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The Next Frontier for Autonomous Buildings: Balancing Efficiency and Human Experience

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When people talk about smart buildings, the focus usually falls on efficiency. Can AI cut energy waste? Can predictive analytics reduce downtime? These are important questions, especially with energy costs soaring and net-zero targets approaching fast. But they are not the whole story.

The next generation of buildings will be judged on two things in equal measure: how effectively they manage resources and how well they serve the people inside them. An autonomous building that saves kilowatt hours but leaves occupants uncomfortable has failed. Equally, a building that feels pleasant but devours energy is unsustainable.

Efficiency as a Foundation

Energy use is the second-largest cost in most buildings after labour. In many organisations, utility bills now represent a serious drag on profitability. At the same time, governments and investors are tightening carbon reporting requirements. Our most recent Infrastructure Transition Monitor found that fewer organisations feel confident of meeting their 2030 CO_2 reduction targets in 2025 than in 2023. And almost half of senior leaders believe they will need to reinvent their business models to decarbonise.

Autonomous building technologies provide a powerful response. Connected sensors, cloud platforms and AI can continuously adjust lighting, cooling, heating and ventilation in real-time. They can learn from occupancy patterns and weather forecasts to make pre-emptive changes, avoiding both waste and

discomfort. In practice, that means less time spent heating empty floors, fewer unnecessary truck rolls for maintenance, and a measurable drop in emissions.

Experience is an Equal Priority

For the people who work, study or recover inside buildings, experience is just as critical. A workplace that is too hot or too noisy reduces productivity. A hospital theatre that drifts outside its required temperature or humidity range endangers patients.

Autonomous buildings offer a way forward; they can continuously monitor air quality and adjust ventilation before CO_2 levels affect concentration. They can use circadian lighting that shifts colour and brightness across the day, detect acoustic patterns and reduce echo or background noise in real time, learn the preferences of individuals and groups, tailoring comfort to context rather than forcing people to adapt to rigid building settings.

This people-first approach does more than improve wellbeing. It reduces absenteeism, improves retention and strengthens the value of real estate assets. In competitive markets for tenants or talent, the promise of a healthier, more responsive building becomes a real differentiator.

For occupants to embrace autonomy, they need to trust it. That means systems must be explainable. If the building reduces cooling in a meeting room, occupants should know it is because cloud cover is arriving in ten minutes and the system is preventing a future temperature drop.

Clarity Builds Confidence

Personalisation and override functions are also essential. Occupants should always be able to influence their environment. Manual input, whether through a dashboard, an app or a voice interface, should feed back into the AI's learning loop rather than being ignored. And because these systems gather sensitive data, robust governance around privacy and cybersecurity must be built in from the start.

The goal is not to remove human control, but to shift it. Instead of responding to endless alarms or comfort complaints, facility managers can validate AI insights, tailor long-term strategies and focus on higher-value tasks. Instead of being frustrated by an unresponsive environment, occupants feel empowered and supported.

Retrofitting the Real World

The majority of the world's buildings are not new. Most are decades old, with siloed systems and patchwork upgrades. If autonomy is to scale, it must work for these legacy assets.

The path forward is incremental. Step one is establishing digital connectivity for use cases such as predictive maintenance or energy monitoring. Step two is broader system integration, ensuring different vendor technologies and IT/OT environments can "speak" to each other. Over time, more advanced functions such as predictive modelling, prescriptive actions and natural-language interfaces can be layered on.

Reframing Value

When we discuss value in buildings, three cost buckets dominate: labour, energy and capital. Autonomous

systems address all three. They reduce staffing pressure by prioritising critical issues, cut energy waste by continuously optimising usage, and extend asset life by enabling predictive rather than reactive maintenance.

Better occupant experiences mean lower turnover and higher productivity. Investors increasingly consider ESG performance and tenant wellbeing when assessing asset value. Regulators are raising the bar on both efficiency and safety. In this context, the ability to demonstrate improvements in human outcomes as well as cost outcomes will be a decisive factor.

The Road Ahead

Each step, from fault detection to predictive models, from agentic AI to prescriptive optimisation, builds confidence and capability. Importantly, each step delivers measurable benefits along the way, whether in reduced bills, fewer outages or happier occupants.

Skills shortages in facilities management, concerns about AI replacing staff, and legitimate worries about cybersecurity all need to be addressed. The answer lies in transparency, openness and collaboration. Autonomous buildings must be designed to augment human expertise, not replace it. They must adopt open standards to avoid lock-in, and they must bake security into every process and connection.

Autonomous buildings will not succeed by focusing on efficiency alone. Nor will they succeed by focusing only on comfort. The future lies in bringing both together, optimising resources while creating environments where people can do their best work, recover their health or pursue their studies without distraction.

This dual mission is no longer optional. Rising costs, tightening regulations and growing expectations make it essential. The organisations that act now, embracing autonomy as a balance of efficiency and experience, will not only meet their sustainability targets but also create long-term value for owners, facility managers, occupants and society.

The question is not whether buildings will become autonomous, but whether they will do so in a way that serves both people and planet. That is the opportunity, and the responsibility, we cannot afford to miss.