ARCHITECTURE · INTERIOR DESIGN · LANDSCAPING · M.E.P. SYSTEMS

SEAB

SOUTHEAST ASIA BUILDING

September / October 2025

Celebrating legacy of SG built industry.

SG 60

In This Issue

Mixed-Use Developments

Club & Bar Interior Design • Interview with Industry Experts on Current Issues • Exclusive Content: Passive Design Meets High-Rise • Playgrounds & Landscaping • SG60 Special Features

ON THE COVER: Hengqin CRCC Plaza / Zhuhai, China

ISSN 2345-7066

Passive Design Meets High-Rise: Challenges and Solutions in Southeast Asia

In this issue, ***Southeast Asia Building*** asked industry experts to tell us about passive design in architecture, specifically pertaining to high-rise developments in the Southeast Asia region. Read more to discover the challenges and benefits of passive design in high-rise architecture, and how architects can adapt using various technologies and innovations.

Interview with **Amit Singhal,** Director, GPM Architects & Planners

Amit Singhal has been associated with GPM Architects and Planners since 1999. His passion for architecture has resulted in the company's overall growth, especially in the commercial and retail design sectors. In addition to the daily responsibilities of the firm's operations, he plays an integral role in business development. As the Director of GPM Architects and Planners, he is the pioneering head of the commercial and recreational design teams. Besides being an enterprising architect, Amit plays a pivotal role in project coordination between the site and the collaborators, which is a source of inspiration to the entire team.

Q: What is passive design in architecture?

A: Passive design is all about shaping a building to work in harmony with its environment, rather than against it. It focuses on deliberate yet straightforward decisions, such as orientation, shading, ventilation, and material choices, to manage light, heat, and airflow without relying heavily on mechanical systems. It's the effectiveness of passive design that stems from considering these aspects early in the design process: how the building is situated on the site, where openings are placed, and how materials perform over time. With proper execution, it enhances comfort, reduces energy use, and strengthens the long-term sustainability of a project.

Q: In Southeast Asia, what are the various factors to consider when implementing passive design in high-rise buildings?

A: Considering the climatic realities of Southeast Asia, characterised by high temperatures, persistent humidity, heavy rainfall, and intense solar exposure, passive design becomes an essential strategy for high-rise buildings. Beyond orientation and shading, which directly impact solar heat gain, the design must strategically address natural ventilation to improve air movement in dense urban conditions where wind corridors are often obstructed.

Studies suggest that applying such passive measures in tropical climates can reduce cooling energy demand by more than 60%, making them both environmentally responsible and economically relevant in the long term. Material selection adds another layer of importance; choosing options that are durable, moisture-resistant, and locally suited ensures longevity and reduces maintenance challenges in humid environments. At the same time, integrating daylighting strategies and rainwater management into the building's form helps balance energy efficiency with resilience. Ultimately, passive design in this region is about tailoring every decision to both climate and context, ensuring that tall buildings remain comfortable, efficient, and sustainable over time.

Q: How is passive design incorporated into high-rise architecture? What technologies are used to optimise the process? Please give case studies from your firm that best showcase passive design.

A: In high-rise architecture, passive design begins at the earliest stage of planning. Orientation, massing, façade porosity, and shading strategies

determine how much a building can rely on natural forces, such as daylight, ventilation, and thermal mass, to reduce its dependence on mechanical systems. Technologies such as daylight and energy modelling, and thermal comfort simulations allow us to test and refine these strategies, ensuring that design decisions are measurable in their performance.

A project that reflects this approach is Mahagun Marina Wwalk in Greater Noida (West), a pre-certified IGBC green building. The design prioritises passive strategies that enhance both environmental performance and user experience. Vegetation and water bodies are integrated within the complex to improve the microclimate through passive cooling and natural air filtration. Wide, landscaped corridors and shaded public areas reduce heat gain while encouraging walkability, transforming shopping into an engaging, outdoor-like experience. Features such as mist-cooled piazzas, deep overhangs, and green rooftops balance comfort with reduced cooling loads.

Material and system choices also reinforce the passive-first approach. Building-Integrated Photovoltaic (BIPV) façades serve a dual purpose, acting as both shading devices and electricity generators. High-performance HVAC systems, supported by variant refrigerant technology and BEE-rated equipment, are employed only where mechanical intervention is unavoidable. Water-sensitive design complements this framework, featuring low-flow fixtures and a Moving Bed Biofilm Reactor (MBBR) wastewater treatment system, which enables recycling and reduces strain on local resources.

Marina Wwalk demonstrates how passive design in a commercial high-rise can extend beyond energy efficiency to create a resilient, enjoyable, and socially engaging environment. By allowing natural systems, such as light, wind, and greenery, to shape the design, the project redefines sustainability as the foundation of architecture itself.

Q: What are the current challenges in passive design? How can they be overcome?

A: Adopting passive design in high-rise buildings in India comes with its own set of challenges. One of the foremost is the pressure of urban density; tight sites often restrict optimal orientation, natural

Mahagun Marina Wwalk

ventilation, or daylight access. Climatic diversity across regions adds another layer of complexity; strategies effective in coastal cities may not be viable in arid or composite zones. Regulatory frameworks and development by-laws sometimes focus more on maximising built-up areas than environmental performance, limiting the scope for responsive design.

Although guidelines such as the Energy Conservation Building Code (ECBC) and rating systems like GRIHA and IGBC encourage climate-sensitive design, their implementation is still uneven. In many projects, developers often prioritise short-term cost efficiency over long-term sustainability benefits, making it difficult to invest in high-performance façades, shading systems, or integrated green infrastructure. Furthermore, passive strategies necessitate interdisciplinary collaboration among architects, engineers, and planners, which is not always the norm in conventional project delivery models. Despite these challenges, the growing awareness of energy efficiency, occupant comfort, and resilience is prompting the industry to reassess its design approaches. With evolving policies and advances in digital simulation tools, the integration of passive design is becoming more achievable and more necessary for India's high-rise future.

Q: What are the long-term benefits of passive design? How can more people be encouraged to implement passive design in high-rise buildings?

A: The real strength of passive design lies in its long-term impact. By reducing dependency on mechanical cooling and artificial lighting, buildings achieve lower energy use, improved indoor comfort, and healthier living conditions. Over the years, this translates into reduced operational costs, greater resilience against rising energy demands, and a longer building lifecycle with fewer maintenance challenges. On a larger scale, such approaches support sustainable urban growth by cutting carbon emissions and creating more liveable cities.

Encouraging wider adoption requires both policy support and a shift in mindset. More straightforward guidelines in building codes, fiscal incentives, and performance benchmarking can drive acceptance at an institutional level. Equally, communicating the human benefits, such as improved comfort, well-being, and long-term savings, helps end-users and developers view passive design as an investment rather than an add-on. When its advantages are understood across stakeholders, it naturally becomes embedded in the way we approach high-rise design.

Interview with **Harsh Varshneya,** Director and Head of Design, STHAPATI

Harsh Varshneya is the Director and Head of Design at STHAPATI, an award-winning multidisciplinary architectural practice headquartered in Lucknow and Delhi. Their globally recognised portfolio spans a spectrum of building typologies, from individual dwellings to large-scale urban developments.

Harsh Varshneya leads the firm's innovative ventures into urban mobility projects, both in India and internationally. Over the past decade, he has guided prestigious projects and various redevelopment initiatives within the aviation and railway sectors, shaping the nation's infrastructure landscape. His extensive portfolio includes the redevelopment of major academic institutions such as Delhi University and the transformation of key transport hubs in cities like Bangalore, Mumbai, Hyderabad, and beyond.

Q: What is passive design in architecture?

A: Passive design is about creating buildings that respond intelligently to their environment, optimising natural resources to maintain comfort and efficiency without relying heavily on mechanical systems. It involves harnessing elements like sunlight, wind, shading, and natural ventilation to reduce energy consumption while enhancing occupant comfort. In essence, it's architecture that works with nature rather than against it.

Q: In Southeast Asia, what are the various factors to consider when implementing passive design in high-rise buildings?

A: In Southeast Asia, high-rise buildings face unique challenges. The climate is hot and humid, characterised by intense sunlight and heavy seasonal rains. In dense urban areas, wind flow is limited, and buildings are exposed to more heat reflected from neighbouring structures. In any case, all site factors are carefully considered to optimise everything, from the orientation of the building to the offset of balconies or the placement of green buffers to best suit its context. Small design decisions like these can significantly impact how air moves through spaces and the amount of heat that enters the building. Designing with these conditions in mind is essential for comfort and energy efficiency.

Q: How is passive design incorporated into high-rise architecture? What technologies are used to optimise the process? Please give case studies from your firm which best showcase passive design.

A: In practice, passive design begins with the building envelope. Shading devices, high-performance glazing, and carefully designed façades reduce solar heat gain. Sky gardens, atriums, and ventilation shafts bring natural airflow into the heart of tall buildings, allowing for a more comfortable and healthy environment. We utilise computational tools, including energy modelling, daylight analysis software, and airflow simulations, to test the most effective strategies before construction, thereby making the design process both precise and responsive.

Q: What are the current challenges in passive design? How can they be overcome?

A: The biggest challenges come from the tension between environmental goals and commercial or programmatic pressures. High-rises need to be economically viable, which sometimes limits space or the ability to incorporate passive strategies. Integrating passive design with modern expectations for comfort can also be a complex task. Overcoming these challenges requires collaboration with engineers and developers from the earliest stages of development. Demonstrating the long-term benefits and using data-driven tools can help convince stakeholders. Policy support and incentives for energy-efficient buildings can also encourage adoption.

Q: What are the long-term benefits of passive design? How can more people be encouraged to implement passive design in high-rise buildings?

A: The benefits of passive design are tangible and long-lasting. Reduced energy use lowers operational costs and carbon emissions. Occupants experience healthier and more comfortable spaces, which enhances well-being and productivity. Buildings that embrace passive principles are more resilient and maintain their value over time. To encourage wider adoption, it is essential to demonstrate what is possible through high-profile projects, education, and clear examples of environmental and economic benefits. Our collective vision should be a skyline where tall buildings do more than reflect our pursuit of economic growth; they should respond meaningfully to climate and the needs of the people who inhabit them. Passive design in high-rises is not a choice to make only when convenient. It is a responsibility to the environment and to the communities we shape.

Interview with **Vineeta Singhania Sharma,** Founder Partner & Principal Architect, Confluence]

Vineeta Singhania Sharma is an accomplished architect guided by a sense of innate curiosity and an affinity for creative problem-solving with an impressive work portfolio spanning over two and a half decades. As the Founder Partner & Principal Architect at Confluence, an award-winning, multidisciplinary firm with over 25 years of experience, Vineeta spearheads the firm's design narrative while focusing on systems and processes. With an unwavering commitment to enhancing the firm's growth, Vineeta specialises in transforming architectural and design innovations into reality.

Q: What is passive design in architecture?

A: It is a design approach that reduces a building's dependence on mechanical cooling, heating, and lighting systems. It leverages natural ventilation, daylight, shading, insulation, and building orientation to maintain thermal comfort and energy efficiency. Instead of relying on artificial systems, passive design works with local climate and natural resources to create sustainable and human-centric environments.

Q: In Southeast Asia, what are the various factors to consider when implementing passive design in high-rise buildings?

A: Southeast Asia offers unique opportunities and constraints for passive design due to its tropical and subtropical climate. High humidity, year-round heat, and monsoon conditions necessitate effective adaptive shading, cross-ventilation, and moisture control. Additionally, urban density poses challenges as tall buildings must account for shadowing effects, heat island impacts, and altered wind patterns caused by surrounding high-rises. The solar orientation is another critical factor, with east-west facades receiving maximum solar gain; therefore, strategies such as double skins, louvres, and deep overhangs become essential.

Cultural preferences also play a significant role, as indoor-outdoor living patterns, community spaces, and daylight expectations shape design responses. Moreover, regulatory standards like green building certifications (e.g., BCA Green Mark, LEED, GRIHA) influence the integration of passive strategies. Lastly, resilience to flooding, storms, and climate variability requires adaptable building envelopes and water-sensitive design approaches.

Q: How is passive design incorporated into high-rise architecture? What technologies are used to optimise the process?

Please give case studies from your firm which best showcase passive design.

A: Passive strategies in high-rises are more complex than those in low-rise structures due to factors like wind pressure, structural demands, and vertical stacking. For instance, façade design may involve using double-skin façades, operable louvres, and perforated screens to effectively control solar heat gain. Additionally, natural ventilation can be achieved through the use of atriums, sky courts, and vertical voids that facilitate cross-ventilation at multiple levels.

Daylighting strategies, such as optimised window-to-wall ratios, light shelves, and high-performance glazing, minimise the need for artificial lighting. The selection of materials for thermal mass and insulation is another critical aspect, as they help buffer heat gain and regulate internal temperatures.

Furthermore, integrating green elements like vertical greenery, roof gardens, and shaded terraces can significantly improve microclimate performance. Lastly, the implementation of smart controls, including sensors that dynamically adjust blinds, ventilation, and lighting, allows for the optimisation of these passive strategies.

Case Study: County 107, Noida

A regenerative high-rise group housing with Platinum IGBC Certification, County 107 integrates over 600 trees into its 10–12-foot-deep balconies, forming a biophilic façade that transforms each residence into a vertical bungalow with self-sustaining microclimates. The design combines thermal-efficient glazing, rooftop solar panels, and VRF-based HVAC systems with cradle-supported maintenance and drip irrigation to

County 107, Noida

ensure long-term performance. The project also incorporates recycled materials, wastewater reuse, and advanced energy strategies to establish a new benchmark for high-rise group housing design in the Indian context.

Q: What are the current challenges in passive design? How can they be overcome?

A: Current challenges in passive design include high humidity and cooling loads, particularly in tropical climates where passive cooling alone often fails to meet comfort expectations. Additionally, the urban heat island effect in dense cityscapes traps heat, diminishing the effectiveness of passive strategies. From a financial perspective, developers might perceive the initial costs of implementing passive solutions as high, with slow returns on investment. Structural and safety codes pose another challenge, as regulations for tall buildings may limit the use of operable windows and natural ventilation. There is also a general lack of awareness and training among stakeholders, such as developers, contractors, and tenants, who often still favour mechanical over passive solutions.

Hybrid models that combine passive and active systems, such as mixed-mode ventilation, offer innovative solutions for enhancing energy efficiency in buildings. To promote these designs, providing incentives and subsidies for green-certified projects can greatly encourage sustainable construction practices. Demonstration projects can further illustrate the tangible cost savings and comfort improvements associated with these approaches, making a compelling case for their adoption. Additionally, it is vital to integrate passive design principles early in the planning process rather than treating them as mere add-ons, ensuring that buildings are optimised for performance from the very beginning.

Q: What are the long-term benefits of passive design? How can more people be encouraged to implement passive design in high-rise buildings?

A: Buildings designed with a focus on sustainability offer numerous benefits, including reduced energy consumption through lower dependence on HVAC systems and artificial lighting. This approach not only enhances indoor comfort by utilising natural ventilation and daylight but also creates healthier environments for occupants. Additionally, these buildings exhibit resilience, remaining habitable during power outages or system failures. Over their lifecycle, they generate cost savings by lowering operational and maintenance expenses. The environmental impact is significant, with substantial reductions in carbon footprint and resource usage. Furthermore, green-certified and sustainable buildings hold a market advantage, attracting higher-value tenants and buyers who prioritise eco-friendly living and working spaces.

To enhance energy efficiency in building design, a multifaceted approach is essential. This includes policy pushes that establish mandates and incentives for adopting energy-efficient designs. Education and demonstration play a crucial role, with case studies, pilot projects, and post-occupancy data showcasing the tangible benefits of these approaches. Early-stage collaboration between architects, engineers, and developers fosters innovative solutions and seamless integration of energy-efficient strategies. Additionally, increasing tenant awareness by directly communicating the comfort, health, and lifestyle benefits can drive demand for such designs. Finally, the integration of smart technology enables the management of passive design systems, making them more intelligent and user-friendly for occupants.