

CONSCIOUS COOLING

Today, HVAC design has become central to shaping how people experience and interact with the spaces around them.

By Bindu Gopal Rao

Buildings account for around 40 per cent of energy-related emissions, and HVAC can drive around half of a building's energy use; performance now influences form as much as aesthetics.

SHAPING BUILDINGS

Smart buildings alone can reduce energy use by up to 30 per cent, prompting architects and engineers to co-design façades, plant rooms, and services from the outset, ensuring that form and systems work in harmony. Sundaresan Narayanan, Senior Managing Director, Carrier HVAC India, says, "At Carrier, we treat every stage—new build, retrofit or upgrade—as a chance to embed sustainability. Our portfolio spans high-efficiency chillers and VRF/heat pump systems, paired with low GWP refrigerants like R32, and digital controls that continuously optimise performance." Carrier's sustainable products, like Edge AI-powered Chiller Plant Optimiser, have helped customers realise up to 30 per cent energy savings at the plantroom level, and they have seen large campuses standardise on the optimiser after measured step changes in kW/RT efficiency. The result is a new

design language where mechanical systems are seamlessly integrated, delivering quieter plant rooms, cleaner lines, and dramatically lower carbon footprints. Put simply, HVAC has moved from 'behind the walls' to a defining element of modern, future-ready architecture.

SPATIAL EXPERIENCE

In high-performance homes and premium developments, HVAC is no longer something you "fit in later". It influences slab-to-slab heights, false ceiling strategy, shaft planning, façade glazing ratios, shading devices, service corridors, and even where you can place art walls or full-height joinery. Hardesh Chawla, Director, and Monica Chawla, Creative Head, Essentia Environments, say, "Done well, HVAC disappears visually and improves how a space feels. You notice fewer hot and cold pockets, no harsh blasts, better acoustics, and cleaner air. It also unlocks planning freedom: fewer wall-mounted units, less visual clutter, and more consistent ceiling lines. In our projects, this often becomes the difference between a space that looks good in photos and a space that feels good every day."



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PHOTO COURTESY: ESSENTIA ENVIRONMENTS

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Earlier, HVAC systems were regarded as the silent enablers of comfort – quietly regulating temperature, humidity, and airflow in the background. But today, their role has evolved. The lifecycle approach is an important step. As with remote monitoring, predictive maintenance, and advanced diagnostics, they safeguard system health and efficiency, ensuring buildings achieve peak performance, reduce energy waste, and extend the lifespan of critical assets. “At Carrier, we understand this change and are moving beyond hardware to deliver digitally enabled, connected lifecycle solutions that adapt to dynamic environments. This evolution allows us to provide comfort, energy efficiency, sustainability, and enhanced occupant well-being. By enabling connectivity across our entire portfolio – from our existing install base to newly developed systems – we are unlocking unprecedented lifecycle value for our customers,” says Sundaresan. Any space looks good when designed well, but it enters another paradigm when it is comfortable. HVAC plays a major role in making spaces habitable and comfortable.



PHOTO COURTESY: CARRIER HVAC INDIA

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Sundaresan Narayanan, Senior Managing Director, Carrier HVAC India

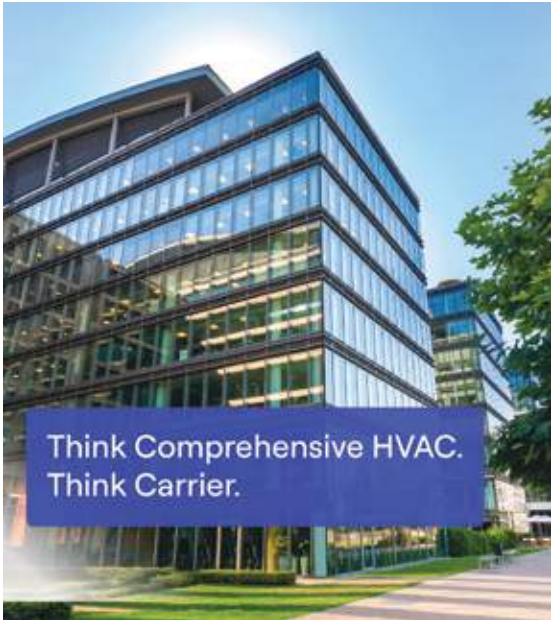


PHOTO COURTESY: CARRIER HVAC INDIA

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Hardesh Chawla, Director, and Monica Chawla, Creative Head, Essentia Environments



Rudraksh Charan, Founder and Architect, 42MM Architecture.



PHOTO COURTESY: 42MM ARCHITECTURE

HVAC solutions today are finally responding to India's diverse climates in a much more adaptive way.



PHOTO COURTESY: ESSENTIA ENVIRONMENTS

Artificial intelligence has transformed HVAC control and efficiency.



Priyanka P Mehra & Piyush Mehra, Founder & Principal Architect – PS Design.

AI FACTOR

Artificial intelligence has transformed HVAC control and efficiency. Where systems once operated reactively, AI now enables us to anticipate issues, optimise performance, and deliver a seamless experience. Smart building ecosystems are redefining the way we think about infrastructure/ designing, and HVAC are now at the very heart of this transformation. No longer operating in isolation, they are seamlessly integrated with digital platforms, IoT connectivity, and advanced analytics to create environments that are healthier, more efficient, and future-ready. “AI has revolutionised HVAC by enabling predictive controls, real-time optimisation, and fault detection, slashing energy use up to 30 per cent while enhancing system responsiveness in architectural contexts. Geothermal heat pumps and demand-controlled ventilation are genuinely transformative. Unproven nano filters and blockchain integration are more hype-driven and lack a scalable design impact. HVAC is deeply woven into smart ecosystems via BMS, allowing seamless data sharing for adaptive designs that respond to occupancy and environmental shifts in buildings,” say Priyanka P Mehra & Piyush Mehra, Founder & Principal Architect – PS Design.

GREEN THOUGHTS

HVAC systems are at the very core of the net-zero conversation. Accounting for nearly 15 per cent of global greenhouse gas emissions each year, they represent one of the most powerful levers for change. In India, the India Cooling Action Plan projects that energy consumption from HVAC systems will rise fourfold and refrigerant demand tenfold over the next two decades. This makes it clear: transforming HVAC is not optional – it is essential to balancing rapid urbanisation with sustainability. “HVAC is critical in achieving net-zero buildings. Systems like chilled water pipes and VRV systems help maintain indoor temperatures and healthy air cycles, which is

HVAC FEATURE

key to getting the best overall performance. HVAC systems are integrated with smart building ecosystems through automation, helping balance comfort with energy efficiency rather than fully intelligent systems,” says Rudraksh Charan, Founder and Architect, 42MM Architecture.

HVAC solutions today are finally responding to India’s diverse climates in a much more adaptive way. With the APAC cooling market projected to grow 2.2x over the next five years, India has become a key hub for climate-specific innovation, prompting systems that automatically adjust airflow, humidity and cooling intensity based on real-time outdoor conditions. Fresh air is non-negotiable. Whether it’s an office or a home, modern units now bring in and treat outdoor air—filtering or dehumidifying it depending on the zone—so comfort and indoor air quality remain stable even when external conditions shift,” says Sundaresan.

LOOKING AHEAD

Efficiency is table stakes. What truly makes HVAC future-ready is being digital, decarbonised and human-centric. That means connected equipment using AI-enabled analytics for remote diagnostics and predictive maintenance; open protocol controls that integrate seamlessly with modern building management systems; and verified indoor air quality through real-time monitoring. Equally important is minimising lifecycle impact – from the adoption of low-GWP refrigerants to service models that sustain performance over time. A future-ready HVAC system prioritises lived experience, not just energy numbers. It delivers quiet, stable comfort with minimal temperature swings and no perceptible drafts, allowing spaces to feel calm and consistent throughout the day. Health is embedded



PHOTO COURTESY: PS DESIGN

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into the design through proper filtration, humidity regulation, and a considered fresh air strategy rather than added later as accessories. Flexibility is equally important, with zoning and controls that can adapt as family routines, occupancy patterns, and spatial use evolve.

Serviceability and longevity are also central to future readiness. Systems must be designed with realistic maintenance in mind, including accessible filters, service clearances, and components that can be supported years later. “Data awareness plays a growing role, where sensors and monitoring are used to understand performance and prevent gradual decline rather than simply display information. Finally, resilience defines true preparedness, with systems capable of handling extreme heat, poor outdoor air quality, and inconsistent power conditions, while remaining integrated with the home’s broader automation ecosystem so they respond intelligently and seamlessly,” say Hardesh and Monica.

The future of building design lies in creating environments that inspire — spaces that are healthier and smarter. With digital intelligence at the core, HVAC is no longer just about comfort; it is about evolving spatial experience and elevating the way we live and work. We advance our broader commitment to enhancing the lives we live and the world we share, ensuring that every innovation contributes to both human well-being and a more sustainable future. **AB**