also revolutionising the global economy. Asset transactions are always performed directly between offer and demand. This allows people to trust each other and transact peer to peer, making the need for intermediaries obsolete. This also brings unprecedented security benefits. Hacking attacks that commonly impact large centralised intermediaries would be virtually impossible to pull off on the blockchain.

Blockchain is more of an enabling technology for products, services, and business models, than a product or service. It makes sense for:

- Tracking purposes (i.e., tracking food from farm to table)
- Auditing and certification (i.e., real estate ownership or notarial services)
- Auto-adjudication (i.e., export/import transactions or clearing)
- Digital procurement (i.e., cryptocurrency as a payment mechanism)

AN ENERGY REVOLUTION

The energy industry has changed significantly in the past 15 years, driven by developments in technology that have required fundamental changes in established business models. The penetration across utility grids of solar, energy storage and other distributed energy resources has been a primary driver of these changes. What driver is next? Blockchain is arguably a very good candidate. Blockchain technology has the potential to radically change business processes and models within the energy industry. A decentralised energy market offers the possibility of innovative business model development. Owners of solar panels become digital electricity traders. Every private power socket could be a “petrol station” for electrical vehicles.

As a member of the non-profit organisation Energy Web Foundation (EWF), Siemens aims to proactively shape the future of blockchain-based, transactive energy applications, new prosumer-centric use cases as well as business models around the operation of distributed energy systems, microgrids and financing.

Transactive energy applications will be a major force in the transformation of the energy sector towards decentralised, decarbonised and digitised energy systems, where distributed energy resources (DERs) such as solar, wind, stationary storage systems, electric vehicles, heat pumps and others as well as flexible loads are playing an ever-increasing role. At the same time, new forms of plant and project financing are needed. Blockchain technology enables transactions in a decentralised network to be validated efficiently and securely. This enables new business models of energy and flexibility trading between consumers, prosumers, producers and network operators, considering user preferences and network restrictions. Ultimately, blockchain-based applications and business models could help increase the overall efficiency of future energy networks and enable new forms of asset and project financing.

Blockchain technology has the potential to play a significant role in the global electricity system’s transition to a more secure, resilient, cost-effective, and low-carbon grid. At pilot scale, there is an understanding of how to connect electricity loads, generators, and everything in between to a blockchain ecosystem to track flows of energy and value while allowing multiple parties to transact.







CASE STUDY: BROOKLYN MICROGRID

Blockchain technology is already being used to help Siemens' customers develop new forms of energy or offers solutions and services for optimised control of energy generation and consumption. By combining microgrid control solutions and blockchain technology, operators of photovoltaic systems can, for example, feed excess electricity into the existing local grid and receive their compensation directly from the customers, i.e. their neighbours. It is important that all stakeholders (users, grid operator, utility, regulator) have a common understanding about the benefits and advantages by using blockchain technology and that all of them are on board and on the same page.

In April 2016, the first transactions occurred within the Brooklyn Microgrid among neighbours who did not have their own solar systems and those who produced excess solar electricity. With the help of LO3 Energy, residents of Park Slope and the adjacent neighborhoods of Gowanus and Boerum Hill founded the Brooklyn Microgrid. This project was possible because it fulfilled three criteria. First

of all, thanks to LO3 Energy's blockchain platform – a technology that timestamps each transaction as a chain of secure blocks – every energy transaction was documented. Second, thanks to the Siemens Digital Grid Division, microgrid-specific technical solutions were offered; and third, Siemens startup financier next47 supported potentially disruptive technologies like this through financing, project expertise and advice.

To be successful, blockchain platforms and microgrids require a regulatory framework. The platform's objectives are to minimise the vulnerability of the power supply system that became visible during Hurricane Sandy, to use more sources of renewable energy, and to reduce costs. The Brooklyn Microgrid is a good test case for these objectives. "A microgrid is a nucleus that sets the stage for an energy future consisting of networks of energy cells," says Stefan Jessenberger from Siemens' Energy Management Division. "Blockchain also supports this process, because it makes it much easier to conduct energy trading within cells."



BLOCKCHAIN AND THE BUILDING INDUSTRY

Due to a large number of actors (contributors or users) and the fact that a Building Information Modeling (BIM) model is a “digital asset”, the BIM data model could be shifted to a blockchain. The fusion of BIM and blockchain allows an optimised business process, with previously impossible functions and characteristics for the participants of a BIM model. The previously monolithic structure of a BIM data model for a building, for example, is decentralised by shifting to a blockchain structure (private or public blockchain). This results in significant advantages throughout the entire BIM process over the lifetime of the building. The use of blockchain technology for BIM data can result in a variety of new business model possibilities which improve BIM data (quality, quantity, consistency) and are difficult to achieve without (too many interfaces and administration costs).

CONCLUSION

Blockchain is an enabling technology which allows for a secure and distributed record of a transaction. Blockchains allow transactions between agents without a third party providing a clearing system or establishing trust. While blockchain has the potential to disrupt many industries - as with every emerging ‘hot’ technology you must take its often-overpromised benefits with a grain of salt. For many applications and use-cases, blockchain technology is not recommended, due to the complexity involved. However, blockchain is much more than just a hype. It can add value to digital business models by delivering unique trust mechanisms for data storage and transactions which currently no other technology can provide. Blockchain can optimise processes, thus increase profits. Now is an appropriate time to invest in building familiarity, identifying priority business use cases and evaluating initial stages with blockchain technology. ✓



By Oliver Zechlin
Innovation & Digital Business Professional
Siemens

All text and images courtesy of Siemens.



SELECTING FOR SUSTAINABILITY

With the growing green building industry, there is a huge pool of green building products and materials for building designers, owners and consultants to select from. That said, the environmental performance of each building product cannot be left to chance, as buildings are permanent structures in place for decades at a time. As such, the materials used in its construction play important roles in ensuring that the building's footprint and impact on its surrounding environment is as small as possible. Green building materials certified for their environmental performance, coupled with sound green building design and technology along with an emphasis on sustainability, will definitely go towards creating buildings which are greener and healthier for both occupants and the environment.



ASSESSING SUSTAINABILITY

So how does one determine if a particular green building product is indeed green? As a dedicated certification scheme for green building products and materials, the Singapore Green Building Product (SGBP) certification scheme – managed by the Singapore Green Building Council (SGBC) - provides a one-stop solution for the certification and subsequent selection of sustainable building materials. While the Building and Construction Authority's (BCA) Green Mark Scheme certifies the complete building for its environmental performance, the SGBP does the same for the building materials that go into a building, helping to ensure that the final structure will be green, healthy and sustainable from inside-out.

Embracing a holistic assessment philosophy that closely mirrors the requirements outlined in the national Green Mark Scheme, products and materials certified by the SGBP can help green building projects obtain higher Green Mark ratings while also ensuring that the building is sustainable and healthy throughout its lifespan and beyond.

Certified green building products and materials are also good news for building occupants. No one would want to live, work or play in buildings that are "sick", with their harmful and detrimental effects on human health and productivity. For employers, having workers operate out of a sick building essentially translates to higher absenteeism rates, greater medical costs and needless work hours lost, which ultimately go towards diminishing the company's bottom line. Therefore, green and healthy buildings make business sense as well.

A FRAMEWORK OF SUSTAINABILITY

The SGBP is structured on a holistic framework that covers energy efficiency, water efficiency, resource efficiency, health & environment protection as well as any other green features present in the product. In addition, the SGBP assesses products across the entire life cycle: from manufacturing to installation / operation and all the way to its end of life. Based on assessment of the product's documentation and testing reports, it will be awarded a rating ranging from 1-tick to 4-ticks (Good to Leader), depending on the verified environmental qualities of the product.



SGBP certification covers a broad range of building products and materials, classified into six main categories. Individual product types are further classified into more than 80 sub-categories within these main categories, meaning that almost any building product can be certified for environmental performance. All certified products are contained in an easily-accessible online directory, where designers and consultants can easily source for and identify required green building products. For example, a consultant looking for certified paints can either type in a keyword or browse through all certified products of that particular category to locate a suitable choice.

Additionally, SGBC also maintains a directory of certified green building services, essentially green

building service providers who have a proven track record to work on green building projects. These organisations are accredited based on their track record and emphasis on sustainability, allowing the industry a meaningful point of reference for their building projects. More recently, SGBC has taken over the administration of Singapore's green building professionals, the men and women behind the nation's high-performance green buildings. The SGBC Green Mark Professional Qualification Scheme not only provides the green building community with a continuing education and development framework to stay abreast of key green building trends and developments, but will also allow for the meaningful sharing and transfer of knowledge with regional and international counterparts.

SELECTING SUSTAINABILITY

Covering the full spectrum of the green building ecosystem, SGBC's certification programmes complement the Green Mark Scheme, with certified products and services helping green building projects to secure higher ratings by accruing bonus points. The accredited professionals also help to ensure that green buildings are designed and constructed to qualified standards, imparting their knowledge and expertise to continually push the envelope for energy efficiency and built environment sustainability.

SGBC regularly engages with building owners, designers and consultants to spread awareness of SGBC certifications, through purpose-organised seminars, sharing at partner events or during green building conferences and trade shows and exhibitions such as the annual Build Eco Xpo Asia event.

Scan the QR code below to browse the SGBC Certifications Directory:



Read on to find out more about some green building solutions certified by the SGBP!



AGC Asia Pacific Pte Ltd

The AGC Group, with Tokyo-based AGC Inc. at its core, is a world-leading supplier of flat, automotive and display glass, chemicals and other high-tech materials and components. Drawing on more than a century of technical innovation, the AGC Group has developed world-class expertise in fields including glass, fluorine chemistry, electronics and ceramics technologies. The group employs some 50,000 people worldwide and generates annual sales of approximately 13 billion USD through its extensive networks of companies operating in some 30 countries and regions in Japan, Asia, Europe.



ACD Filtration Pte Ltd

ACD Filtration was established in October 2008 and specialises in the trading of a full range of airfilters. Its Blu Hybrid filters are manufactured in Germany and utilises the very latest in German engineering. The filters are the result of 3 years of research and development to bring a unique style of low energy filter to the Singaporean market. ACD works closely with its customers to develop an optimised filter change schedule that prioritises energy savings.



YiTac(S) Pte Ltd

YiTac(S) Pte Ltd incorporated in 2006 as a supplier for building materials as well as a dependable engineering solutions provider to the building and construction industry. The company's policy is to provide excellent products and services for all its customers. YiTac's well established network coupled with its strong sourcing and procurement capability enables us to bring in quality products from acclaimed brands worldwide at competitive pricing. Its ramped-up 13530 square foot factory provides the necessary housing and workshop space for its many products. The factory allows us to house ready stocks to meet the constant construction demands from clients. For the past decade, YiTac(S) has been providing the market with innovative products and quality services to the building and construction industry. Equipped with the necessary knowledge and technical expertise, Yitac will definitely be the solution for your engineering needs.

Dongyang E&P Co., Ltd

Since its establishment in 2006, Dongyang E&P Co., Ltd has developed quality, eco-friendly and health-enhancing paint solutions with its proprietary technologies. The Korean Ministry of Environment had awarded the company with numerous accolades over the years, including the Certificate of Green Technology, Certificate of Green Technology Product and Certificate of Korea Eco-Label in some 30 countries and regions in Japan, Asia, Europe.



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GOING CIRCULAR WITH OFFICE FURNITURE



Rethinking the Economy of Office Furniture to extend Longevity and Use

After you cook and eat a meal in your home, would you throw away your bowls, plates, metal spoons or forks? No, of course not, that is incredibly wasteful since your bowls, plates and cutlery are still very much usable. This principle of reusing products is one of the key aspects of one of the hottest buzzwords in the industry: the circular economy.

The Ellen Macarthur Foundation suggests that the circular economy is based on three principles: "Design out waste and pollution; Keep products and materials in use; Regenerate natural systems ." These principles differ from the linear economy where used items are typically disposed of and then thrown into a landfill.

The case study presented here is focused on the circular economy principle to keep products and materials in use, and illustrate how a partnership model to connect organisations with surplus resources to community groups with a need has reduced sending quality furniture to the landfill. This model can be applied across any product or sector.

The Circular Economy is in Focus Locally and Globally

Globally, 193 countries have committed to achieving waste reduction and circular economy principles as part of the United Nations Sustainable Development Goal (UN SDG) number 12, focused on responsible production and consumption .

The Singapore government recognises the challenge and opportunities associated with transforming linear "take, make, dispose" production and consumption cycles into circular economy opportunities. Semakau Landfill, Singapore's only landfill, will run out of space by 2035³ , and this in part has prompted the government to declare 2019 as the "Year Towards Zero Waste." This campaign includes different focus areas, like circular economy, to help government, business, and society partner together to develop practical waste reduction activities that also provide shared prosperity.



Sustainable Furniture Management

Double Loop Solutions was founded to help partner organisations efficiently manage their redundant office assets, (e.g. office chairs, workstations, and storage units) and avoid the landfilling of these assets by identifying optimal reuse strategies in the community. As a budding social enterprise, the intention is to redeploy assets to community organisations, charities, or other voluntary welfare organisations with limited resources and budget available to purchase furniture.

The organisational partner in this case study is Tanglin Trust School, a leading international school which teaches and practices strong values related to responsibility to the broader community and society.

At the initial introduction, Double Loop met with the school to collaboratively discuss how to best assist with managing 50 office desks and chairs that were not needed anymore due to the planned demolition of the building where the items were located. The school wanted to leverage the redundant furniture as an opportunity to explore the circular economy and sustainability initiatives.

In their own words, Tanglin Trust school is:

"...committed to promoting the UN Sustainable Development Goals with our students and encouraging them to act responsibly at school and beyond school. In this context it is particularly important that we act responsibly as an organisation, demonstrating the values that we promote. There is often a tension between the will to act responsibly and the pressures of timelines and budgets."



Goals: Divert from Landfill and Rehome Furniture in the Community

The school first looked internally to see if there were other departments who wanted or could reuse the 50 items within the school: this is an important part of circular economy solutions, to evaluate internal reuse or repurpose options. Often times this is the most convenient, cost-effective, and risk-free option. Double Loop was tasked to explore alternative avenues only after the school had exhausted all internal reuse options.

Ensuring that all partners share common goals and outcomes from their partnership is key to developing a mutually successful project. The agreed project goals were:

- Avoid landfilling of the 50 pieces of furniture
- Provide a benefit to the community

Tanglin Trust School engaged Double Loop to explore alternative avenues to achieve the stated project environmental and societal goals. Upon agreeing to a clear project scope, budget, and timeline, the objective was to deliver what the school commented as “to make ‘doing the right thing’ also the most convenient and cost-effective option.”

Exploring Reuse and Repurposing Options

Double Loop categorised the 50 items that were tasked for reuse by creating an asset register to detail the type, dimensions and quality of the items available. This was to ensure that the next users of the furniture were clear about the condition and type of items that they would be inheriting - transparency was key.

Once the asset register was completed, Double Loop set about exploring and evaluating best reuse cases for the assets in the community. Reuse of furniture in the community allows these organisations to save money on furniture that they otherwise would have purchased, and instead spend their resources on their mission and delivery of core services.

Five community organisation partners for the cataloged items of furniture were identified, vetted, and confirmed as having valid use cases and need for the type of furniture available. Double Loop planned how the actual transfer of items would occur, confirming asset condition and delivery requirements for each partner organisation.



Circulating the Assets

Once logistical details were confirmed, a date was scheduled for the items' redeployment. Apart from asset tagging each piece of furniture, this involved cleaning each asset in preparation for the transfer to their new home.

During the day of the item redeployment, Double Loop gathered onsite at the host location to have a site briefing. The logistics team was well prepared and brought over 60 years of combined experience loading, unloading and moving assets.

Redeploying the furniture to the five identified community organisations brought about real, tangible impact. It was heartening to see how items that were originally destined for the landfill were instead diverted to continued usage and directly benefited the community. One community organisation stated that the redeployed furniture now provided the opportunity for children to do homework on proper furniture rather than on the floor. Another recipient organisation was able to lightly furnish two rooms for their community events space, which directly impacted and provided storage and seating value to 12 individuals.

A real joy of the circular economy is experiencing how products can be continuously reused, repurposed, repaired, or reprocessed, and how in each transformation the product continues to bring value and benefit to its user.

Impact and Transparency

A successful circular economy partnership results in shared economic, environmental, and social benefits.

All items were kept in the production loop and continued to be reused. The school's key role in evaluating alternative options for how they were managing their surplus furniture resulted in direct positive environmental and community impact. The resources were recycled and lives were improved.

In total, all 50 items were diverted from the landfill and redeployed to the community for continued reuse. Environmental benefits included directly avoided roughly 2000 kilograms of waste (about the weight of a full grown male rhinoceros), 100 ft³ (equivalent to a 10ft storage unit) of associated landfill space, and by reusing furniture rather than purchasing new furniture the project reduced raw materials extraction and avoided carbon impact. This circular economy project enabled five organisations to reap cost savings of \$5,000, and directly impacted more than 70 individuals of the recipient community organisations.

The next time you are thinking of disposing of an item in your personal or professional life, take a moment to consider who else can continue to benefit from use of the item, and how the item can be used. With some creativity and connectivity to your community, you can find a better destination for the item than the landfill. ✔

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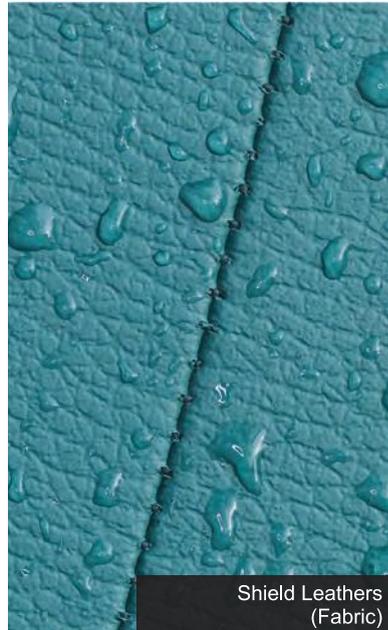
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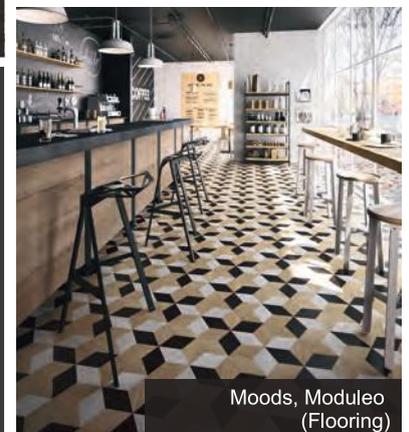
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