

SG Green | Issue 7.0

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SG GREEN



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Taking Climate Action Live. Work. Play. Green.

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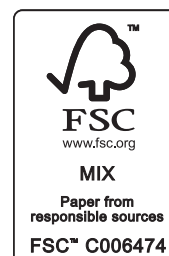
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MESSAGE FROM THE EDITORIAL TEAM

Climate change poses an existential threat, affecting everyone on this planet. Capricious weather patterns, odd climate phenomenon and uncharacteristic environment behaviour continue to make their presence felt, sometimes exacting a heavy toll. It will take a collective, concerted effort to mitigate effects of climate change on a global scale, and it requires everyone's involvement and buy-in. Acknowledging this and doing its part, the Singapore Government has designated 2018 as the Year of Climate Action.

Singapore as a country remains particularly vulnerable to the effects of climate change, being an island nation with little natural resources. Climate Action Year aims to focus attention on this global crisis, to raise the level of national consciousness around the need to take individual and collective action to address climate change for a sustainable Singapore.

We can all have a role in climate action, especially corporates and the business community. Although buildings only occupy three per cent of the world's total land mass, they are responsible for more than half of the energy use and one third of all carbon emissions. Yet buildings are integral to the very fabric of society, crucial to our day-to-day activities and social lives. In fact, people spend more than 90 percent of their time living, working and playing in buildings. Therefore, it stands to reason that the buildings we live in must also be buildings we can live with.

While it is true that certified green buildings cost up to 5 percent more than regular buildings, the additional costs are offset by savings in operational costs from reduced energy and water consumption. Importantly, beyond cost savings, studies have shown that green buildings have a direct and positive impact on occupants' health, wellbeing and productivity. Simply put, green buildings are not only better for the environment, they are also better for us.

In this edition of SG Green, we explore the crucial climate action of Live. Work. Play. Green. Essentially, our building choices affect the larger built environment; if more people choose to live, work and play in green buildings, the state of our buildings will inch towards greater sustainability. This issue of the magazine also touches on placemaking, the importance of indoor air quality as well as on how green building products can help shape our buildings for greater comfort and wellbeing.

In Singapore's Year of Climate Action, living, working and playing in green buildings should be one of our most important climate actions.

Yours sincerely,
SG Green Editorial Team





PLACEMAKING IN GREEN BUILDINGS

PLACEMAKING ON DIFFERENT SCALES

What kind of places do we want to live, work and play in? Only by helping people connect to the place they occupy, can they want to care for and shape their surroundings.

Placemaking is essentially a people-centered approach to improve the everyday experience of users in any given space. Some of the thinking behind this concept started back in the 1960s, when ideas about designing cities for people gained traction, focusing on the social and cultural importance of lively neighborhoods and inviting public spaces.

In cities, there are public spaces like parks and civic spaces where communities gather; in buildings, there are shared spaces like atriums and cafés where people come together, and at workplaces there are pantries and common areas that serve a similar purpose. In fact, there are many parallels that can be drawn between what makes great cities and great building spaces.

Today, the term 'Placemaking' is used in many settings on different scales, extending beyond cities and districts to buildings and even at the workplace (Figure 1). At the building level, placemaking is often an iterative process between the building owner/manager and occupants, with the aim to establish the building as an attractive destination. For the landlord, the goal is often to increase occupancy, occupier's sense of ownership and probability of retention within the building when their lease is up for renewal. For the corporate occupiers, it would often be from the employer branding perspective, to attract and retain talent.

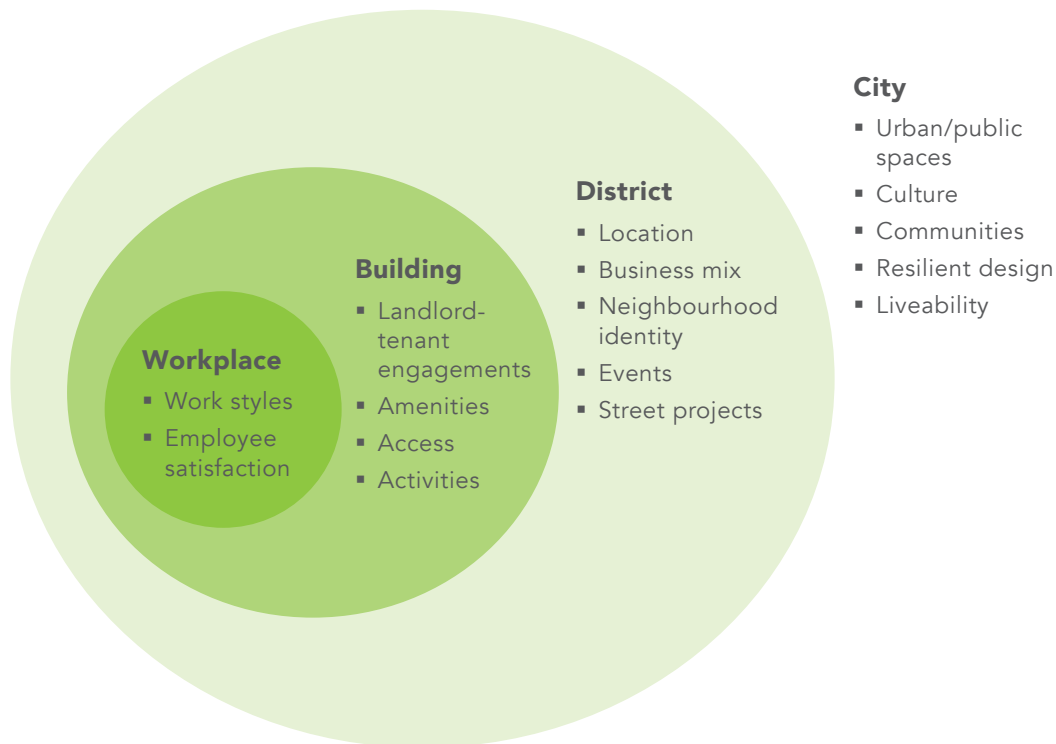


Figure 1: Placemaking on different scales

DRIVERS FOR PLACEMAKING IN BUILDINGS

Organisations are facing tremendous **pressure to improve efficiencies and cut costs**, which will have a key impact on their physical footprint. Firms need to do more with less, including real estate, which often represents the second highest expense for a company after staff costs. Hence, beyond location, corporate occupiers are increasingly looking for flexible and productive spaces that meet changing business needs and also retain talent in the face of a highly mobile workforce. As a result, landlords now compete to offer tenants not just bricks and mortar spaces in good locations, but attractive and adaptable places that help corporate organisations deliver on their dynamic needs.

Advancement in building technologies is also a key driver, where data collection combined with advanced analytics and dashboards support continuous building optimisation. Highly sophisticated building management systems, tenant management platforms, and sensors are already enabling spaces with a high degree of usability and capacity for customisation. In addition, the data collected from these sensors have provided us with much more insights about the factors that affect occupant perception and performance within buildings. For example, the impact of various environmental attributes and workplace design on employee productivity, engagement and overall satisfaction. Utilising this growing body of knowledge will lead to a much deeper understanding of the relationship between people, spaces and technology, guiding the integrative concept of placemaking in buildings.



Key Components of Placemaking in Buildings

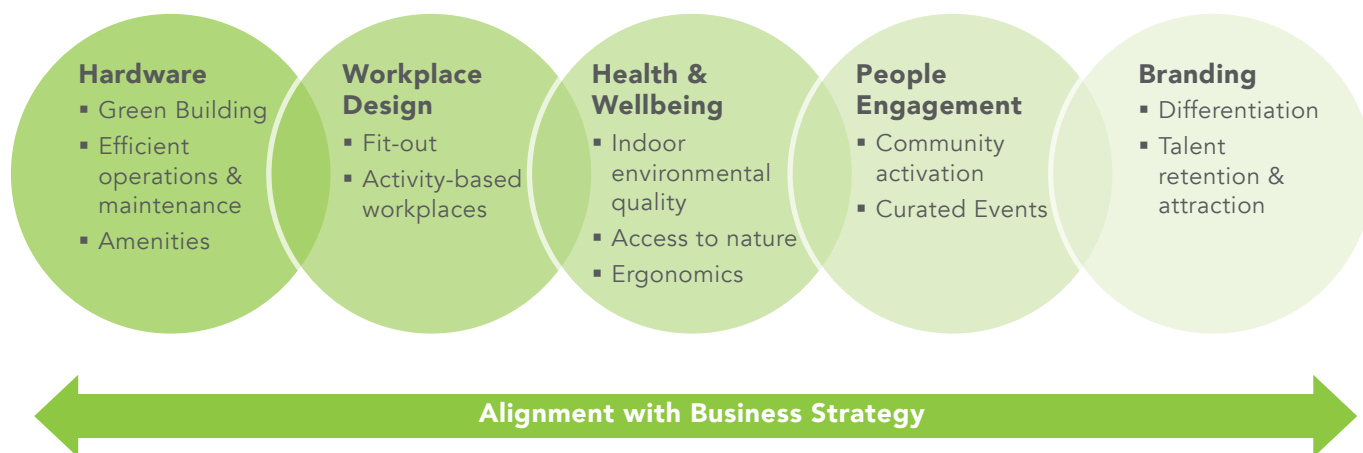


Figure 2: Key components of Placemaking in Buildings

In order to enhance user experience in a building and brand a building as an attractive destination, we propose five key components- starting with the physical asset itself and extending to the softer aspects of engaging with stakeholders and outward communications. All these components should be closely tied to the building owner’s or corporate occupier’s business strategy in order to leverage on the desired outcomes from placemaking.

HARDWARE

For building owners, the **placemaking process often begins with the decision to own and lease green buildings, and for occupier organisations, in choosing to locate in a green building/space.** Not only is a green building more resource-efficient, has sustainable environmental management processes in place and generally sets a certain standard of indoor environmental quality, they are a critical foundation because of the increasing business value of sustainability.

More organisations are seeking to be sustainable, to demonstrate their commitment towards resource efficiency to their employees and customers, many of whom are increasingly discerning in this aspect. The motivation goes beyond utility cost savings, but increasingly

towards how sustainability commitments support organisational branding, employee engagement and corporate social responsibility objectives. Especially with the signing of the Paris Climate Accord in 2015, setting ‘science-based targets’ (to reduce enterprise carbon emissions to meet the two-degree global maximum) has become a growing effort in corporate sustainability programs to demonstrate leadership. Two-thirds of the executives in the CoreNet Global Corporate Real Estate 2020 End-User Survey either agreed or strongly agreed that all states and competitive organisations will have green sustainable agendas, policies and strategies to compete for investment and talent.

Efficient operation and maintenance of a building over time is also crucial to ensure that the building continues to perform optimally and provides a smooth experience for occupiers. This is especially crucial as occupier expectations are increasing for such services to be factored: think advance fault detection and repairs for HVAC and elevators, lighting and other equipment in shared spaces, as well as quality cleaning, security and landscaping services. On this front, outcome-based services and performance contracting in the building sector is increasing (see Box 1 for examples), to ensure performance during the operational phase level meets the design intent.



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What is Energy Performance Contracting (EPC)?

- A method for retrofitting existing facilities by using guaranteed operational energy savings to pay for the upgrades.
- Building owners are assured that the retrofits are effective and generate enough cost savings from use reduction in electricity to pay for itself.
- For EPC projects with a Zero-Capital Partnership (ZCP), there can be no capital outlay by the building owner, as the EPC firm will arrange for and bear the financing needed.

What is Continuous Commissioning?

- Commissioning is an approach to ensure that operational efficiency in buildings meets the design intention and occupier needs, through checks at specified points in a building's lifecycle.
- Continuous commissioning ensures persistent high performance, through fault detection and diagnostics tied into a building's management system, where data is continuously collected and alerts are sent out when buildings operate outside their intended parameters.
- A barrier to adoption is the lack of intelligent controls and sensors especially in existing buildings today, which forms the basis of any continuous commissioning system.

In addition, the provision of shared amenities can be a huge plus point for potential tenants/employees, especially by adding versatility to a building to host events and other recreational activities that enable greater human interactions and convenience. These include end-of-trip facilities like showers and bike racks, auditoriums and seminar rooms for events and workshops, F&B options, open green spaces and relaxation spaces. The key is in providing the right mix of amenities that serves the needs of the building's particular tenant profile, while taking into consideration the availability (or lack of) of similar options in the vicinity.



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WORKPLACE DESIGN

Workplace design extends the building core and shell into the tenant space, **and the design and fit-out of an office space is often a one-time investment that is critical to 'do-it-right' from the start**, due to its far-reaching impacts and strong inertia for change later on. **Fit-outs can greatly influence the resource efficiency of a workplace, the indoor air quality, the type of work configurations, flexibility to shrink/expand etc** (see Box 2 for examples of flexible workplace fitout solutions). These factors will in turn affect employee performance, and ultimately the bottom line for businesses. With millennials to account for about 35 percent of the working population in APAC by 2020 based on UN forecasts, workplace design also plays a key role to attract and retain talents.

In today's business environment of constant change and disruptions by technology, **Activity-Based Workplaces (ABWs) are being explored actively, as an agile multi-use space utilisation approach that can reduce the overall office real estate footprint of an organisation**, yet provide for sufficient work and community spaces. The agility of ABW allows the operational flexibility of scaling a workforce up or down without incurring the cost of disposing, acquiring or re-configuring space. Such futureproofing of the workplace is increasingly valuable to organisations.

There is a common misconception that ABWs are hot-desking or remote-based working spaces inspired by a 'café-culture'- bringing to mind the open-concept offices of Google, Apple etc. Rather, there is no one-

size fits all; successful ABWs thoughtfully consider the range of office activities and provide the right kind of spaces to support these unique needs. The aim is to create an intuitive workplace that, by design, empowers employees to work effectively, by providing them the choice of inhabiting the ideal work setting within the office.

Examples of flexible workplace fitout solutions:

- Workplace solutions to track occupancy and utilization patterns
- High acoustic performance products
- Task lights/zone lighting controls
- Movable walls/partition systems
- Personal lockers, sit-stand desks etc

However, **just as important is helping existing employees understand why they might need to change their workstyles**, with senior management walking the talk. Change management at the workplace is no small endeavour, including the need for user surveys, focus group dialogues, internal change ambassadors and accessible feedback channels. Consistent messaging of 'what will change', 'why and when the change will take place', 'who will be part of the change' and 'how the change will be effected' are essential, and can be of great comfort to users in accepting change.

Understanding Placemaking

HEALTH & WELLBEING

While cost savings from low-hanging EE projects are probably still the most easily valued by organisations, there has been **increasing evidence and frameworks developed for valuing improvements in the built environments with respect to health & wellbeing, organisational productivity and brand value to employees.** For example, the recently published Playbook for Sustainably Healthy Workplaces by Sustainability Roundtable, Inc. and Delos explores the close alignment between real estate and operations management strategies and employee health & wellness, while the latest compilation of case studies under the World Green Building Council (WorldGBC)'s global Better Places for People project highlights the tangible economic benefits and the improved occupant satisfaction that resulted from companies implementing new health, wellbeing and productivity features.

Given that 90 percent of the costs associated with running a building come from employee salaries and benefits, it is not surprising that organisations are increasingly prioritising employee wellbeing. As such, building owners are shifting away from analysing Return on Investments (ROI) solely based upon property-limited inputs (e.g. costs benefits analysis using project capital costs and building operating expenses), to respond to occupiers whose occupancy decisions are affected by how the space impacts their staff in

financial terms (i.e. reductions in health costs, turnover, absences and increases in productivity).

As mentioned, **out-fitting of a building space at the onset is a major determinant of whether a space will be greener and healthier**, and to ensure that the maximum benefits are achieved. Specifically, interior fit-out features of concern include the use of low-Volatile Organic Compound (VOC) paints, carpets and furniture, ergonomic workstations, maintenance of good indoor air quality (IAQ) and thermal comfort, and provision of access to daylighting and greenery.

One example is the use of such materials and fixtures in Paya Lebar Quarter, a mixed-use development that is a prime example of a building with a strong placemaking concept. It integrates flexibly designed workplaces, amenities and lifestyle options to promote occupant health and wellbeing.

PEOPLE ENGAGEMENT

Moving beyond the physical environment and static amenities, **the communications layer between landlord and tenant and even amongst tenants is a crucial and challenging part of the placemaking process in buildings.** Often, building committees are formed to work on achieving common goals that improve occupants' overall experience of the building. For instance, under the Green Mark Scheme, building owners and tenants are encouraged to come together in a Green Building Committee to promote sustainability-related initiatives for the building.





However, there remains a large gap from having such committees to **achieving community activation over time**, where genuine interest is fostered between building stakeholders who then begin to interact independently and informally to act. In reality, a key barrier is the time and effort required to bring together different corporate cultures, values and commercial objectives of diverse tenants. Fortunately, what building managers used to spend a large amount of time and effort on, such as attending to maintenance calls, collecting rent payments, organising events and engaging tenants individually are now increasingly disrupted by digital technologies.

Terms such as 'Proptech', 'Fintech' and 'Googling' probably did not exist 10 years ago but are now commonplace. Top players in the Proptech industry (e.g. Equiem, HqO, Bixby, hOM) and commercial real estate management firms are now creating platforms not only to ease workflows in building management but also to revitalise the community experience for each and every tenant. These soft aspects that used to be 'nice-to-have' are increasingly becoming a necessity as building owners compete on people engagement.

For example, there are now **managed digital platforms complemented with mobile apps designed to increase tenant satisfaction, improve communication, profile retailers, support leasing and other concierge initiatives.**

Each tenant can create an online account storing their profile and preferences and gain access to on-demand services, such as being able to report building faults, book amenities like a shared event space or time in a nap room, register to attend events such as lunch time talks, and order in food from nearby vendors. Tenants are also incentivised with weekly discounts or promotions and can converse and connect with other tenants on a community board. In turn, building managers benefit by leveraging on tenants' preferences to curate events, as well as value-add to on-site retailers to drive awareness and offer targeted products.

Engaged and satisfied tenants are likely to be more loyal tenants, and landlords are already noticing the huge advantage of retaining tenants: each renewal saves up to \$5,000 to \$7,000 in turnover costs, and long-staying tenants also help to build up a strong community within the building.



BRANDING

Last but not least, **branding threads through and connects many aspects of placemaking, and is fundamental to achieve the desired end outcomes of the placemaking process.** Successful placemaking can change the perceived value of a building by giving it a sense of place and unique identity that people want to experience. These differentiated spaces may rent faster and for more money, create higher tenant/ employee satisfaction and retention, and command a higher occupancy rate. Branding is key to help deliver a cohesive storyline to the target market audience, so as to reap the benefits of placemaking efforts for the building.



In fact, **branding strategies sometimes serve as the overarching vision to drive ideas and themes at the start of the placemaking process.**

One example is the focus on the brand value of sustainability and occupant health & wellbeing, which are two key areas for real estate investors to demonstrate leadership. This branding proposition is further enhanced by market developments, where Green Building certifications are increasingly viewed as a necessary 'Class A attribute' for real estate. Also, the Global Real Estate Sustainability Benchmark (GRESB), a global benchmark for real assets, now includes voluntary data from 66,000 assets, with about half also participating in the Health & Wellbeing benchmarking module.

Hence, this brings us full circle to how organisations often demonstrate their commitment to sustainability and occupant health & wellbeing through the decision to own/ lease green buildings. Starting a placemaking process with a clear branding direction in mind would thus allow better prioritization of efforts and increase the cohesiveness of the entire experience for the target audience.

MAKING THE FIRST MOVE

So how and where do we start? While the concept of placemaking has become mainstream at the city and district scale, it remains relatively new when applied on a building scale. Many large placemaking projects today still do not include plans to measure progress, as highlighted in a white paper by the Massachusetts Institute of Technology (MIT) on Places in the Making. This could be a grave mistake in a society that values tangible rewards, and fortunately at the building scale quantifying impact is much more manageable.

We propose a 3-steps approach:

1 Identify desired placemaking outcomes and overall branding strategy that are aligned with business goals, with a simple performance metric for measuring progress.

2 Understand the current work scopes of your organisation's Corporate Real Estate (CRE), Human Resources (HR), Facilities Management (FM) and Information Technology (IT) functions, as well as their potential to cross-collaborate.

3 Target specific short-term projects e.g promoting green and healthy workplaces, undertaking building retrofit projects, or even implementing activity-based workplaces (ABW), while keeping in mind how these would fit into the overall placemaking process.

For corporate occupiers, office managers in close collaboration with HR and FM teams play an important role in articulating a placemaking strategy and in undertaking projects to improve the user experience in a building/workplace. Many office managers overseeing an organisation's CRE are already engaged in day to-day activities that require interactions with other support functions. As they are increasingly challenged to look beyond location decisions to address strategies on how the physical work space can be designed to make workers more efficient and productive, these professionals will expand their key areas of focus to include company culture, attraction and retention of employees and business unit efficiency, beyond the traditional asset management and operational leasing roles.

Building on SGBC's work in promoting green building design, practices and technologies for the last decade as well as our recent Better Places for People programme to engage occupants on health & wellbeing features, SGBC recognises the potential for placemaking in buildings as the next frontier. To support organisations' placemaking journeys, SGBC will be working with the relevant authorities for new placemaking programmes. The focus will be on translating the pre-requisites into simpler actions that can be easily interpreted and acted upon by corporate occupiers, as well as providing an online resource portal and peer sharing platforms to exchange best practices. ✓



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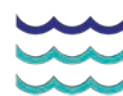
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Live.Work.Play.Green.

LIVE.WORK. PLAY.GREEN



SGBC's first-ever public engagement campaign for climate action aims to drive awareness of green building in the general public

THE NEED FOR CLIMATE ACTION

Climate action comes in many different forms: separating recyclables from general waste at home is a personal climate action while allowing employees to have individual climate control can be viewed as a climate action undertaken on a corporate level. In Singapore's Year of Climate Action as designated by the Ministry for the Environment and Water Resources, it is a good time to appreciate one of the most significant yet constantly overlooked ally against climate change: our buildings.

Buildings occupy a special niche in the grand scheme of things. Although buildings occupy only three percent of the world's total land mass, they are responsible for more than half of the world's total energy usage, one third of the globe's carbon emissions and use 40 percent of all raw materials. Given this impact, it makes a lot of sense to build our buildings better, greener and also healthier, seeing that people spend more than 90 percent of their time living, working and playing in buildings.

GREEN BUILDING AS A CLIMATE ACTION

Green buildings can be seen as the natural progression of buildings. While it is true that certified green buildings cost up to 5 per cent more than regular buildings, the additional costs are offset by savings in operational costs from reduced energy and water consumption. More importantly, beyond cost savings, studies have shown that green buildings have a direct and positive impact on occupants' health, well-being and productivity.

Studies and reports published by the World Green Building Council (WorldGBC) have repeatedly pointed to the linkage between green buildings and human health. According to the WorldGBC's Better Places for People Programme, employees with access to views of nature have been shown to exhibit improved wellbeing and productivity. Similarly, studies indicate that adequate exposure to natural daylight can result in more quality sleep per night, adequately recharging the individual for the next day ahead. The facts are quite clear: green buildings are not only better for the environment but are also better for people.





Green building is something that is not as easy to get behind than recycling or water conservation, for example. Most people see buildings are part and parcel of the very fabric of society, societal constructs that are beyond their locus of control. They simply move from one building to another to accomplish the specific task at hand, usually oblivious about how the buildings affect them on a personal level. Only in extreme cases will people feel the impact from a building with a bad interior environment, or sick building syndrome. This is when people start to exhibit visible health symptoms associated with unhealthy or stressful factors in the building they are in, such as headaches, respiratory problems and coughing fits.

Green buildings by design are able to create a conducive, healthy environment for its occupants. By taking into consideration the host of factors that can affect human health and wellbeing, green buildings shape environments that are beneficial for humans and make people want to stay in and make use of buildings, essentially placemaking. After all, buildings are built for people.

SPREADING THE MESSAGE

As an enabler of green buildings, the Singapore Green Building Council (SGBC) undertakes a myriad of initiatives and programmes to advance the green building movement in Singapore. Despite being a largely industry-centric organisation, SGBC runs a number of outreach and engagement programmes intended to extol the virtues of green building to the general public. One of the most notable ones is the Green Schools Initiative (GSI) student education programme launched in 2013. Comprising of easy-to-digest slides and learning journeys to local green buildings, students are able to get a working understanding of what a green building is as well as their associated benefits.

In February this year, the JOULES Smart Centre @ Bukit View Secondary School was opened, an industry-community fit-out project catalysed by the SGBC. Essentially a green classroom converted from an old technical workshop, the JOULES Smart Centre was constructed with sustainability, health and wellbeing in mind, blending a plethora of certified green building materials with an active, dynamic design. Since its opening, the Centre has held upwards of 400 students a week, allowing them to learn more about the benefits of the green facility they are in right from where they are.

EMBEDDING SUSTAINABILITY

On 2 August 2018, the SGBC launched its largest and most ambitious public engagement campaign yet. Officiated by Mr Masagos Zulkifli, Minister for the Environment and Water Resources, at the annual SGBC Leadership Conversations thought leadership forum, the **Live.Work.Play.Green** Campaign aims to reinforce the benefits of green buildings in an engaging and interactive format.





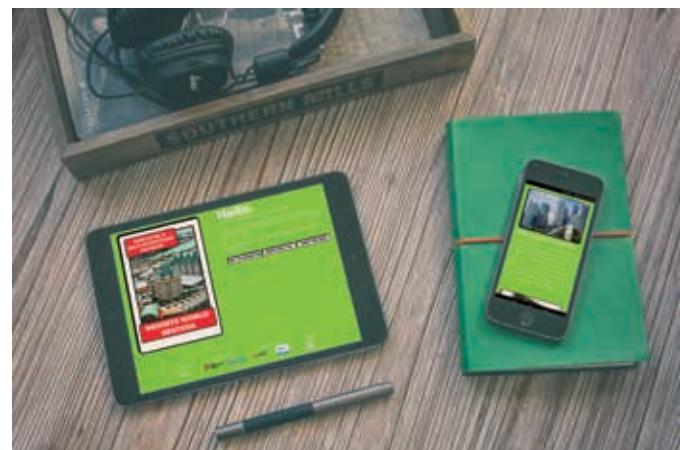
“Improving energy and carbon efficiency in our buildings is a key strategy for reducing our emissions,” Mr Masagos said, “This is a good effort to raise awareness among building owners and users of the value of green buildings, and the important role they play in reducing our carbon footprint.”

During the campaign period, the **Live.Work.Play. Green** campaign will leverage on public buses to bring the green message to members of the public. These buses will prominently feature messaging and nuggets of green building trivia on both the exterior and interior of the vehicles. An interactive



campaign website (www.greenbuildings.sg) will also feature a short quiz where the public can stand to win attractive prizes while learning more about the benefits of living, working and playing in green buildings. Concurrently, a digital marketing blitz will run on social media platforms, leveraging information of consumption habits to intensify awareness and increase publicity.

Mr Tan Swee Yiow, President of the SGBC, said, “Climate change poses an existential threat, and it will take a collective, concerted effort to mitigate its effects on a global scale. In support of the Year of Climate Action, we are glad to roll out the **Live. Work.Play.Green** Campaign, which we believe will drive public engagement on the green building movement and embed the seeds of sustainability within the community.”



Visit www.greenbuildings.sg to find out more! 🍀

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GREEN BUILDINGS: A CONCRETE CLIMATE ACTION

In Singapore's Year of Climate Action, living, working and playing in green buildings should be one of our most important personal climate actions.

"I am what I am because of who we all are"

The Ubuntu philosophy essentially considers the success of the group above the self, and this mentality is critical to our efforts to address climate change. This was shared by Mr Masagos Zulkifli, Minister for the Environment and Water Resources during the SGBC Leadership Conversations annual thought leadership forum held on 2 August 2018, where he had a candid conversation with SGBC President Mr Tan Swee Yiow, facilitated by Ms Pauline Goh, CEO (Singapore and Southeast Asia), CBRE Pte Ltd.




Held at the National Gallery Singapore, the signature event organised by the Singapore Green Building Council (SGBC) was attended by more than 160 representatives from the building and construction industry, all of them listening intently to the hour-long dialogue. Climate change is an existential threat that threatens our way of life, therefore, it is vital for all of us – government, businesses, community and individuals - to play our own part and collectively shape the future.



During the conversation, Mr Masagos emphasised that Singapore as a country is vulnerable to climate change. In fact, Singapore is already affected by climate change, having experienced the following weather events in recent years:

- **Rise in Temperature**
 - 2017 was Singapore's warmest year on record that was not influenced by other weather anomalies
 - 9 out of 10 of the warmest years in Singapore all took place in the 21st century
- **Prolonged Dry Weather**
 - 2 dry spells lasting a record-breaking 27 days in January to March 2014
 - February 2014 was the driest month since 1869 with just 0.2mm of rainfall against the monthly average of 112.8mm
 - Desalination and NEWater plants had to operate at almost full capacity to meet water demand



Singaporeans are feeling the impact of climate change today

Temperature: 2017 was the warmest year on record that was not influenced by El Niño. 9 out of the 10 warmest years in Singapore have all occurred in the 21st century.

Rainfall: Singapore experienced two record dry spells in 2014, from 13 Jan to 8 Feb and 17 Feb to 15 Mar, both lasting a record-breaking 27 days.

Feb 2014 was the driest month since rainfall records began in 1869. **There was just 0.2mm rainfall, compared to the long-term monthly average of 112.8 mm.**

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▪ **More Intense Rainfall**

- Major flash floods occurred in 2010, 2011 and 2013
- A plankton bloom from the heavy rain caused farmers to lose over 600 tons of fish
- Trees were damaged and uprooted by strong winds

As climate change is caused by global warming which in turn is caused by the excessive emission

of greenhouse gases, particularly carbon dioxide, one of the most important climate action to take is to cut back on carbon dioxide emissions, and this can be achieved in a number of ways. Designating 2018 as Singapore's Year of Climate Action aims to draw focus on climate change, to raise the level of national consciousness around the need to take individual and collective action in order to build a sustainable Singapore.



Ocean Financial Centre
©Keppel Land

One of the main pathways to achieve a low carbon future is simply to build better and more efficient buildings. To help nudge the industry, Singapore has in place a target to certify green 80 percent of the existing building stock by 2030. Everyone, from the builders to the occupants, must work together to help achieve the target.

Mr Tan Swee Yiow highlighted that the challenges and threats stemming from climate change also presents opportunities, sparking innovative ways to tackle resource challenges and leveraging on technology to improve the quality of life. The level and pace of innovation that are commonplace these days hold strong promise: what used to be mere concepts such as automation, machine learning, artificial

intelligence, blockchain technology and data-driven insights will move at a greater pace and scale over the next few years, with applications in smart cities sprouting across the world.

Mr Tan shared an example from the private sector: the Ocean Financial Centre from Keppel Land. Completed in 2011, Ocean Financial Centre is an eco-icon in the heart of Singapore's central business district, with state-of-the-art energy-efficient and environmentally-friendly technologies and eco-features. The 43-storey Grade A office tower is the first office development in Singapore to achieve the highest BCA Green Mark Platinum rating and also the first high-rise office building in Southeast Asia to achieve the internationally-recognised Platinum Level LEED certification.



Mr Masagos testing out an innovative handwashing system at the co-located sustainable solutions exhibition during the SGBC Leadership Conversations 2018.

Some of the eco-breakthroughs at Ocean Financial Centre include having one of the largest assembly of solar panels for high-rise buildings in Singapore, an energy-efficient hybrid chilled water system and an innovative paper-recycling system for all offices. The green features incorporated within the development lead to long-term energy savings of about 35 percent.

Reiterating Ubuntu, Mr Masagos emphasised that while the government is introducing policy changes, where necessary, to mitigate the threat of climate, they cannot do it alone. The involvement of all stakeholders is instrumental in realising the vision of a low-carbon and sustainable Singapore. This is why Mr Masagos is heartened by the launch of SGBC's Live.Work.Play.Green climate action campaign, a public drive to raise awareness on the role of green

buildings in climate action. Through a highly visible bus campaign and an interactive website designed to be user friendly and also informative, the campaign will definitely elevate the profile of green building in the public's eyes.

The event also showcased a selection of innovative sustainable solutions that address climate challenges in a unique way. The exhibition of solutions showed how practical green building solutions can be readily accessed to address climate challenges, from a lightweight green roof system to translucent concrete and solar thermal hybrid air-conditioning systems.

In Singapore's Year of Climate Action, living, working and playing in green buildings should be one of our most important personal climate actions. ✔

GO Green with Goodrich

Top ECO-FRIENDLY trends decoded

Let's think green and do green! We are talking about doing things with considerations for our planet earth. While the plastic assault on our oceans is recognised worldwide, we can play a part by becoming discerning consumers when it comes to selecting green products for our homes, hospitals, hotels and shopping centres. It's not just about using less plastics, it's also about using ecologically-friendly furnishings to minimise damage to our environment. Thankfully, Goodrich has a wide range of stylish, green interior furnishings with novel, earth-friendly features, destined to make eco-conscious individuals smile.



Goodrich Global
SINCE 1983



Symphony, J. Josephson (Wallcovering)



Symphony, J. Josephson (Wallcovering)

WALLCOVERING

If you love and respect the environment, then you'll also love and respect the hospitality, commercial and residential zones that you create for your clients, customers and loved ones. Goodrich has a wide range of wallcoverings that are not only stylish and tasteful, they incorporate green features too.

- Zero usage of heavy metals such as lead, mercury, cadmium and chromium
- Class 0 - BS 476 PART 6/7 fire rated
- Low in VOC and eco-friendly

**IDEAL FOR HOSPITALITY,
COMMERCIAL, RESIDENTIAL**

WALLCOVERING ADHESIVE

Nobody likes the strong odour of adhesives when doing up a wallcovering. Goodrich solves the issue with their wallcovering adhesive that Mother Nature will approve of. This product even has a "Green Label Singapore", so you can rest with ease that people's health won't be compromised.

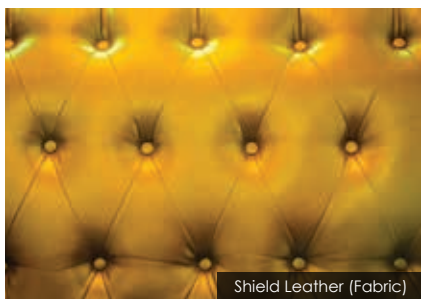
- Specially formulated for all types of contract wallcovering
- Non Hazardous, Non Toxic, Non Flammable, Non-Staining
- Solvent Free and Formaldehyde Free
- VOC is 0.45mg/kg
- Made in England

Complies to:

- Regulation (EC No 1907/2006)
- CLP European Regulation (EC) No 1272/2008
- BS3046/1981



Scan here to download
GO Green with
Goodrich Catalog



Shield Leather (Fabric)



Shield Leather (Fabric)



Shield Leather (Fabric)



Shield Leather (Fabric)

FABRIC (Shield Leather)

Leather upholstery on your lounge chair, sofas or seating systems is paramount in welcoming guests, clients, and patients, particularly in the hospitality, healthcare, commercial and residential situations. With a vast array of leather choices, Goodrich fabric (shield leather) can clothe any sofa or armchair shape to match your requirements. This interesting product snagged double ticks for the Singapore Green Building Product label and it is certified as "Very Good".

- ✔ Biodegradable
- ✔ Inherently fire retardant and stain resistant
- ✔ Low VOC emissions
- ✔ Naturally sourced color pigments and metal free

IDEAL FOR HOSPITALITY, HEALTHCARE, COMMERCIAL, RESIDENTIAL

CARPETS

Carpets are no longer "by the way" products when it comes to furnishing a hospitality or commercial space. Goodrich carpets have three ticks for the Singapore Green Building Product label and it is certified as "Excellent".

- ✔ Low in VOC with maximum recyclability
- ✔ Recyclable thermoplastic backings
- ✔ Eco-fresh self-renewal odor reducer treatment
- ✔ Micro Shield anti-microbial treatment
- ✔ Awarded CRI Green Label Plus, Singapore Green Label & SGBC (Leader), U.S. GreenCircle Certified

IDEAL FOR HOSPITALITY, COMMERCIAL, RESIDENTIAL



FLOORING

First impressions count when it comes to flooring in healthcare, hospitality, commercial and residential situations! Why should our feet (and expensive shoes) be an after-thought? Goodrich floorings have three ticks under the Singapore Green Building Product label and it is certified as "Excellent".

- ✔ Suitable for the indoors / outdoors
- ✔ Available in vinyl, laminate, engineered timber and WPC Decking.
- ✔ Accredited with ISO 14001, PEFC, Blue Angel, SEC and SGBC.
- ✔ Certified safe with low levels of TVOC & formaldehyde air emissions

IDEAL FOR HEALTHCARE, HOSPITALITY, COMMERCIAL, RESIDENTIAL



New Geff Laminate (Flooring)



WPC Decking, GEFF (Flooring)



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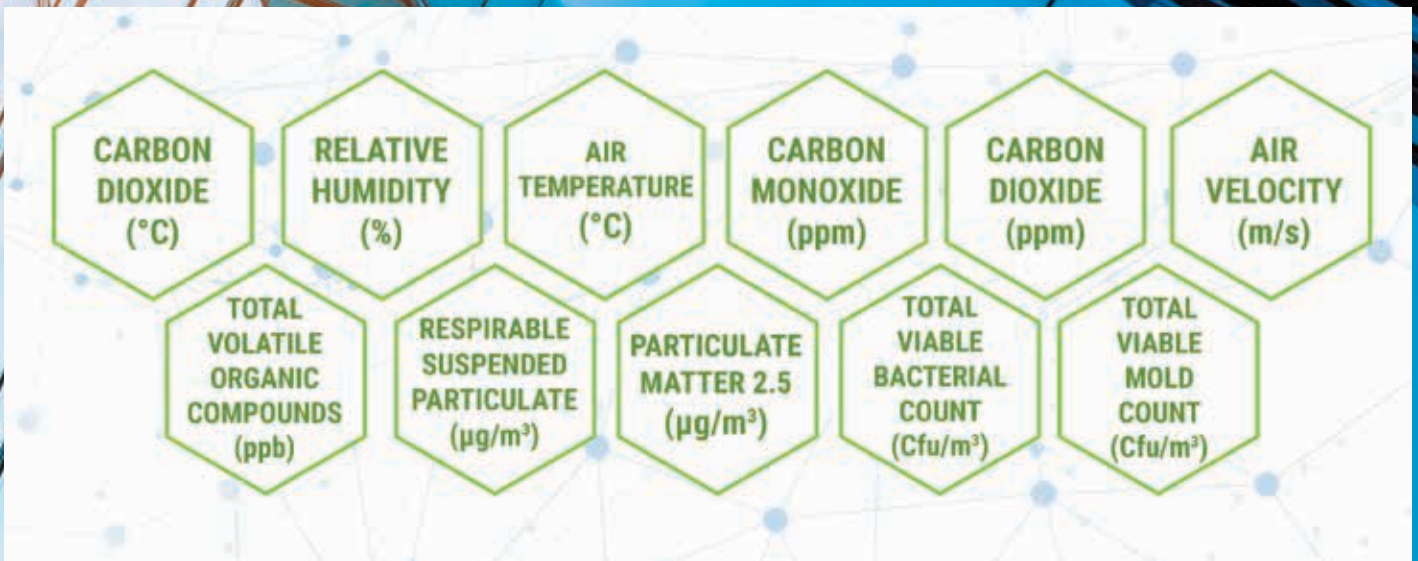
YOU ARE WHAT YOU BREATHE: THE IMPORTANCE OF INDOOR AIR QUALITY

Working professionals spend a significant part of the day inside office buildings. Ensuring proper indoor air quality is thus of paramount importance for their well-being as well as employee productivity.

WHY IS INDOOR AIR QUALITY IMPORTANT?

No matter what industry you work in, barring a minority who may be required to be on the field, chances are that you spend at least 8 hours of the day in a workplace. That is one-third of the day spent inside office buildings, which means it is imperative to consider the quality of the environment you are in for this duration.

Indoor air quality is one such aspect that business owners, building and facility managers as well as employees should consider. Maintaining good standards can provide employees a comfortable working environment and improve their productivity, while poor standards could affect their focus, wellbeing and even cause health problems. For business owners and facility managers, poor air quality standards can result in both financial losses due to employee healthcare reimbursements, reconstruction and rectification costs as well as a hit to brand reputation.



WHAT CAUSES POOR INDOOR AIR QUALITY STANDARDS?

There is no one single factor that causes poor indoor air quality standards. Air quality depends on a combination of complex factors that involve pollutants in indoor environments. Recent IAQ audits in workplaces in Singapore have shown that, of these pollutants, three certain contaminants pose a bigger problem to occupiers and facility stakeholders. They are:

- Total Volatile Organic Compounds (TVOC) – Toxic in high concentrations and short-term exposure can have harmful effects on the health.
- Formaldehyde – Occupiers can experience adverse health effects such as watery eyes, skin & throat irritation and coughing. Particularly harmful for expecting mothers.

- Mold – Severe mold growth can be disastrous for the workplace tenants as well as to the building’s infrastructure.

Affected workplaces can face high remediation costs, so ensuring proper air quality therefore demands controlling these factors. This requires a three-pronged approach that involves

- Identification of the pollutant sources and removal from the building or isolation from people through barriers – either physical or in the form of air pressure variations
- Dilution of pollutants that do enter the building and removal through ventilation
- Filtration to clean the air of pollutants

This can be accomplished if there is a well-designed building ventilation system that is efficiently maintained and operated.



WHAT TO LOOK FOR IN A BUILDING VENTILATION SYSTEM

Aside from the layout of the office space and pollutant source management, a building's heating, ventilation and air conditioning (ACMV) system plays a major role in determining its indoor air quality. Consider the following aspects when you design a ACMV system:

1 People and equipment

Determine how many people and equipment there is in your building which you want the ACMV system to supply air to. If an area is being used in a way different from its intended purpose, like when a storage area is converted to a meeting room, make the necessary modifications to the ACMV system to deliver sufficient air to this space.

2 Entry of fresh air from outside

Ventilation systems require adequate supply of outside air to dilute pollutants dispersed from equipment and materials in the building. Ensure your system has access to fresh air from outside, proper filters to weed out pollutants like carbon monoxide, pollen and dust as well as easy distribution of this air to occupied spaces within the building.

3 Have proper maintenance programs in place

Regular maintenance of equipment is essential for uninterrupted delivery of quality air into and around the building. Have proper preventative maintenance procedures in place to keep your office staff comfortable.

INDOOR AIR QUALITY IS A SHARED RESPONSIBILITY

Ensuring proper indoor air quality is not just within the purview of one single stakeholder. Building management personnel, tenants and business owners have to work collectively. Some duties like maintenance fall under the building management, while controlling renovation materials that come into the building is the job of the occupants. Other tasks like cleanliness and housekeeping require the cooperation of both teams. Each and every individual involved have specific responsibilities that when addressed, together make for a good working space with quality air.



THE ROLES OF OFFICE MANAGERS AND TENANTS

Every business that operates on leased space in Singapore will be required to nominate an office manager. This person is responsible for policies relating to the office, including liaising with property owners and fostering fruitful relationships with building managers to discuss ways to improve the working environment. Here are some ways the office manager can step up to improve indoor air quality:

- **Plan an ideal office layout**

Plan out an office layout that allows for proper air flow within the office. This means placing furniture, partitions and equipment such that the air circulation, temperature control and pollutant removal functions of the ACMV system can go on unhindered.

- **Coordinate regular maintenance**

Air conditioner filters, heating and cooling units often require regular maintenance and servicing. It is the duty of the office manager to coordinate with the building management team to keep up this routine and ensure that the entire building sees optimal servicing regularly.

- **Enforce smoking policies**

Aside from the direct impact on health to smokers, tobacco smoke can interfere with the ventilation system and cost you extra for cleaning and replacing soiled materials. Clearly communicate the smoke-free policy to occupants of your building and work with the building management to devise separate smoking rooms with proper ventilation to prevent smoke from moving into the nearby areas

- **Minimise exposure to problematic products**

It becomes the duty of the office manager to ensure that materials that are odorous or which give off pollutants do not impact the indoor air quality in a big way. This could mean keeping out chemical products like adhesives, cleaners and pesticides or ensuring that the ventilation system finds a way to remove the pollutants created from these. During times when remodeling or renovation work is required, work with contractors and facility managers to try and schedule for weekends and ensure that working areas are not exposed to any pollutants generated.



Lighten up

Did you know bringing the outside in can improve your sleep, productivity, and boost access to vitamin D? Natural light makes spaces healthier, and cuts down on energy use.

#homegreenhome



**WORLD GREEN
BUILDING WEEK**

24 - 30 SEPT 2018

Join the movement

Learn. Share. Lead.

visit www.worldgbc.org/worldgreenbuildingweek



THE MULTI COMFORT APPROACH TO GREEN BUILDINGS

Human comfort is of paramount importance when it comes to our builds because ultimately, buildings are built for people.

Buildings are an intrinsic part of the very fabric of society, constructed for a variety of reasons. Buildings are needed to house people, these same people go to work in buildings and they also partake in recreational activities on the weekends. In fact, people spend up to 90 percent of their time inside buildings! Therefore, it is essential that our buildings be designed such that the people who use them will benefit the most.



Saint-Gobain North America Headquarters featured in the GBC report. More info at www.livinglaboratory.com

In the grand scheme of things, buildings occupy a peculiar niche. Although buildings only account for 3 percent of the world's total land mass, they are however responsible for half of all energy use and account for one third of the world's carbon emissions. Buildings are thus able to address climate change challenges by being more energy and resource efficient, something that is already being achieved through the proliferation of high performance green buildings.

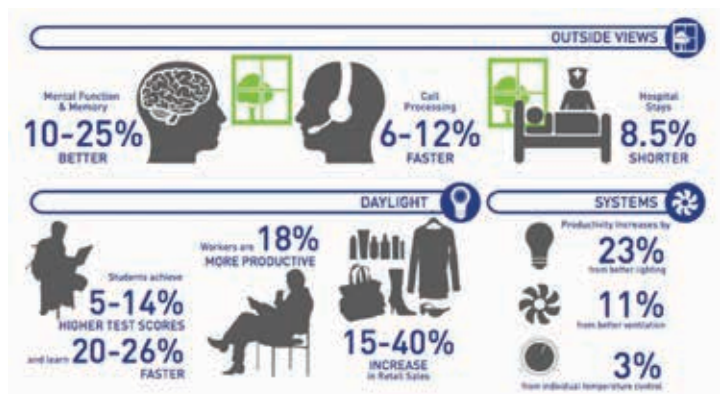
Green buildings can be viewed as the logical progression building philosophy, essentially ensuring that the buildings constructed are not only good for the environment but also good for the occupants using the buildings. Green buildings are more energy-efficient, require less resources to operate and are fitted-out with sustainable green building materials to create a positive, healthy indoor environment for its occupants.

Over the past decade, the green building movement has blossomed into a global concept, influencing the built environment and positively impacting millions of lives all over the world. We now have the necessary know-how to build our buildings green from a technical point-of-view but we also need to ensure that the buildings we live in can be buildings we can live with.

THE MULTI COMFORT CONCEPT

A growing body of research and evidence points to a strong link between better buildings and increased wellbeing among occupants. The World Green Building Council (WorldGBC) puts out several such studies through its Better Places for People programme, aimed at raising awareness of key attributes responsible for creating places that are good for people.

Saint-Gobain, one of the Campaign Partners for the Better Places for People programme, is pushing the sustainability envelope through a concept termed simply as Multi Comfort. True to its name, the Multi Comfort concept looks at multiple elements that contribute to the comfort level of a place. When applied to green building and placemaking, the multi comfort concept helps designers to conceptualise and create places and spaces that are not just environmentally-friendly but also place the occupants at the heart of the buildings. After all, the occupants are the ultimate end-users of any building.

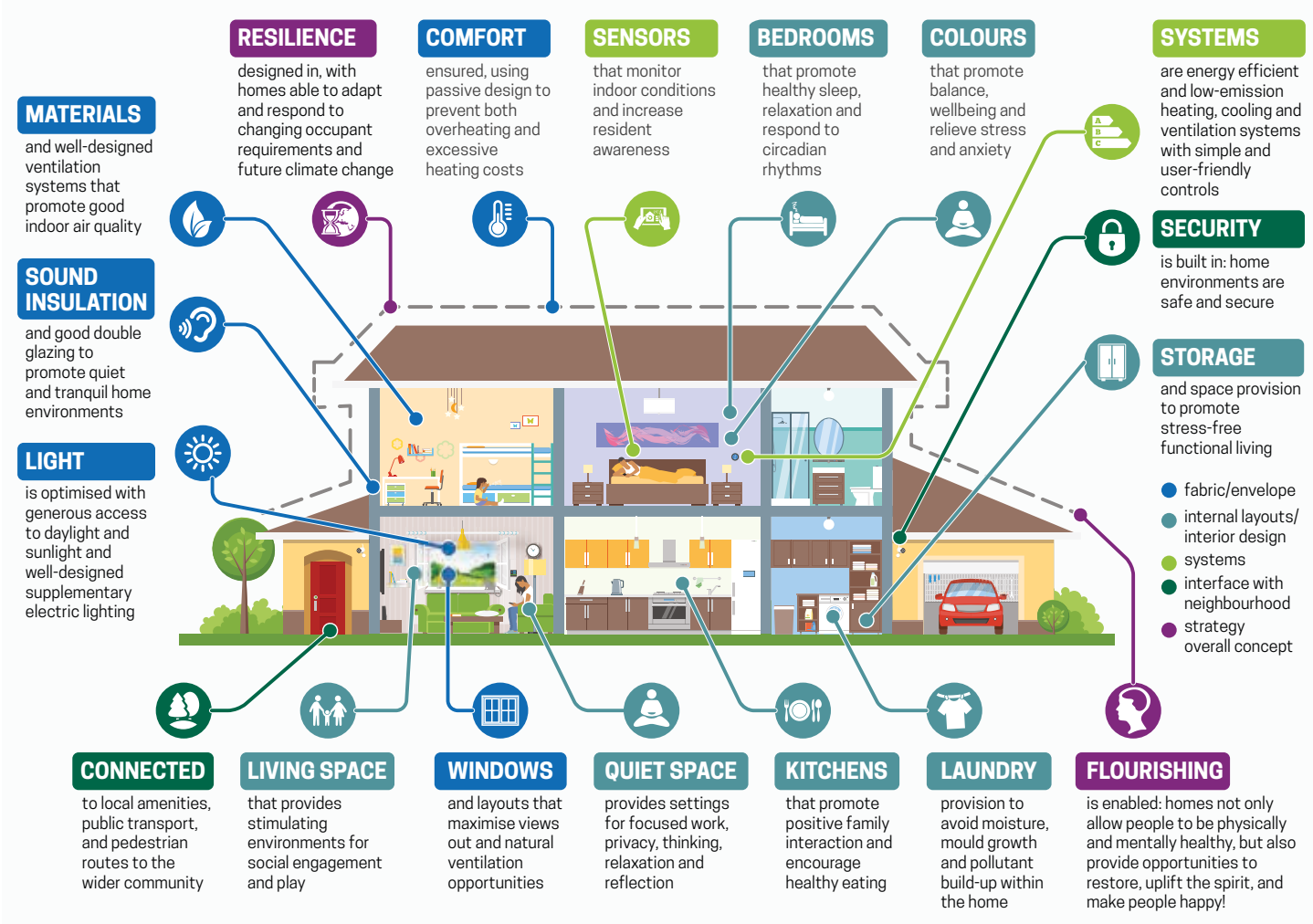


Net present value analysis of the operational cost and productivity and health benefits of LEED certified buildings. Illustration taken from 'Health, Wellbeing & Productivity in Offices', World Green Building Council, 2014



THE WHOLE BUILDING APPROACH

Increasingly, architects and engineers are focusing on the question of how to achieve a healthy indoor environment that contributes to people's wellbeing. But the relationships between people's wellbeing and their indoor environments are quite complex. As a result, indoor environmental factors have largely been dealt with in an individual way, taking factors one at a time and making recommendations for the improvement of each. However, taking a holistic approach to comfort, health and wellbeing in buildings is the way forward.



"What is a healthy home?" Illustration taken from UK Green Building Council report 'Health and Wellbeing in Homes', July 2016.

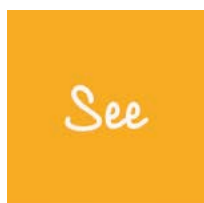
The Multi Comfort Approach to Green Buildings



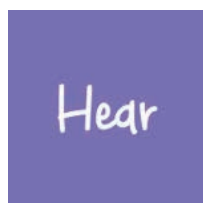
By carefully considering all the different areas of comfort that a building can provide, people's wellbeing within buildings can be bolstered – regardless of the types of buildings and the specific activities taking place inside them.



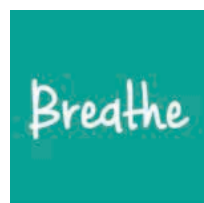
THERMAL
COMFORT



VISUAL
COMFORT



ACOUSTIC
COMFORT



INDOOR AIR
COMFORT

FOUR SENSORY COMFORTS

Comfort is a state of physical ease and wellbeing in a given environment. Within a building, various conditions are required to enable people to feel comfortable, and to perform their tasks effectively. There are four main considerations that affect people's senses and therefore their perception of comfort inside buildings. These are core to the Multi Comfort standard.

FEEL

This essentially refers to thermal comfort. A balanced thermal environment is necessary to feeling comfortable. Concentration, manual dexterity, and the occurrence of accidents are all influenced by excessively high or low temperatures. Operative Temperature and Relative Humidity in a space determine Global Comfort conditions, depending on what we are wearing and what we are doing. Our bodies are also sensitive to small variations in factors such as Air Velocity and Temperature Gradient. The impact of these Local Discomfort elements must be minimised – so we can fully enjoy the space and function comfortably regardless of the activity.

Key Considerations:

- Air temperature
- Surface temperatures
- Humidity
- Absence of draughts

Good buildings should:

- Keep indoor temperatures at ideal levels using very little energy
- Have walls that are nice to touch regardless of outside weather
- Have no draughts, even on the floor



The Multi Comfort Approach to Green Buildings

SEE

Visual comfort is crucial for an optimal sense of wellbeing. Light brings architecture to life and brings life to architecture. Different tasks require specific Light Quantity levels with optimum spatial distribution and a good combination of natural and artificial light. A visual connection to the outside world through exterior Views allows us to set our biological clock and, together with indoor Space Quality, provides an overall appreciation of indoor aesthetics.

Key Considerations:

- Views of outside space and connected to nature
- Light quality
- Luminosity
- Absence of glare

Good buildings should:

- Be full of natural light without glare
- Have rich colours, making close-up work easy from even light distribution
- Bring the outdoors inside, connecting you with nature and improving your mood

HEAR

Acoustic comfort is characterised by an appropriate Sound level. This means the absence of unwanted sounds, our ability to generate sound without bothering other people, and most importantly, the quality of sounds we do want to hear. In well-balanced sound environments, people are more productive, happier and experience fewer health issues. To address these aspects, depending on the type of building (residential, office, school, healthcare or hotel) and activity, different Room Acoustics comfort descriptors are used.

Key Considerations:

- Noise from outdoors and/or neighbours
- Sound vibrations through the structure
- Clarity of hearing, speech intelligibility

Good buildings should:

- Protect you from noise – coming from outside or inside
- Allow you to make noise without disturbing others
- Give an improved level of ambient noise
- Allow control over noise reverberation and increase speech intelligibility, making sound places to work and learn



The Multi Comfort Approach to Green Buildings

BREATHE

This aspect deals with indoor air quality. The fresher the air we breathe, the healthier we feel in the buildings we live, work and play in. A constant supply of fresh, clean air in buildings avoids Stuffiness and creates an optimally healthy environment, reducing to an absolute minimum the impact of harmful Chemical Pollutants and Particulates. Good design, proper ventilation and specification of the right building materials are essential to increase the supply of fresh air in the building, and to reduce our exposure to indoor pollutants and odours.

Key Considerations:

- Indoor air quality
- Fresh air supply
- Absence of internal pollutants
- Control of odours

Good buildings should:

- Keep outdoor pollution outside
- Have a constant supply of clean, fresh air
- Never feel stuffy nor damp
- Actively break-down impurities in indoor air



Mr. Nicolas Godet
*Regional CEO
Saint-Gobain
Construction Products
Southeast Asia*



Ms. Lynette Siow
*Managing Director
EMIX INDUSTRY (S)
PTE LTD*

“ By introducing the Saint-Gobain’s Multi Comfort Concept, we aim to inspire the region’s top minds and revolutionise the industry’s standards and building methods. This clearly demonstrates Saint-Gobain’s ambitions to be the region’s leader for sustainable habitat.

The Saint-Gobain Sensorial Lab in Singapore will allow visitors to better understand the 4 Multi Comfort standards and experiencing the different comfort levels of each. This intensifies and enriches our prescription towards our relevant stakeholders. ”

SUSTAINABILITY CONSIDERATIONS

Construction has a major environmental impact, particularly in terms of carbon emissions and energy use, material and resource efficiency and people health. Climate change and accelerating urbanisation also highlight the need for good water management and biodiversity.

The environmental impact of buildings over its whole lifecycle should be minimised, after all, the ultimate vision of Multi Comfort is an autonomous and neutral building that actually brings positive effects!





ENERGY & CARBON – TOWARDS ZERO CARBON

The Multi Comfort concept promotes a “fabric first” approach, meaning that the building should first be energy efficient through its highly performing envelope and limit to the unavoidable minimum the needs for heating, cooling and lighting. The remaining needed energy should be supplied with renewable and decarbonised sources and buildings be prepared to produce more energy than they need.

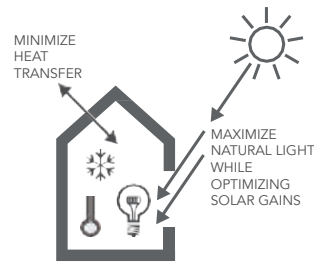
Key Considerations:

- Energy needs for provision and maintenance of Indoor comfort
- Energy supply and sourcing
- Smart equipment and smart grid-readiness
- Low impact carbon impact over the whole life cycle

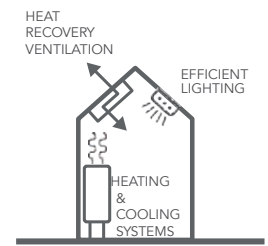
Good buildings should:

- Limit energy needs for the main comfort purposes (heating, cooling and lighting)
- Source and, if possible, supply clean and local energy for residual needs
- Are smart, being able to control consumption and smart-ready for connection to the grid
- Give preference to products and solutions with a lower carbon

1 USEFUL ENERGY NEEDS



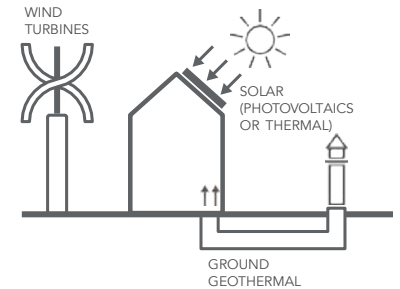
2 FINAL ENERGY DEMAND



4 SMART AND GRID READY



3 CLEAN AND LOCAL ENERGY SUPPLY

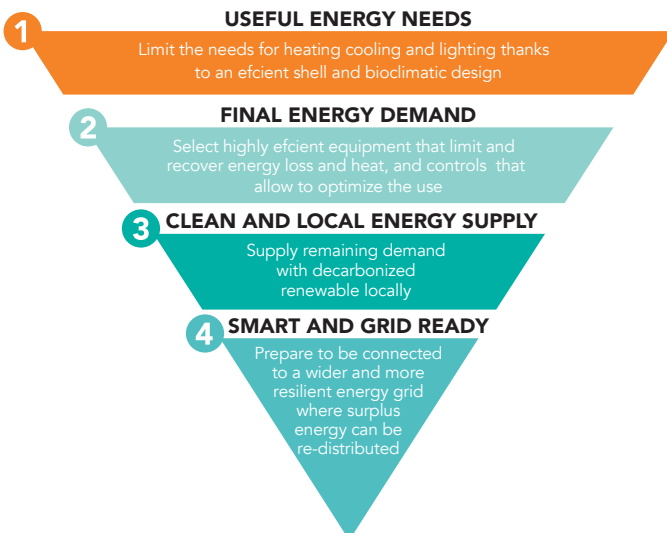


MATERIAL AND RESOURCES: TOWARDS CIRCULAR ECONOMY

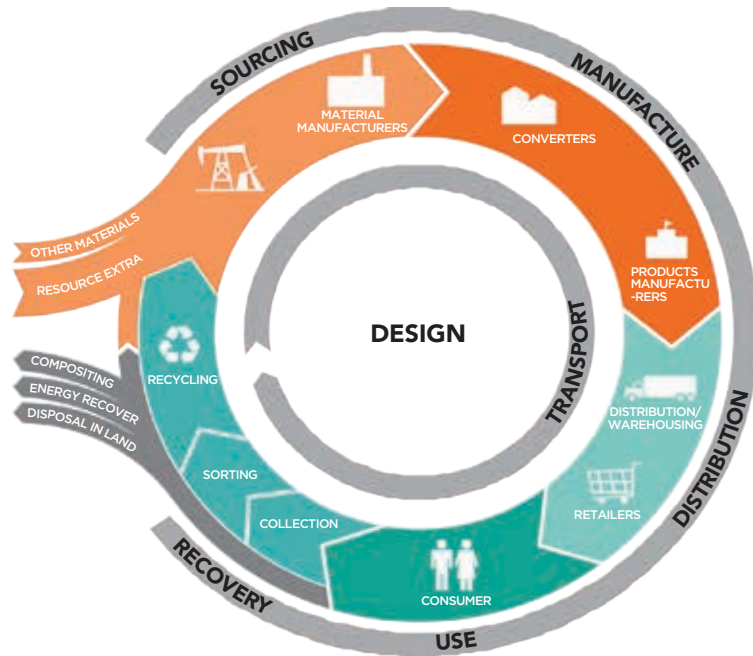
As a key contributor to resource consumption and waste generation, the construction sector has a role to play in increasing resource efficiency. The linear model where a resource become a waste can be transformed into a circular model where a waste can also become a resource.

Ultimately: Towards a circular economy

Close the loop by reducing to the minimum waste generation, divert residual waste from landfill, and use it as a secondary raw material, while ensuring all of the solutions have no hazardous content.



The Multi Comfort Approach to Green Buildings



DO YOU KNOW THE DIFFERENCE?

Internal recycled content is the name of a material recovered directly during the production process. This waste is reintroduced in the process and does not leave the plant. It is not considered recycling in the traditional sense and as defined by the norm ISO 14021–1999.

SECONDARY (RAW) MATERIAL

Secondary materials are materials recovered from previous use or from waste. They substitute primary materials and are used as an ingredient in another product.

Examples: scrap metal, crushed concrete, glass cullet, recycled wood chips, recycled plastic, etc.

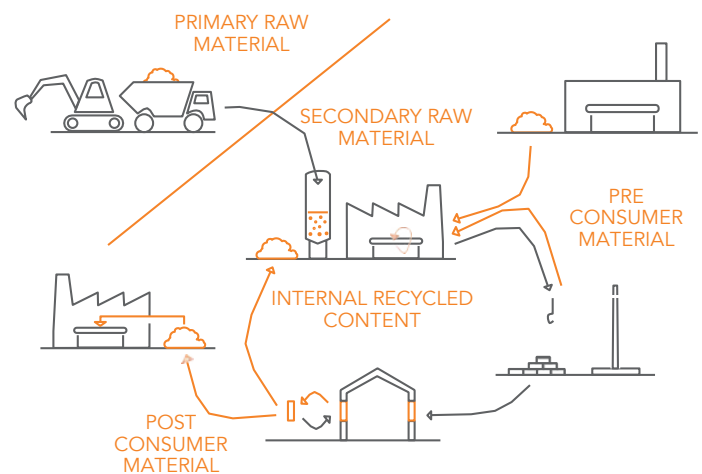
This secondary material is differentiated depending on the phase when the recovery occurs.

- **Pre-consumer waste or material** corresponds to a material that was discarded before it was ready for consumer use. The difference with “internal recycled material” is that it is not reused within the same plant but supplied externally
- **Post-consumer waste or material** corresponds to a material discarded after someone has used it, collected, sorted and transformed into secondary raw material

	Target (Must have)	Recommendations (Nice to have)
Criteria definition	Maximize recycled* content by family of products (see next 2 pages)	Divert waste from landfill, and use it as secondary raw material. <ul style="list-style-type: none"> ▪ Jobsite: 100% construction waste diverted from landfill ▪ End of life: Easy to dismantle

Assessment Value taken from the recycled content declarations or the EPD (Environmental Product Declaration): parameter “Use of secondary material” at Product stage

* recycled content claims must conform to ISO 14021–1999 and correspond to the parameter “use of secondary material” in the EPD (Environmental Product Declaration)





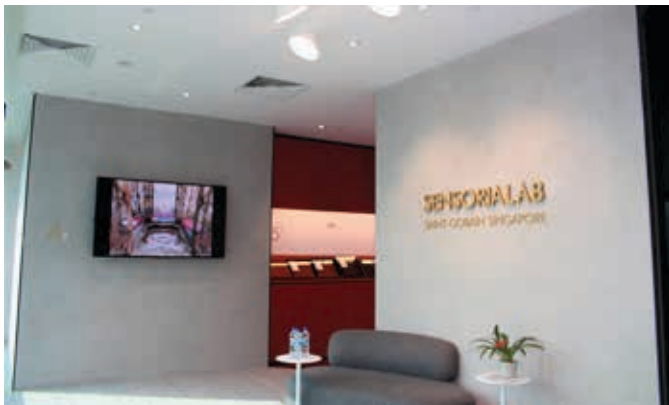
Experience Multi Comfort right here in Singapore!

SOUTH EAST ASIA'S REGIONAL SENSORIAL LAB OPENED IN SINGAPORE

Saint-Gobain opened the South East Asia (SEA) Sensorial Lab (mini Domo-Lab) in its Singapore common office. The Sensorial Lab serves as a show-case space to strengthen and improve its prescription towards architects, developers, contractors, government agencies, Green Associations and relevant stakeholders. It demonstrates the ambitions of the Saint-Gobain SEA teams to be region's leader for sustainable habitats.

- The thermal module enables visitors to experience a thermal delta between what they see and what they touch.
- The visual module highlights the importance to balance between artificial and natural lights. Experience what human technology has provided
- The sound forest is a pathway through a labyrinth of materials to experience noise, its correction and comfortable silence.
- The Solutheque highlights the diversity of materials supplied and distributed by Saint-Gobain companies.

Email EIS.INFO@Saint-Gobain.com to book a tour! ✔



All text and images courtesy of Saint-Gobain.



SYSTEM SOLUTIONS

01



ROOFING SOLUTIONS FOR ROOF



WATERPROOFING SOLUTIONS FOR BALCONY



02



TILE FIXING & PLASTERING MORTARS SOLUTIONS FOR LIVING ROOM

03



WATERPROOFING SOLUTIONS FOR BATHROOM



WATERPROOFING SOLUTIONS FOR SWIMMING POOL

04



WATERPROOFING SOLUTIONS FOR BASEMENT

Our Products:



Plaster



Tile Fix



Waterproofing



Screed



Non Shrink Grout

Going Green

STAY SAFE & GREEN WITH ARMSTRONG FLOORING

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)



Treatment Room (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 atrium spaces and public lounge areas, 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.



Office in USA (Flooring)



Office in USA (Flooring)

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Flooring Catalog



Classroom, USA (Flooring)



Laboratories (Flooring)

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.

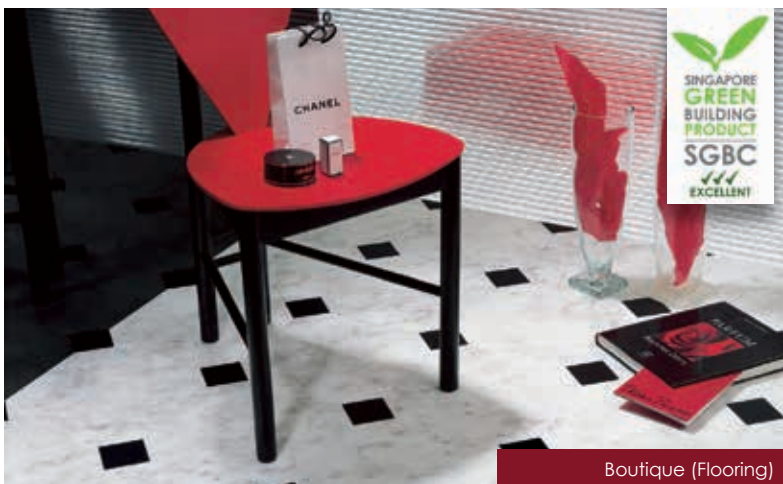
FLOORINGS FOR EDUCATION PROJECTS

When it comes to high-traffic areas such as education rooms and high-susceptibility to stains and corrosion such as laboratories, then **Armstrong Starlux 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!



Boutique (Flooring)



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)**.



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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. However, the environmental performance of the particular 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 greener, healthier buildings.

ASSESSING SUSTAINABILITY

So how does one determine if this particular green building product is indeed green? As the only dedicated certification scheme for green building products in the country, the Singapore Green Building Product (SGBP) certification scheme – administered by the Singapore Green Building Council (SGBC) - provides a one-stop solution for the selection of sustainable building materials. While the Building and Construction Authority's 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 healthy and sustainable from inside-out.



Selecting Sustainability

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”, since it would have 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 hours lost, which ultimately go towards diminishing the company’s bottom line. Therefore, it stands to reason that 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 environmental qualities of the product.



SGBP certification covers a broad range of building products and materials, stratified into seven main categories. Individual product types are further classified into more than 80 sub-categories within these main categories, ensuring that almost any conceivable 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.



MAKING A SUSTAINABLE CHOICE

Since 2010, the SGBP has certified more than more than 3000 products across more than 400 companies and suppliers. SGBC also regularly engages with building owners, designers and consultants to spread awareness of SGBP-certified products, through purpose-organised seminars, sharing at partner events or during green building conferences and related exhibitions. ✓



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

INNOCITY SOLUTIONS PTE LTD

With the growing emphasis on smart technology and applications, Innocity Solutions provide a suite of products and services that help to improve building management and operations. The Smart Lighting System enables remote access using a free mobile application, allowing users to apply and edit multiple usage schedules with ease. The system also makes use of a hub to pair all devices together, providing great coverage without taxing the WiFi router.

Innocity's systems are easily configured and compatible with every household's switchboxes. The system detects its fault automatically and is equipped with voice-control function. Listening closely to users' needs and promptly adapting products to meet ever-changing needs, Innocity's products are compatible with Amazon Alexa, for the 11 million existing Echo users and 24 million more to come in 2017.

Innocity also has a smart indoor air quality monitoring system that is wireless, making it a breeze to install and operate. Powered by an internal solar battery, the system is able to generate accurate temperature and humidity reports, allowing building owners to have updated data on the indoor air quality.



38 MARINE AND OFFSHORE (KOL ENGINEERING)

38 Marine And Offshore is strategically based in Singapore and Myanmar to provide a comprehensive range of services to serve and meet the specific needs of the Onshore, Marine and Offshore Industry. The company operates both regionally and internationally, through the support of our global network and partners, in the onshore, marine and offshore industry.

38 Marine And Offshore wholly owns KOL Global Engineering, the authorised distributor and integrator for the VAF Water Filtration Systems & VAF Centrifugal Separator system for commercial building and industrial application, a product that has cleared the stringent Singapore Green Building Product labelling scheme assessment process.

KOL Global Engineering is also the authorised distributor for BSRIA compliant VEXO X-POT combined 4-In-1 Filtration, Dirt & Air Separator and Dosing Pot Systems to maintain excellent quality chilled-water or closed system water ensuring main system plant items including Chillers, Pumps and Heat Exchangers operate at their designed efficiencies.



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, YiTac's policy is to provide excellent products and services for all customers. For the past decade, YiTac has been providing the market with innovative products and quality services to the building and construction industry.



TRUWATER SINGAPORE PTE LTD

Truwater is a manufacturer specialising in the wet and hybrid type of cooling tower. In the last 20 years, Truwater has constructed highly efficient and environmentally friendly cooling towers for the air-conditioning, power generation, biomass co-generation, petrochemical, chemical, oil & gas, steel mill, food and other processing industries. Engineered from a choice of available materials ranging from timber, steel, concrete and even of composite FRP structures combined with various configurations of fill packs designed specifically for both the mechanical draft counter/cross flow application.

The EX-S and EX-C Series are respectively an induced draft cross-flow and counter-flow, film filled, FRP multi-cell rectangular cooling tower designed for the equipment cooling, and industrial process cooling and air conditioning applications. Truwater Cooling Towers are specifically designed to meet maximum performance and reliability, and minimum maintenance.

WIELAND ELECTRIC

Wieland Electric GmbH is a medium-sized, family-owned company in the electrical and electronics industry, and is headquartered in Bamberg, Germany. The Wieland company, which celebrated its 100-year anniversary in 2010, is among the pioneers in electrical connection technology. The internationally aligned family company, market leader in the area of pluggable installation technology for buildings, maintains worldwide subsidiaries.

The components of product family GST are certified according to IEC 61535, are suitable for the installation of lighting systems, switches, sunblinds and power receptacles. Mechanical coding facilitates clear separation of different applications within the same system. In addition, the connector colour identifies the connections that belong together. Mis-mating is thereby virtually eliminated.



YiTac's well established network coupled with its strong sourcing and procurement capability enables the company to bring in quality products from acclaimed brands worldwide at competitive pricing. Their sprawling factory provides the necessary housing and workshop space for YiTac's broad range of products.

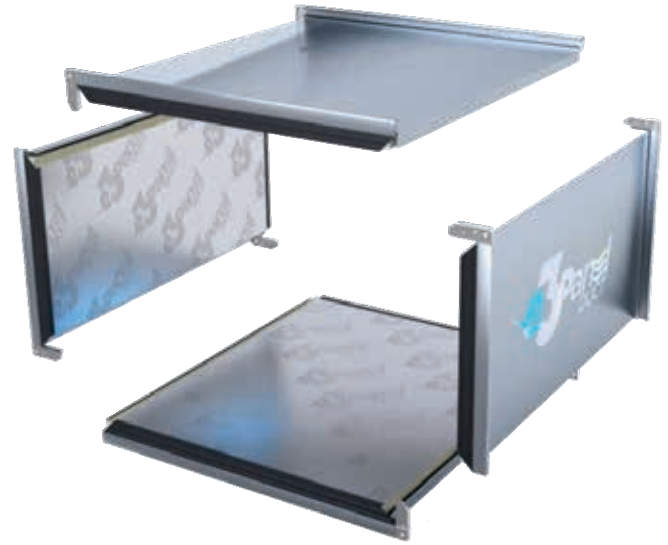
Passive displacement ventilation, or PDV, is an innovative air distribution system that closely resembles the displacement

ventilation system. In both systems, air is supplied at the floor level and extracted from the room at the ceiling level. However, with PDV, no mechanical fans are used to propel air into the room. PDV systems rely completely on the process of natural convection to deliver the chilled air to the end user. The Twenty80 PDV Coil design comes with integrated drain pan and insulation, condensation issue should not happen given proper design and installation.

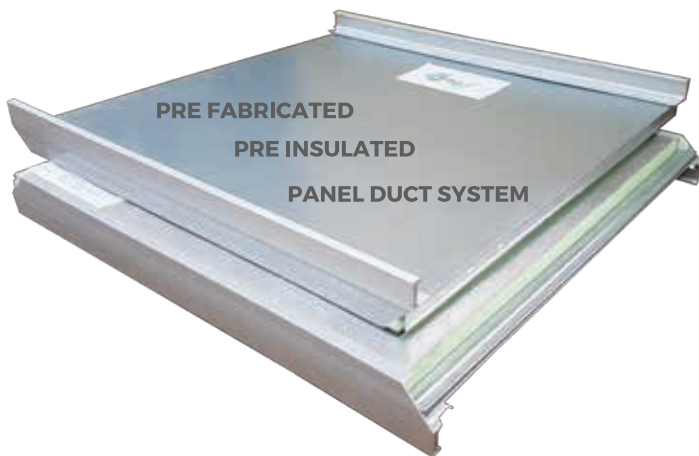


INSTAD PRE FABRICATION PTE LTD

INSTAD Pre Fabrication Pte Ltd is a subsidiary of R Glazen Group, leader in manufacturing and supplying of HVAC applications in the construction sector. INSTAD Pre Fabrication Pte Ltd is specialised in research, design, development, manufacture and delivery of innovative building services solutions transforming engineering projects into fast track, sustainable, high performing environments.



**PRE FABRICATED
PRE INSULATED
PANEL DUCT SYSTEM**



**PRE FABRICATED
PRE INSULATED
PANEL DUCT SYSTEM**

TRANSFORMING THE FACE OF DUCTING

INSTAD's E3PANEL DUCT™ is an innovative ductwork system design that will revolutionise the HVAC applications in the construction sector. It comprises premium performance E3PANEL DUCT™ panels, fabrication methods, coupling systems and a complete line of accessories to produce ductwork in sections.

Consisting of a polyisocyanurate (PIR) insulation core, faced on the external with a protective and durable zero spangle thin galvanised sheet metal and on the internal with a 100 micron embossed aluminium foil, the panel is pre-fabricated and pre-insulated (PFPI) reducing on-site human resources, installation time, cost and space, transportation space and material wastage.

For HVAC systems designed to withstand a maximum static pressure of 1500 Pa, ductwork fabricated from this system can achieve air-leakage rates to a fraction of those typical of rectangular galvanised sheet metal ductwork thus offers the benefits of cutting energy use, cutting operational carbon dioxide (CO₂) emissions and cutting costs.

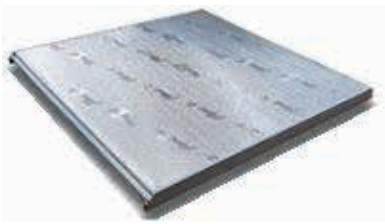
E3PANEL DUCT™ is eco-friendly, efficient and easy to install. As a result, the system is the next generation ductwork system where low embodied and operational environmental impact are key requirements.



MADE IN SINGAPORE

“E3PANEL™ A NEW GENERATION METAL DUCT”

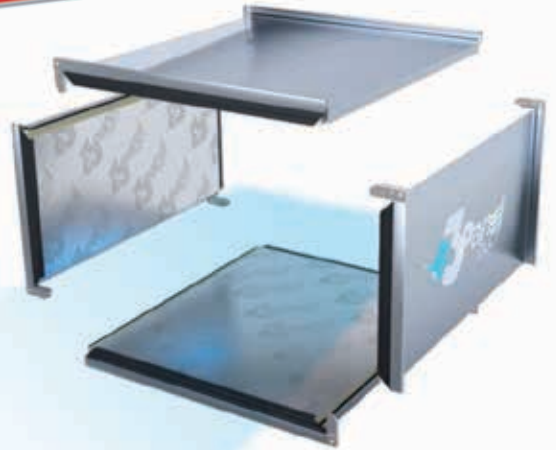
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SINGLE FIX



EASY HANDLING



INVENTORIAL



EFFICIENT TRANSPORTATION



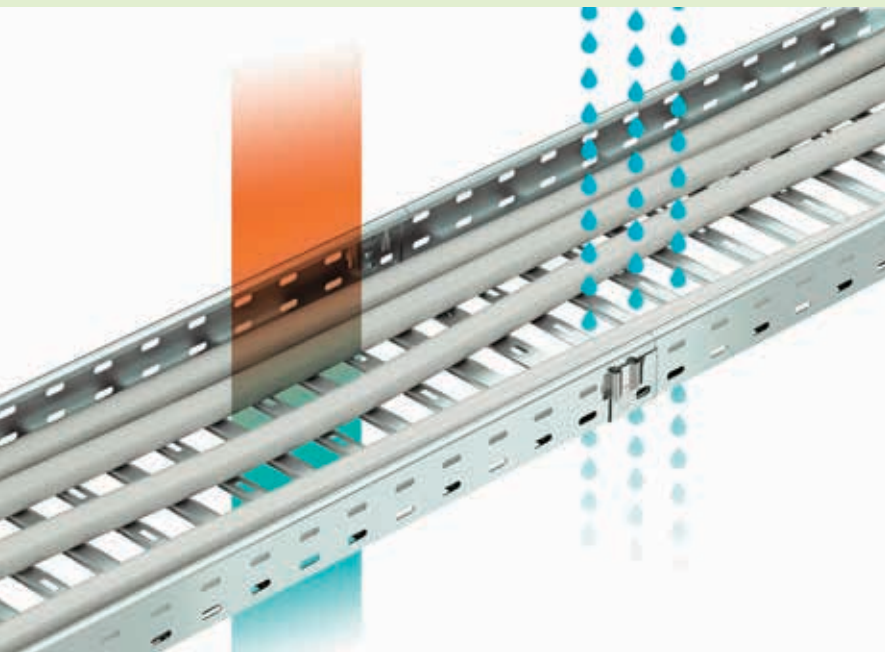
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OBO BETTERMANN SOUTH EAST ASIA PTE. LTD.

Since the 3rd of January 2015, OBO Bettermann South East Asia's CEO, Mr. Conrad de Lange has set up the headquarters for the South East Asian market in Singapore. Complete with warehouse and logistic facilities at 18 Tampines Industrial Crescent, OBO Bettermann is ready to serve the market with industry experience and expertise of more than a century. Besides cable support systems, OBO Bettermann offer professional products in the following segments as well:

- Connection and Fastening System
- Transient and Lightning Protection System
- Fire Protection System
- Cable Routing System
- Device System
- Underfloor System



THE FUTURE OF CABLE SUPPORT SYSTEMS HAS BEGUN

What is more than a simple piece of steel plate to carry cables going around from infrastructures like tunnels and bridges to buildings like hospitals and industrial plants? With the ever increasing demand for more services and complex network of pipes, cable supports and HVAC systems, the task has never been easy for consultants and mechanical and electrical engineers.

Skyscrapers, Green buildings and mission critical industrial plants all demand better and more reliable cable support systems with a tad more innovation and intelligence.

Increasing labour cost calls for more productive methods of installation which in turn facilitates shorter project timeline.

OBO Bettermann from Germany, brings about a new generation of cable support system and accessories with paradigm shifting possibilities and ideologies.



THE 'MAGIC' CABLE TRAY SYSTEM

Available in different grades of material and finishing, suitable for every industrial, commercial and infrastructure application. The Magic cable tray system was designed to improve the way of installation, increase the loading capability, maximise support structures and most importantly to better hold and protect the cables which they are supporting.

SIMPLIFIED MOUNTING

The lighter structure produces a considerable benefit for overhead mounting and at great heights. The Magic cable tray system is the world's first completely screw-less tray system. All the system components and tray types are equipped with the innovative Magic connection from the tray through to the fitting. The combination of both advantages makes mounting simpler and quicker. To illustrate this, a 400 meter length of cable tray connection requires only 24 minutes compared to 4 hours and 16 minutes with the conventional cable tray using bolt and nut connection.

LOAD CAPACITY INCREASED

Compared to previous systems, Magic cable trays offer greater stability. The complex 3D structure and the different material structure around the laser seam produce previously unachieved load values. As an example, a minimum support distance at 1.5 meters apart is achieved with less than 20mm deflection for all ranges of cable tray width.

LOCKABLE FITTINGS

Even faster. Even simpler. All the classic fittings, such as bends, T pieces, mounting/branch pieces and intersections are equipped with the trusted, lockable Magic connector. The cable tray is run into the fitting connection from above with the spring element. Just connect the pieces, lock them in place – and you're done. Gone are the days where a big and costly Tee piece is required when the Magic add-on Tee does the same function with increased flexibility and yet at a lower cost.

IMPROVED ECO-BALANCE

The use of the new, highly innovative and patented manufacturing method DUO-Plus leads to a considerably optimised CO2 balance for the entire product family. This technological leap saves 2,600 tonnes of CO2 emissions per years. OBO Bettermann cable tray system fulfils the Green requirement of being a sustainable product. This was the main reason that OBO Bettermann is proud to be a member of the Singapore Green Building Council.

IMPROVED CABLE VENTILATION

The completely new base structure allows perfect cable ventilation. According to VDE 0298-4, a tray made up of more than 30% holes is considered a perforated tray. This means that lower reduction factors must be taken into account during cable dimensioning, possibly allowing the use of cables with smaller cross-sections thus achieving cost savings.

WATER RUN-OFF GUARANTEED

All the perforated Magic cable tray systems of width 200 mm and wider are suitable for safe installations under sprinkler systems - in accordance with the requirements of the VDS. The new base structure allows perfect water run-off.

Green Mark with OBO



SINGAPORE
GREEN
BUILDING
COUNCIL

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OBO
BETTERMANN



A MAMMOTH STEP TOWARDS SUSTAINABLE DEVELOPMENT



Balancing urban development with sustainability can be a mammoth undertaking, and a plethora of different organisations and disciplines is needed to tackle the herculean task that is sustainable development. We spoke to **Mr. Pierre-Étienne Bindschedler, CEO of SOPREMA GROUP**, to find out how green building product manufacturers can also help to create better buildings and better places.





CAN YOU BRIEFLY INTRODUCE SOPREMA?

SOPREMA is a French family-owned company founded in 1908. It specialises in the manufacturing of waterproofing and insulation materials for buildings and civil engineering. Although first developed in the European and North American markets, SOPREMA is not a newcomer in the Asia Pacific region: our first regional project dates back to 1925, with the Majestic Hotel in Ho Chi Minh City. Several other projects came afterward, some of them very emblematic, like the Bird's Nest stadium in Beijing, or the Marina Bay Sands and the Gardens by the Bay here in Singapore.

In 2017, SOPREMA opened its first Asian plant in China, joining offices in Singapore, Shanghai, Beijing, Hong Kong and Sydney. This facility supports a growing demand in the Asian market and brings us closer to the needs of the industry. This first investment focused on the production of polymer waterproofing membranes, and also includes a technical training center. We believe it is essential to work closely with our partner installers to ensure that our solutions are properly applied on every project.

HOW DOES SOPREMA HELP TO ADDRESS ENVIRONMENTAL AND CLIMATE-RELATED ISSUES?

First of all, it is clear to us—as it is for a growing number of building stakeholders—that we must be on the frontline: buildings have large carbon footprints and simultaneously consume a large quantity of raw materials, which are rarely recycled.

Here is a small observation that illustrates SOPREMA's vision of ecological transition. Our symbol is the mammoth; it was chosen over a century ago, and gave its name to the first bituminous waterproofing membrane in history. But above all, it sends a message: the mammoth is extinct, as it was not able to adapt to the conditions of its time. Therefore, we must continuously innovate to survive. SOPREMA is an old family; it celebrates its 110th birthday this year, but it plans on remaining at the cutting edge of green building technology.

For more than 20 years, SOPREMA has been working on all kinds of projects to begin this transition. Let me give you some examples: we started marketing our SOPRANATURE vegetated system in 1987. At that time, we were ahead of everyone else in a market that was almost non-existent! This was not only about products, but also processes: in 1998 we were the first waterproofing company to obtain ISO 14001 certification.

A Mammoth Step towards Sustainable Development

We launched our most ambitious program with Mutaxio in 2010. This involved an R&D effort of 20 million euros over five years, with a clear goal: reducing our oil dependency by 65 percent. This goal is far from insignificant, considering waterproofing products are still almost completely oil-based. Everyone knows that oil resources are limited and pose a problem from an environmental point of view. It is a huge challenge to find plant-based substitutes at acceptable consumer prices while offering equivalent or even better performance. However, we are already witnessing results: MAMMOUTH NEO, sold in France and the United States, is produced from recycled oils and pine resin. We are also working on insulation products with raw materials such as cellulose wadding and algae.

A second key focus is recycling. While it is crucial to use greener raw materials and to ensure that products

last over time, recycling – an important part of the product life cycle – should not be overlooked. This year, we are taking a decisive step by launching our first PET plastic recycling plant for the production of polyurethane foam, with a target of 10,000 recycled tons per year. This is a win-win situation, as not only will this process focus on complex types of plastics that were not recycled until now, but it will eventually replace oil as a raw material in our polyurethane insulation plants.

We would like to raise awareness in the industry and demonstrate that cost effective and efficient solutions can be implemented. This is why SOPREMA participates in SGBC's campaign against climate change. This is also why SOPREMA is a partner of the Solar Impulse Foundation and contributes to the "1000 solutions that protect the environment in a profitable way", that will be proposed at COP24.



Le Bienvenüe, France

SOPRANATURE®

Green roof complex using SOPREMA bituminous waterproofing membrane with anti-root properties. Green roof system mitigates the urban heat island and improves stormwater management while increasing urban biodiversity.

A Mammoth Step towards Sustainable Development

LIDL Logistics Facility, France

FLAGON® EP/PR

“Cool Roof” complex composed of mineral wool insulation panel and SOPREMA light grey single-ply TPO waterproofing membrane. Reflective roofing materials limit the absorption of solar energy by the roof, and as result, reduce the consumption of cooling energy in buildings.

CAN YOU SHARE THREE SOLUTIONS THAT SPECIFICALLY ADDRESS SINGAPORE'S UNIQUE CHALLENGES ?

Singapore is foremost a densely populated urban area. Like all cities, it is exposed to the issue of the urban heat island effect: numerous international studies show that there is a difference of several degrees between the city and the countryside due to solar heat trapped by dark colored roofs, and this is a top priority for the fight against climate change. This is even more serious here as Singapore has hot and humid weather with abundant rainfall all year round. The main challenge is to guarantee the comfort of residents while minimising the load on air-conditioning systems which can create energy efficiency problems.

The first solution may be to focus on highly reflective, bright-colored rooftop terraces, called **cool roofs**. While a dark colored roof exposed to a temperature of 30°C can heat to over 70°C and thus warm the air, cool roofs maintain a surface temperature of about 35°C.

Green roofs are also a good choice for lowering the building temperature, as plants absorb solar radiation. This is just one of the many benefits of green roofs. Thanks to the storage capacity of the substrate and plant life, they participate in the retention and filtration of rainwater – which is particularly useful against the risk of flooding, for example. Moreover, this very comprehensive solution will benefit biodiversity: you give a portion of land you own back to nature!

A Mammoth Step towards Sustainable Development

Finally, let's not forget about a building's energy performance. It is now well understood that airtightness is essential to limit heat exchange, but at the same time, moisture must not accumulate in the interior space as it might damage insulation materials. The best compromise is to use **permeable vapor barriers**; they ensure continuous airtightness, and protect against water infiltration, while allowing the building to breathe. The benefits are numerous, as much for the reduction of energy bills as for the comfort of residents, with the improvement of indoor air quality.

HOW DO YOU VIEW THE ROLE OF PLACEMAKING IN SUSTAINABLE PLANNING?

It is important for occupants to be aware of the impact of buildings on the climate. Consumption choices can guide the transition in the construction industry. Thus, by understanding that not all materials are ecologically equivalent and by making informed

choices, individuals can create trends. We have several products certified with the Singapore Green Building Product (SGBP) certification scheme, including our polymer waterproofing product line, while others are also undergoing the certification process. We are also collaborating with several international certification bodies, and we believe that it is essential to maintain a constant dialogue to progress together.

In addition, we encourage both experts and users to focus on systems-integrated solutions that combine waterproofing, airtightness and thermal insulation. Indeed, using optimised combinations of products is the best way to guarantee good energy performance and durability of the solutions.


Finally, never hesitate to ask more from industry stakeholders: construction has been less ecologically mobilised, but fortunately the situation is evolving, and the public can join this movement to live, work and play green. 🌱



Suzhou Sport Center, China

STRATEC® II

SOPREMA vapor permeable barrier was used in order to protect the building from rainwater while enabling the air to circulate freely. Keeping a building dry provides a number of performance benefits including better thermal efficiency.



Transforming Places into Sanctuaries of Natural Light

TRANSFORMING PLACES INTO SANCTUARIES OF NATURAL LIGHT

SMART GLASS CAN PLAY A BIG ROLE IN CREATING BETTER PLACES FOR PEOPLE

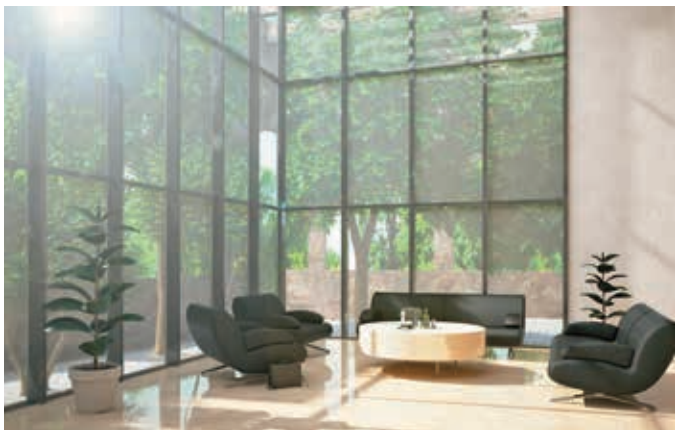
Increasing numbers of new building projects are focused on sustainability and green building guidelines, but there is also growing awareness for the health and wellness of people in buildings. WELL certification for example, is a building certification programme based on the merits of the wellness of building occupants. This is clear evidence on the important contribution of building materials and technologies to the health and wellbeing of people.

Facades, windows and skylights bring visual connection to the outside and daylight inside buildings. However, the challenges of incorporating more glass into building projects include glare and unwanted heat at certain times of day and seasons.

In response, building owners and occupants typically rely on blinds, shades and curtains to control glare and to seek relief from the heat, but the trade-off is in compromised views and less natural daylighting. Another disturbing trend is the increasing amounts of energy spent on air-conditioning to cool down the inside of buildings.

How do we address such issues? Leaders in the building industry are looking towards the latest smart glass technologies for design solutions to improve health and wellbeing of occupants. One of the latest innovations is Halio™, the most advanced natural light management system using smart-tinting glass technology, launched in 2017.

Transforming Places into Sanctuaries of Natural Light





INTELLIGENT & CONNECTED

Enhancing spaces today and in the future will involve the creation of immersive and interactive experiences that are intuitive and adaptive to people. Imagine using a light sensor to read the light levels outside to auto tune the right glass tint level or witness the windows facing west to darken more than other sides to block the afternoon sun. Let's say you are away from the building for some time, you can remotely control through a secure mobile application to tune all the windows to the darkest tint state until you return. Halio™ is a complete solution including glass, control system, and robust range of control means allowing the system to adapt to buildings and occupants specific needs.

Connectivity to a dedicated cloud platform enables real time monitoring for responsive operation while providing maximum security. Early detection of malfunction or failure before it becomes critical and remotely solving the issue to correct it is possible with the cloud platform. The system is transforming how people work and play in spaces designed with plenty of glass. As a complete system, Halio™ without additional shading elements allows users in buildings to remain connected with nature and environment without visual constraints.

AN ULTIMATE COMFORT SOLUTION

Bringing together buildings and spaces designed to make humans feel comfortable are part of placemaking. As more humans invest in experiences and comfort in the spaces they use, seeking a balance in creating comfortable, appealing yet functional places is often challenging for architects and designers. For a solution aiming at enhancing human comfort, three comfort zones are important – visual, thermal and acoustic.

Halio™ improves visual comfort, by reducing glare from the sun with light management. The solution tints in optimal neutral grey shades to maintain visual connection and high colour rendering index with undistorted colours. For thermal comfort, Halio™ maintains a comfortable temperature of heat inside the building by optimising the heat gain through the façade based on the tint level adjustment of the panel. Tied together with an automated algorithm and thermal sensor, the ideal settings can be programmed to automatically run. While silent transition of the glass preserves acoustic comfort. Users can enjoy smooth, silent and even transitions with unobstructed views.

Transforming Places into Sanctuaries of Natural Light





RESPONSIVE TO USERS' NEEDS

Halio™ transitions from its most transparent to its darkest state in less than three minutes and starts transitioning within 20 seconds. By integrating with light, motion and temperature control sensors, Halio™ can be configured for optimal comfort and user preferences while adapting to weather conditions. More recent smart technologies such as voice control devices, enable Halio™ to pilot facades or create soft barriers for privacy without manual controls.

IMPACT OF HALIO IN PLACEMAKING

Designing spaces with dynamic control of daylight and view is important. People can use Halio for greater design freedom to use glass without blinds, curtains and shades to obstruct views and integrated greater connectivity with the surroundings and community. So more attention can focus on embracing and creating vibrant spaces. By integrating smart technologies for placemaking can function to dynamically address human needs and desires.

Placemaking is also a sustainable strategy for building modern and liveable places, it is a vehicle for differentiating places and enabling occupiers to engage with the community. The impact of smart architectural technologies has intangible benefits to the society. With government and building owner's involvement in driving adoption of new building technologies, the potential impact of Halio™ goes beyond improving comfort and wellbeing. The solution also protects human and interiors from sun damage, allow more people to enjoy natural daylight and see the outside world.

We should aim to develop buildings and spaces into connected sanctuaries that create positive impact and work for people of all ages and backgrounds. From planning and design to managing the appearance of glass transparency, to draw more users and visitors to the building, precinct or city. ✔

David Yim
Halio International (AGC Asia Pacific Pte Ltd)

All images courtesy of AGC Asia Pacific Pte Ltd.



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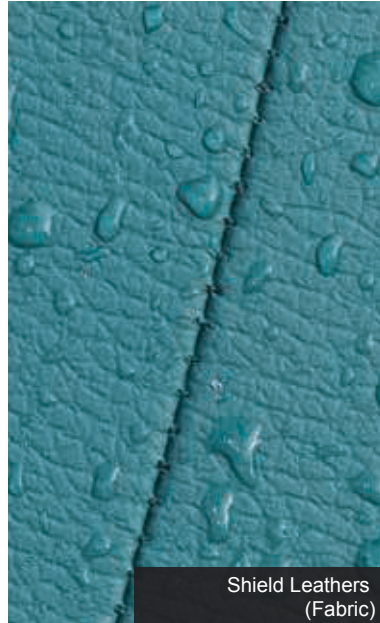


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WALLCOVERING

IDEAL FOR HOSPITALITY, COMMERCIAL, RESIDENTIAL

- ▶ Zero usage of heavy metals such as lead, mercury, cadmium and chromium
- ▶ Class 0 - BS 476 PART 6/7 fire rated, low in VOC and eco-friendly



Shield Leathers
(Fabric)

FABRIC

IDEAL FOR HOSPITALITY, HEALTHCARE, COMMERCIAL, RESIDENTIAL

- ▶ Biodegradable
- ▶ Inherently fire retardant and stain resistant
- ▶ Low VOC emissions
- ▶ Naturally sourced color pigments and metal free

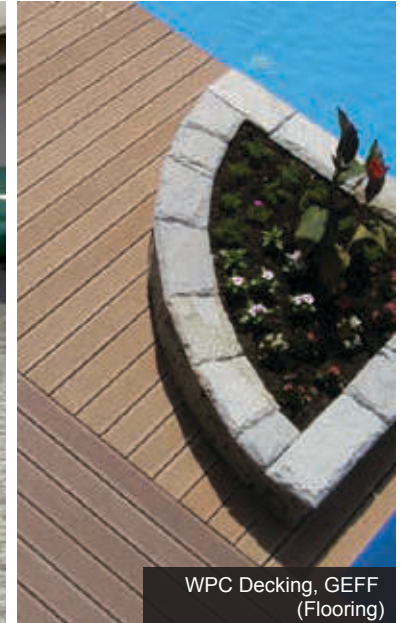


Renaissance of Art,
Tuntex (Carpet)

CARPET

IDEAL FOR HOSPITALITY, COMMERCIAL, RESIDENTIAL

- ▶ Low in VOC with maximum recyclability
- ▶ Recyclable thermoplastic backings
- ▶ Eco-fresh self-renewal odor reducer treatment
- ▶ Micro Shield anti-microbial treatment
- ▶ Awarded CRI Green Label Plus, Singapore Green Label & SGBC (Leader), U.S. GreenCircle Certified



WPC Decking, GEFF
(Flooring)

FLOORING

IDEAL FOR HEALTHCARE, HOSPITALITY, COMMERCIAL, RESIDENTIAL

- ▶ Suitable for the indoors / outdoors
- ▶ Available in vinyl, laminate, engineered timber and WPC Decking.
- ▶ Accredited with ISO 14001, PEFC, Blue Angel, SEC and SGBC.
- ▶ Certified safe with low levels of TVOC & formaldehyde air emissions



Moods, Moduleo
(Flooring)

Goodrich Global (Headquarters)
Goodrich Building | 8 Changi South Lane, #05-01 | Singapore 486113
T: 6787 8787 | F: 6788 7733 | E: info@goodrichglobal.com
Mon to Fri: 9am to 6pm | Closed on Public Holidays

Stay connected - www.goodrichglobal.com | info@goodrichglobal.com

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Your Dreams, Our Challenge

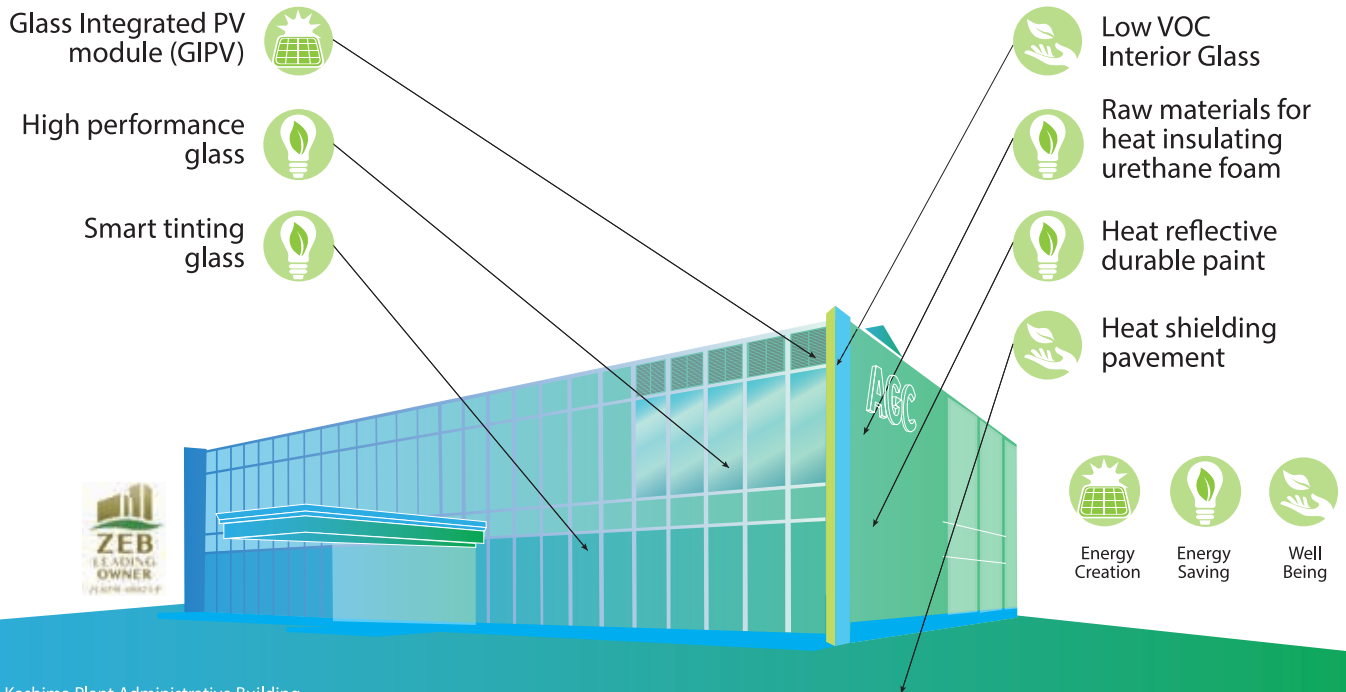
Established in 1907, AGC draws on more than a century of research and technical innovation to develop world-class expertise in various fields related to glass, chemicals, electronics, ceramics as well as other high-tech materials and components.

Leveraging on the breadth and depth of its know-how, AGC's unique materials, solutions and reliable partnerships have facilitated leading innovations across diverse industries and markets.

With effect from 1 July, 2018, the corporate name of Asahi Glass Company, Limited was changed to AGC Inc. in order to further enhance the integrated management framework for the AGC Group on a global scale.

Today, by working with others to combine knowledge and advanced technology, we help make ever greater achievements possible, and bring bolder ideas to life.

AGC will always be with you, **Your Dreams Our Challenge.**



AGC Kashima Plant Administrative Building
Location: Kamisu-City, Ibaraki Prefecture, Japan
*The Kashima Plant Administrative Building uses some of the above products.



LUMIFLON® resins
for durable yet environmentally-friendly coatings

Stopray Vision
for high-performance energy saving facade

Fluon® ETFE Film
for versatility in design and illumination effects

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- AGC Interpane ipasol ultraselect 62/29
- Stopray vision 51T
- Stopray vision 40T

