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INBAC ASSOCIATION

October 2025 Issue

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THE EDITOR'S DESK

Across the world, buildings are evolving into intelligent ecosystems - where data, design, and human experience converge. Smart infrastructure is no longer a futuristic idea; it's the foundation of how cities breathe, learn, and adapt. From Singapore's connected districts to Europe's net-zero workspaces, every leading economy is aligning with digital, interoperable, and sustainable building standards.

In this global movement, INBAC stands as India's bridge to the future - championing open protocols, advancing BACnet standards, and nurturing collaboration between engineers, manufacturers, and policymakers. Our mission extends beyond technology; it's about enabling India to lead in creating buildings that are energy - intelligent, climate - resilient, and human - centric.

The upcoming INBAC - ORGATEC India 2025 at the Jio World Convention Centre, Mumbai, reflects that vision on an international stage. It brings together global innovators who are defining the next decade of smart spaces - where wellness meets digital control, and sustainability meets intelligence.

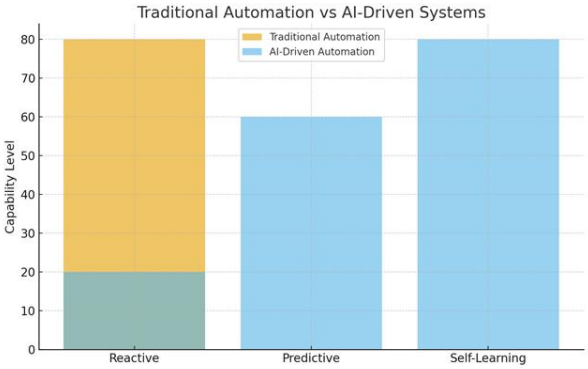
This issue of the INBAC Magazine celebrates the experts who make that transformation real. Our contributors - pioneers from across disciplines - offer perspectives that challenge conventions and set new benchmarks in design, automation, and performance. Their ideas are shaping not only India's buildings but also the global dialogue on smarter living.

As the world moves toward a future where every watt, litre, and breath is measured with purpose, INBAC remains committed to leading that change - ensuring that the buildings we create today will empower the generations of tomorrow.

Sincerely,
Dr. Amit Chaudhari (CFPS, LEED AP, PMP, WELL AP)
Editor-in-Chief
Building Technology BizBits Magazine

AI AND AUTOMATION: REDEFINING THE FUTURE OF SMART HOMES AND BUILDINGS

Artificial Intelligence and automation are transforming the way smart buildings and homes function. Beyond convenience, systems powered by AI are optimizing energy efficiency, predictive maintenance, security, and making sustainable living possible. With urbanization, ESG objectives, and declining technology prices, AI application in India's built space is gaining speed. This report showcases applications, drivers, challenges, and the revolutionary future of AI in building automation.



AI at the Core of Intelligent Built Environments

The building automation industry is shifting into a new era—one where artificial intelligence isn't just an add-on, but the driving force behind smarter environments. Whether in homes, offices, or factories, AI-powered systems are changing how buildings use energy, run smoothly, and create safer, healthier, and more tailored spaces for people inside**.**

From Traditional Automation to AI-Powered Systems

Conventional automation relies on preset rules—responding to triggers such as time schedules or sensor readings. These systems work well, but they’re fundamentally reactive.

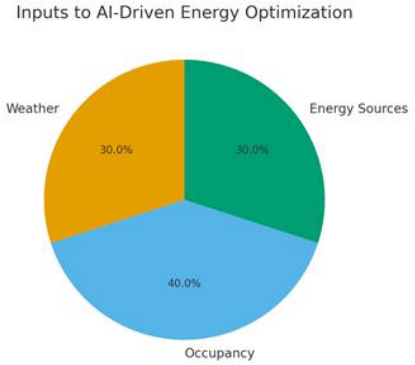
·AI-enhanced automation brings adaptability with:
·Machine Learning (ML) models that analyze usage trends, weather, and occupancy.
·Predictive algorithms that anticipate needs instead of just reacting.
·Self-learning systems that gradually improve control strategies, boosting efficiency and cutting waste.

This evolution shifts the industry from rigid automation to flexible, intelligent management of resources and comfort.

SAI and Automation in the Built Environment: Key Uses

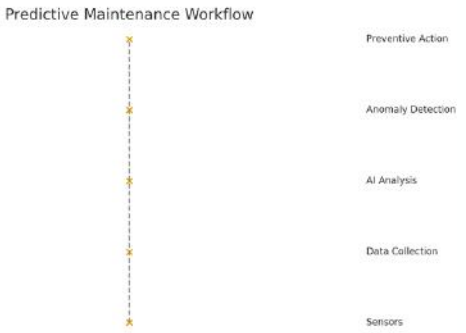
1.Energy Management and Optimization

AI-powered Building Management Systems (BMS) predict energy needs by analyzing weather data, occupancy sensors, and past usage. They automatically balance loads across HVAC, lighting, and renewables, easing strain on systems and scheduling less urgent tasks for low-demand times.



2.Predictive Maintenance

Sensors built into equipment feed real-time performance data to AI systems, which spot irregularities—like odd vibrations, unexpected heat, or energy surges—well before breakdowns happen. This helps equipment last longer and cuts downtime.



3.Indoor Environmental Quality (IEQ)

Using inputs from air-quality monitors, smart ventilation, and lighting tuned to natural rhythms, AI helps create healthier indoor spaces. It keeps the air clean, temperatures comfortable, and lighting conditions ideal.

4**.Security and Safety**

AI-enhanced video systems detect unusual activity, recognize faces, and monitor crowd size. In emergencies, fire detection can initiate automated evacuations and direct people using digital signs.

5.Digital Twins and Simulation

Digital twins mirror real-world buildings and systems. AI studies this virtual data to model energy use, maintenance needs, or emergency plans—giving managers a head start on solving issues.

Smart Homes: More Than Just Convenience

Today's smart homes focus on resilience, efficiency, and wellness—not just luxury. AI helps manage distributed energy, monitors air quality, and learns user habits to deliver personalized, context-aware experiences.

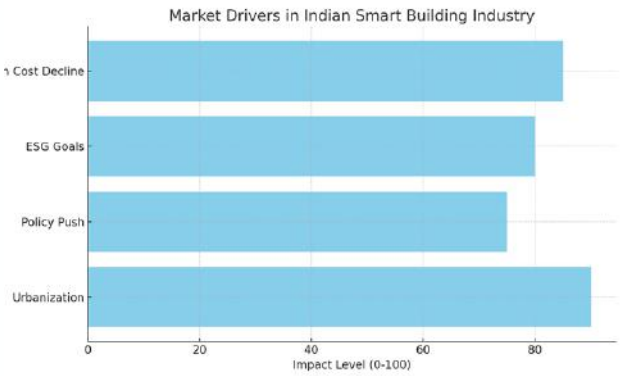
Commercial and Industrial Use

AI-driven automation cuts operational costs across sectors:

- **Corporate Campuses:** Dynamic energy management lowers carbon emissions while keeping spaces comfortable.
- **Healthcare:** AI maintains air quality compliance and minimizes downtime.
- **Retail & Hospitality:** Adaptive lighting and energy controls improve guest experiences.
- **Industrial Plants:** Enhances safety, reduces shutdowns, and makes better use of resources.

Industry Drivers and Indian Market Context

- **Urbanization:** India is set to add 400 million urban residents by 2050, straining resources further.
- **Policy Support:** Efforts like the Smart Cities Mission and green building standards push adoption.
- **Corporate ESG Goals:** Companies increasingly seek sustainable, AI-powered buildings.
- **Falling Tech Costs:** Affordable sensors, IoT devices, and cloud services make scaling easier.



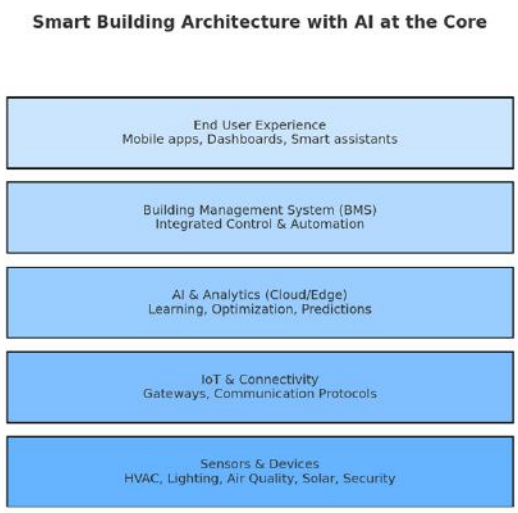
Challenges for Industry Growth

- **Interoperability:** Without common standards, integration moves slowly.
- **Data Privacy & Cybersecurity:** More connectivity means more weak spots.
- **Awareness & Skills Gap:** Lots of developers still don't grasp everything AI can do.
- **ROI Perception:** High upfront costs scare people off, even if it pays off later.

Where AI and Sustainability Meet

Next up in AI-driven automation:

- **Edge + AI:** Quicker, safer local data handling.
- **Net-Zero Buildings**: AI fine-tuning helps hit carbon-neutral goals.
- **User-Centric Design:** Tech that supports wellness and syncs with natural rhythms.
- **Blockchain:** Lets energy trading go decentralized.



What Industry Players Are Doing

Firms like **Acceron Infosol Pvt Ltd** Creates Awareness about AI-friendly platforms for homes and offices. Their systems blend security, energy, and comfort into one package—showing how automation's shifting from a luxury to a must-have.

Wrapping Up

AI and automation are redrawing the blueprint for smart homes and buildings. With energy demands climbing and sustainability non-negotiable, AI is set to become the core of efficient, human-focused spaces. The takeaway for developers, managers, and tech suppliers? Getting ahead with AI now is how you shape what's next.

AI and Automation in Smart Homes & Buildings: At a Glance

- **Smarter Energy Use –** AI balances comfort with sustainability.
- **Safer Spaces –** Predictive maintenance and real-time monitoring reduce risks.
- **Healthier Living –** Air quality, lighting, and comfort tailored to people.
- **Lower Costs –** Efficiency means long-term savings.
- **Future-Ready –** Aligns with ESG, Net-Zero, and smart city goals.

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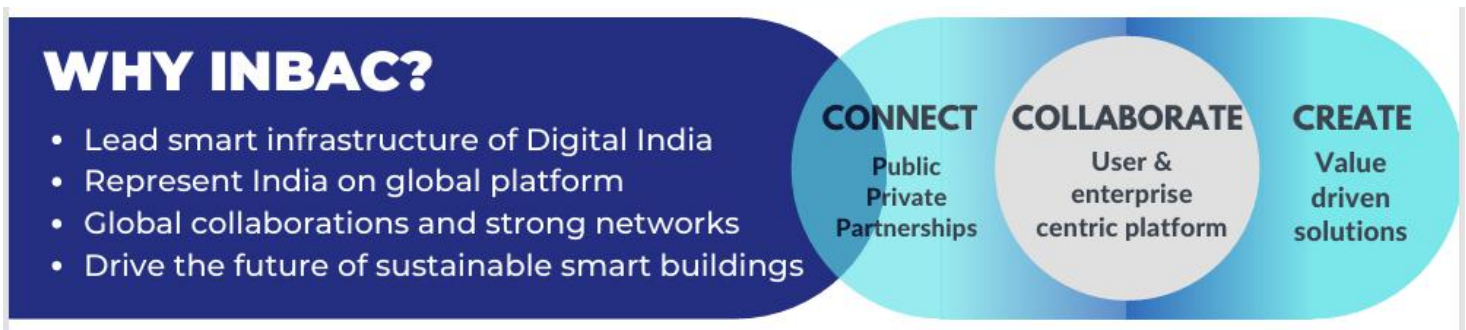
LOCATION : MUMBAI



DRIVING GREEN INNOVATION: ENERGY OPTIMIZATION IN A HOTEL REFURBISHMENT PROJECT

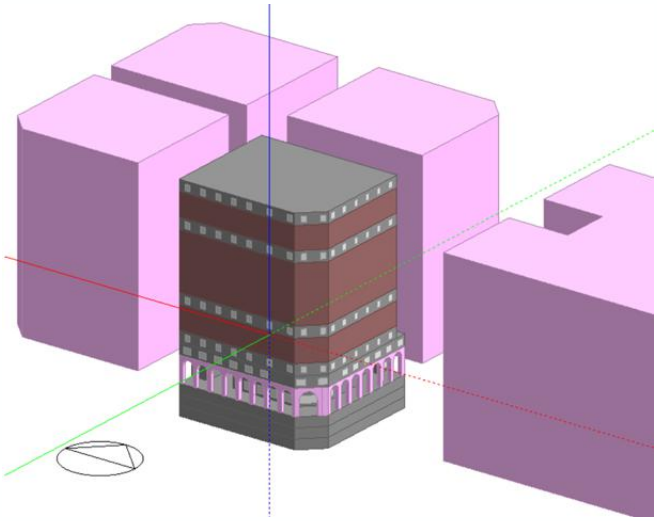
In today's construction and development landscape, sustainability is no longer a peripheral concern — it has become a defining measure of quality and innovation. Organizations around the world are rethinking how they design, build, and operate facilities to reduce environmental impact while improving performance and cost efficiency.

One recent refurbishment project serves as a strong example of how engineering and sustainability can come together to transform an existing hospitality property into a more energy-efficient and future-ready asset.

This hotel refurbishment, managed by KPM Engineering, aimed to breathe new life into a well-established urban property while aligning it with modern energy standards and guest expectations. The challenge was not only to upgrade systems and aesthetics but to do so with measurable improvements in performance and sustainability — without compromising the comfort and charm that define a great hospitality experience.

Energy Simulation as a Design Catalyst

At the heart of the project's sustainability strategy was energy modeling — a data-driven process that enables engineers to predict and refine a building's energy behavior long before any equipment is installed. Using advanced simulation tools such as DesignBuilder, the project team conducted a detailed analysis aligned with ASHRAE 90.1 Appendix G standards to benchmark and optimize energy performance.



The initial simulations revealed that the building's annual energy consumption was above the target baseline. Rather than treating this as a setback, the team used it as a starting point — a diagnostic insight that guided a series of design interventions aimed at significantly reducing energy demand while maintaining architectural integrity and occupant comfort.

Smart Design Interventions

Armed with insights from the simulations, KPM Engineering's design team implemented a combination of mechanical upgrades that collectively reshaped the building's performance profile.

- **Transition to a Primary Variable Chilled Water System –** This shift provided greater control and flexibility in cooling operations. By varying water flow based on load conditions, the system achieved notable reductions in energy waste and improved part-load efficiency.
-
- **Integration of Adiabatic Cooling –** The addition of these features not only optimized indoor air quality and temperature control but also minimized the dependence on high-power cooling systems during peak seasons.

Together, these interventions resulted in an estimated 14.5 to 17% reduction in energy consumption, along with measurable operational and environmental benefits.

Energy Consumption Analysis

ECM 1 EU (PREVIOUSLY EXISTING CONDITION)

The existing system operated on a Primary Constant Cooling. Simulation results showed higher energy consumption at 45.32 KBTU/SQ.FT, which exceeded the baseline and thus failed to meet the ASHRAE 90.1 energy-saving benchmark.

ECM 2 EU (ASHRAE 90.1 Baseline)

A baseline model was developed in accordance with ASHRAE 90.1 Appendix G (ECM 2 Baseline Method) to analyse the building's energy performance. This model served as the reference standard, consuming **43.63 KBTU/SQ.FT**, against which all energy conservation measures (ECMs) were evaluated.

ECM 3 EU

To improve efficiency, the system was modified to a **Primary Variable pump in chilled water system**. This configuration offered marginal improvement over the baseline, achieving a modest **1% reduction** in energy consumption, bringing it down to **45.09 KBTU/SQ.FT.**

ECM 5 EU

Since ECM 3 results were not satisfactory, additional measures were adopted under **ECM 5,** which included **Primary Variable pumps and Adiabatic Cooling.** The integration of adiabatic cooling and variable frequency drives significantly enhanced efficiency, achieving a **17% energy saving** with energy consumption reduced to **37.56 KBTU/SQ.FT.**

ECM 6 EU

To explore other options, **ECM 6** introduced a **Primary Variable Cooling system with DOAS** (Dedicated Outdoor Air System). This strategy improved indoor air quality while maintaining substantial efficiency, yielding a **14.5% energy saving** compared to the baseline, with total energy use of **38.75 KBTU/SQ.FT.**

The stepwise evaluation of Energy Conservation Measures illustrates how data-driven refinements can transform energy performance. By progressing from the ASHRAE baseline to optimized HVAC and DOAS integration, the study achieved notable efficiency gains without compromising comfort. This approach not only advanced sustainability goals but also set a practical model for future hotel refurbishments aiming for balanced performance and value.

Beyond Savings: Broader Impacts

The benefits of energy optimization extended well beyond utility bills. The refurbishment produced a chain of positive effects across various dimensions of the hotel's operation and value proposition:

- **Operational Efficiency**

Precisely sized and fine-tuned HVAC systems reduced both energy and maintenance costs, leading to smoother daily operations.

- **Asset Value**

Sustainability improvements enhanced the long-term value of the property, making it more attractive to environmentally conscious investors, developers, and guests.

- **Guest Comfort and Experience**

Better temperature regulation and air quality translated directly into improved comfort levels — a key metric for guest satisfaction and brand reputation.

- **Environmental Responsibility**

Lower energy demand meant fewer greenhouse gas emissions and reduced strain on the local power grid, reinforcing the project's contribution toward broader climate goals.

A Continuing Commitment to Sustainable Progress

The success of this refurbishment has inspired KPM Engineering to further strengthen its commitment to sustainability and performance-driven design.

Key lessons from the project have helped shape three ongoing focus areas within the organization:

- **Continuous Innovation –** Embracing emerging technologies, including smart controls and real-time monitoring, to drive further improvements in efficiency and occupant well-being.
- **Stakeholder Collaboration –** Encouraging clients, developers, and operators to view sustainability as a shared responsibility rather than a technical checkbox.
- **Performance Feedback –** Establishing post-occupancy evaluation systems to track long-term performance and continually refine design practices.

Reflections on the Journey

Looking back, what stands out from this refurbishment journey isn't just the measurable energy savings — it's the collective shift in mindset it represents.
Turning a functioning hotel into a more efficient and sustainable version of itself demanded more than just technical expertise; it required adaptability, creativity, and a shared sense of purpose among all stakeholders.

This experience served as a reminder that progress often happens quietly — through the integration of data-driven insights, transparent communication, and the willingness to challenge existing norms. When approached thoughtfully, energy optimization doesn't just reduce consumption; it transforms how buildings serve people and communities.

Perhaps the most valuable lesson is this: sustainability isn't just for new, state-of-the-art projects. It's equally relevant — and perhaps even more impactful — in the spaces we already occupy. Every upgrade, every recalibration, every design rethink adds up to something larger: a built environment that is not only efficient but genuinely responsible and resilient for the years to come.

BY TEJAS K. GAWDE
PRINCIPAL ENGINEER
KPM ENGINEERING

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BEGINNING OF AN NEW ERA - SMART RESIDENTIAL BUILDINGS.

IGlobally, The value of residential property significantly outweighs commercial property, accounting for approximately 75% of the world's real estate value, while commercial real estate makes up around 13%, and we tend to omit most important part in residential infrastructure development that is Integrated Building Management System.

Building management systems (BMS) are more essential in residential buildings, as they enhance efficiency, sustainability, and comfort for residents. Here are several detailed reasons illustrating the importance of implementing BMS in residential settings:

Energy Efficiency

A well-designed BMS optimizes energy consumption by managing heating, ventilation, air conditioning (HVAC), and lighting systems. This efficiency leads to significant cost savings on utility bills for residents.

Improved Comfort and Convenience

BMS can automate systems to maintain optimal indoor climates and adjust to personal preferences. For instance, temperature control and lighting can be personalized, ensuring a comfortable living environment tailored to individual needs.

Enhanced Security

Implementing a BMS allows for better control of security features such as surveillance cameras, access controls, and alarm systems. This leads to increased safety for residents and peace of mind.

Maintenance and Performance Monitoring

A BMS provides tools for real-time monitoring of equipment performance, allowing for proactive maintenance. This not only extends the lifespan of building systems but also minimizes disruptions for residents due to unexpected failures.

Sustainable Living

Integrating smart technologies through BMS fosters sustainable practices, such as monitoring resource use and promoting energy conservation. This aligns with the growing demand for environmentally friendly living options among residents.

Integration of Smart Technologies

As smart home devices gain popularity, incorporating them into a BMS allows for seamless integration and centralized control. This enhances the functionality and appeal of residential units, attracting tech-savvy tenants.

Synopsys

In summary, the implementation of a building management system in residential buildings is vital due to its numerous benefits spanning energy efficiency, comfort, security, maintenance, sustainability, and smart technology integration. With the increasing complexity of building systems and the expectations of today's residents, BMS is becoming indispensable in residential infrastructures.

The integration of intelligent building systems will inherently elevate the sophistication of urban environments. Each smart structure contributes to a cohesive network of efficiency and sustainability, which collectively enhances the overall functionality of the city. As individual buildings optimize energy consumption, improve security, and streamline resource management, the cumulative effect fosters a responsive and adaptive urban ecosystem. This synergy between smart buildings and city infrastructure is pivotal in creating a resilient and progressive urban landscape.

"Every building counts when its about smart city"

About The Author.

I Am Mehul Joshi From Artech Engineering Solutions, a qualified Engineer with ELV, IBMS & MEPF Design and Design Consultant with more than 19 years of experience in total. His academic pursuits have been focused on Electronics Engineering.

Mehul worked with a few MNC's, including Siemens, Havells, Legrand, and Honeywell, and I have developed competence in engineering design, project management, and product management during my career. I have a constant desire to learn new things and a strong desire to give my customers outstanding service through my practical knowledge of systems and experiences in ELV & IBMS domain.

Throughout my career, I have had the privilege of working as a critical team member on numerous high-profile projects, some of which include Wankhede Stadium, Narendra Modi Stadium, Mumbai International Airport, Ahmedabad International Airport, Residence Antilia, IIT Gandhinagar, Adani Global Corporate House, and Reliance Vantara, Multiple Projects at GIFT City.

I'm passionate about new technology and like to spend my leisure time researching potential developments in the near future.

MEHUL JOSHI
MEPF CONSULTANT
ARTECH ENGINEERING SOLUTIONS.

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BAC E&C 2025

INBAC will be entering into 7th year on 16th Dec this year. Unbelievable. Wonderful to watch toddler growing to child stage. I am amongst the few privileged who have witnessed the transition of this organization since its birth & infancy. It will be inappropriate to call this as transition, rather transformation would be the apt term to describe the growth INBAC as an organisation has achieved in these 7 years. From single member in 2019 it has grown to ____individual & corporate members in 2025.

As I look back, I remember meeting Sakhee for the first time in 2019 during an event, who came up with the concept of "getting all the stake holders of building automation community together". Being an automation enthusiast throughout my professional career, I was excited about the concept, though I was also sceptical about the whole idea as I believed that bringing Building automation stake holders together and making them speak a common language is as difficult a task as integrating the building subsystems that prefer to communicate on some uncommon & unreliable protocols. But then I was also impressed by the genuine & unique concept, and without much deliberation I agreed to be a part of the journey. And what an amazing ride it has turned out to be over years. Voyage full of learnings, sharing's & collaborations. These associations have helped me personally as I could connect with incredible personalities from industry and encouraged me to take few critical professional decisions.

I recall all the INBAC virtual meets during pandemic. Covid period was anxious phase, but then it was also a moment to take a pause and ponder about the work journey so far. Sakhee suggested me to jot down all the learnings; I came across during my professional career. I did that and I was amazed by the data and information I accumulated over years. This information certainly helped later when I accepted position as Chairperson for INBAC Standardization committee.

I feel delighted that I have been a part of many special milestones with INBAC, it begun with first BAC E&C in the year 2020 an online event, and the anniversary celebrations continued every year thereafter adding new flavour every time, signifying INBAC's growing stature. I also consider formation of INBAC Standardization and Education committee as significant landmark. Establishing INBAC chapters in various cities like Pune, Mumbai, Delhi and South were another feather in cap. Through Building Technology Bizbits (BTB) magazines INBAC connected wider audience. BTB continues its engagement with automation industry by publishing innovative solutions, expert opinions and inspiring stories. Then INBAC launched another revolutionary concept VITAL, India's first certification focused on evaluating and recognizing buildings based on their digital infrastructure, connectivity & technological advancements, emphasising remarkable journey so far. These are only few notable achievements I recollect and surely this is not the end. INBAC will continue inspiring current & future automation professionals through innovative means.

I wish more power to INBAC. Continue the good work, keep on connecting, collaborating, learning in process, share the learnings with aspiring automation professionals, continue the great job to the community.

I look forward to be a part of ORGATEC India 2025 event supported by INBAC. Exciting times ahead!

BY RAJESH ADHANGALE
DIRECTOR
CONFIDO INNOVATIONS PVT LTD.

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koelnmesse

DECARBONIZATION AND HIGH-PERFORMANCE BUILDINGS: ENGINEERING THE FUTURE WITH AN EPIC APPROACH

As buildings continue to account for nearly 37% of global emissions, the pathway to **Net Zero** is being defined not by ambition alone, but by precision—how efficiently, predictively, intelligently, and controllably we manage every watt, drop, and degree inside our built environments.

At the core of this transition lies **Decarbonization**, which is not a one-time retrofit exercise but a continuous, data-led evolution toward **High-Performance Buildings (HPBs)** structures that minimize environmental impact while maximizing occupant comfort, reliability, and operational value.

The Context: Decarbonizing the Built Environment

According to the **Energy Conservation and Sustainable Building Code (ECSBC) 2024**, all large commercial buildings are now required to integrate efficient comfort systems, renewable energy adoption, and intelligent controls.

However, compliance is only the baseline. To achieve true decarbonization, organizations must advance toward **performance-driven operations** where systems respond dynamically to weather conditions, occupancy, and real-time asset behavior.

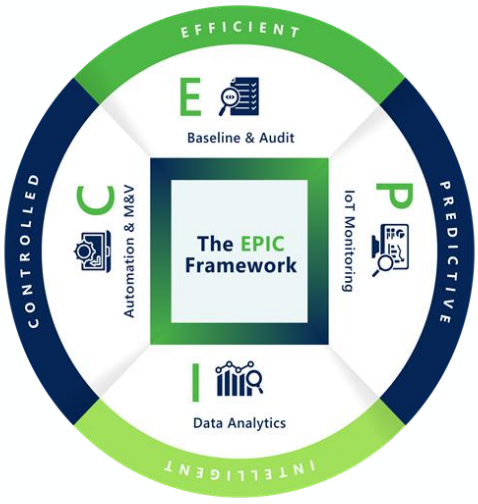
Traditional BMS systems offer control; what's needed today is decision intelligence—a framework that connects the physical and digital layers of building performance.

The EPIC Approach: Efficiency | Predictive | Intelligent | Controlled

A practical framework gaining traction in performance-led decarbonization is the EPIC approach, which structures optimization into four iterative stages:

- **Efficiency (E) –** Establishing baselines through detailed audits and load mapping to identify immediate energy-saving opportunities.
- **Predictive (P) –** Deploying IoT-based monitoring to understand asset behavior in real time, enabling early detection of inefficiencies and maintenance needs.
- **Intelligent (I) –** Leveraging analytics and AI/ML models to enable data-driven decisions—such as adaptive setpoint resets, dynamic chiller sequencing, or weather-based cooling control.
- **Controlled (C) –** Implementing advanced automation that maintains consistent efficiency, enforces operational discipline, and verifies results through digital M&V.

The EPIC approach ensures that once efficiency measures are implemented, their performance is tracked, refined, and continuously improved creating a closed-loop system that evolves with the building's lifecycle.



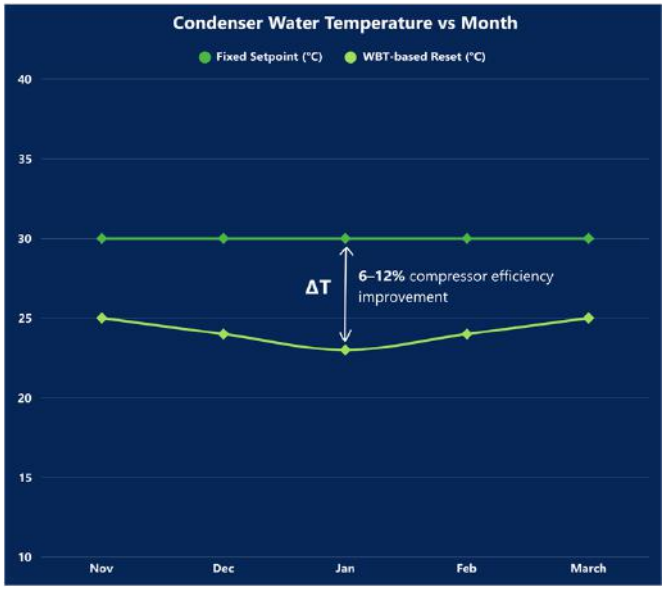
Cooling Systems as a Decarbonization Driver

One of the largest and most controllable energy consumers in commercial buildings is the **chilled water system.**

For instance, a cooling tower with a fixed condenser water setpoint of 30°C can operate more efficiently by aligning its control logic with the **wet-bulb temperature (WBT).**

Studies based on annual weather data show that **WBT-based reset strategies** can lower condenser water temperature by 5–7°C during favorable months (November–March), improving compressor efficiency by 6–12%.

This principle aligns directly with ECSBC 2024, which emphasizes adaptive setpoint control and IoT-based automation under "Comfort Systems and Controls." Beyond cooling towers, similar logic applies to AHU static pressure optimization, pump VFD modulation, and chiller sequencing—each step adding incremental value to the overall carbon footprint reduction.



Beyond Compliance: Measured and Verified Impact

Adopting advanced controls is only meaningful when their outcomes are verified. Frameworks such as **IPMVP** and **ISO 50006** provide methodologies for **Measurement and Verification (M&V)** of savings.

High-performance buildings follow a structured loop: Monitor → Analyze → Act → Validate.

When implemented consistently, the results are substantial:
● 15–20% energy savings in HVAC systems through control optimization

● 10–15% water savings via tower and condenser loop management

●12–25% reduction in Scope 1 & 2 carbon emissions

●Extended asset life and reduced maintenance overhead

These outcomes demonstrate how decarbonization is both an environmental and operational advantage—reducing emissions while improving reliability and cost efficiency.

Enabling the Future: Role of Technology and Collaboration

The building sector's decarbonization journey depends on the convergence of engineering standards, regulatory frameworks, and digital enablement. Organizations such as INBAC are instrumental in bridging these worlds bringing together technology providers, integrators, and policy experts to accelerate the adoption of intelligent controls across India's commercial and industrial infrastructure.

The evolution of high-performance buildings also requires data transparency, interoperability, and cybersecurity all areas where INBAC's technical leadership continues to shape the national conversation.

As India scales its sustainability commitments, the conversation must shift from "efficient designs" to "performing systems."

High-performance buildings are not defined by the materials they use, but by the decisions they make every second through data and control intelligence.

Decarbonization, when pursued through structured frameworks like EPIC and guided by collaborative ecosystems such as INBAC, transforms buildings into active participants in the climate solution

BY ARUN PRASAD
FOUNDER
SUSTAINABYTE TECHNOLOGIES PVT LTD

Key Outcomes at a Glance

METRIC	TYPICAL RANGE	IMPACT
Energy savings	15–20%	Reduced OPEX
Water savings	10–15%	Lower Resource Use
Carbon Reduction	12–25%	Scope 1 & 2 emissions
Pay Back	2–3 Years	Verified ROI

SMART AUTOMATION FOR MULTI-TANK WATER SYSTEMS: A LEAP TOWARD SUSTAINABLE LIVING

Introduction: Water—The Pulse of Daily Life

Water is the silent architect of our daily lives. From the moment we wake up to the time we rest, it fuels our routines—cooking, cleaning, bathing, and beyond. Yet, in many homes and institutions, water management remains surprisingly archaic. Overhead tanks, often sealed and opaque, hide their water levels from view. This invisibility leads to a common yet costly mistake: forgetting to turn off the motor pump. The result? Overflow, water wastage, and inflated electricity bills.

In an era where water scarcity looms large and sustainability is no longer optional, such inefficiencies are no longer acceptable. The solution? Smart automation for multi-tank water systems—a transformative innovation that redefines how we manage our most precious resource.

The Necessity: Why We Can't Afford to Ignore This

The global water crisis is not a distant threat—it's a present reality. According to the UN, nearly 2 billion people live in water-stressed regions. In India alone, millions face daily water shortages, especially during peak summer months. Manual water management is not only inefficient but also unsustainable in the face of rapid urbanization and climate change.

Multi-tank systems, common in high-rises, institutions, and rural setups, are particularly vulnerable to mismanagement. Without real-time monitoring and control, they become hotspots for water loss, energy waste, and equipment damage. The need for an intelligent, automated solution is not just a convenience—it's a necessity.

The Technology: How Smart Automation Works

Smart water automation systems combine cutting-edge hardware and intelligent software to create a seamless, self-regulating ecosystem. Key components include:

- **Ultrasonic Sensors:** Measure water levels using sound waves, offering non-contact, accurate readings.
- **Carbon or Float Sensors:** Provide redundancy and precision in level detection.
- **Microcontrollers (e.g, PLCs):** Act as the system's brain, processing sensor data and executing control logic.
- **Relay Modules:** Switch pumps and valves on or off based on sensor input.
- **Motorized/Solenoid Valves:** Direct water flow to specific tanks.
- **LCD Displays & Mobile Apps:** Offer real-time visibility into tank levels, pump status, and consumption metrics.
- **Wireless Communication (GSM/Wi-Fi):** Enables remote monitoring and control via smartphones or centralized dashboards.

Advantages: Why It's a Game Changer

Smart automation for multi-tank water systems offers a cascade of benefits:

Benefit	Description
💦 Water Conservation	Prevents overflow and ensures optimal usage.
⚡ Energy Efficiency	Reduces electricity bills by eliminating unnecessary pump operation.
🛡️ Equipment Protection	Prevents dry-run damage and extends pump life.
📉 Cost Savings	Cuts down on maintenance and utility expenses.
📲 Remote Access	Monitor and control systems from anywhere via mobile apps.
📊 Data Insights	Track usage patterns for better planning and budgeting.
🌞 Renewable Integration	Compatible with solar power for off-grid or eco-conscious setups.

🌱 **Environmental & Economic Impact**

Smart automation is not just about convenience—it's about responsibility:

- 🌍 **Sustainability:** Reduces water and energy waste, supporting climate goals.
- 💸**Affordability:** Lowers operational costs over time.
- 🔧**Durability:** Minimizes wear and tear on pumps and valves.
- 🧘**Peace of Mind:** Eliminates the stress of manual monitoring and intervention.

🚀 **Adoption: A Game-Changer for the Future**

The phrase "game changer" is often overused—but here, it fits. Smart water automation transforms a mundane, error-prone task into a streamlined, intelligent process. It's not just a product—it's a paradigm shift.

Imagine a world where every drop of water is accounted for, where pumps never run dry, and where households, farms, and cities operate in harmony with nature. That's the promise of this technology.

📣 **Urge for Everyone adoption**

Whether you're a homeowner, a facility manager, or a policymaker, the time to act is now. Here's why:

- 🌐**Scalable:** From single homes to sprawling campuses.
- 🧠**Smart:** Learns and adapts to usage patterns.
- 🛠️ **Customizable:** Tailored to your specific tank and pump setup.
- 💚**Eco-Friendly:** Aligns with global sustainability goals.

Adopting smart water automation isn't just a tech upgrade—it's a moral imperative. It's about safeguarding our future, one tank at a time.

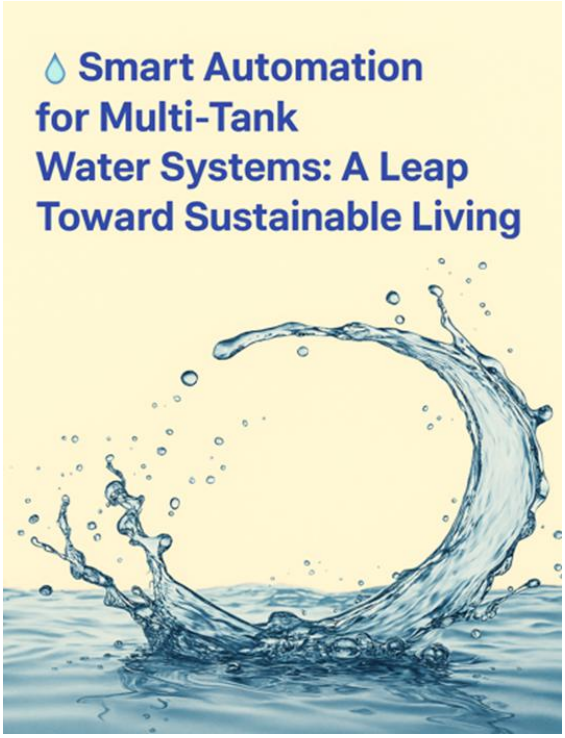
✅ **Conclusion: A Smarter, Greener Tomorrow**

Smart automation for multi-tank water systems is more than an innovation—it's a revolution. It empowers us to:

- Conserve water and energy
- Reduce operational costs
- Enhance reliability and convenience
- Build a sustainable future

As climate challenges intensify and urban populations grow, this technology will be the backbone of resilient infrastructure. Let's not wait for scarcity to force our hand. Let's lead the change—today.

💡 Because every drop counts, and every smart decision shapes a better world.



BY PRIYANKA GAUD
MEP LEAD
MAHINDRA LIFESPACE

EVOLVING INTO COGNITIVE BUILDINGS

“When physical spaces gain digital senses, they stop aging and start evolving.”

What was once concrete and steel is now becoming responsive and alive. As infrastructure technology reshapes how spaces sense, learn and adapt, we are entering an era where sustainability and intelligence are not aspirations — they are the new design minimum.

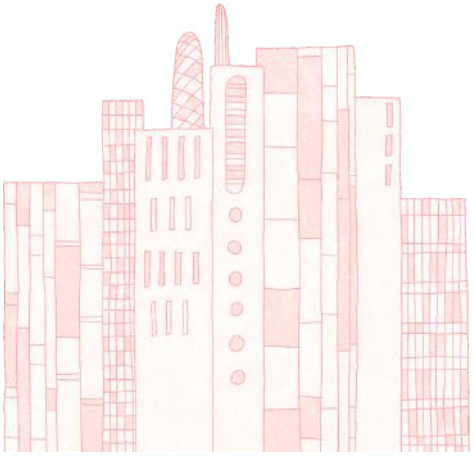
Smart Spaces are not merely an upgrade in building automation or energy efficiency. They represent a fundamental shift from reactive operations to predictive, proactive, and data-driven performance. At the heart of this shift are **Infrastructure Technologies** - the digital nervous system that allows built environments to think, communicate and evolve.

This transformation didn’t happen overnight. It began in the 18th century with the invention of the thermostat. This device was used to sense and regulate the temperature of a building, initially by signalling the need to add more coal to a furnace to maintain heat.

What started as a simple mechanism has evolved into increasingly coordinated control of HVAC and other services, pushing buildings from passive structures to reactive environments.

Today, infrastructure technology is transforming that reactive capability into something far more advanced. It is giving space owners and operators unprecedented visibility and control. Modern IoT (Internet of Things) and sensor networks provide real-time data on occupancy, air quality, lighting, equipment condition, and energy use. AI and machine learning interpret this data to automate actions, predict failures, and optimise performance. Digital twins enable operators to understand and manage assets throughout their lifecycle, while smart energy systems integrate renewables, storage, and intelligent controls to reduce carbon impact

The value created by this evolution is both measurable and meaningful. Smart controls and analytics reduce energy consumption while improving comfort, health, and productivity. Predictive maintenance and real-time monitoring lower operational costs and enable informed decisions. Carbon footprints shrink, ESG (Environmental, Social, and Governance) outcomes improve, and assets gain longer, more efficient life. Better indoor environments reflect better organisational intent, strengthening brand value and reinforcing a commitment to innovation and sustainability.



To fully unlock this future, the industry needs more than technology—it needs collaboration, awareness, and aligned direction. This is where the **INBAC VPA (Voice, Platform and Accelerator)** Initiative is poised to create a meaningful shift.

- **Voice –** Giving professionals, solution providers, designers, integrators, and asset owners a collective voice to share knowledge, challenges, case studies, and best practices

- **Platform –** Creating a neutral industry platform where stakeholders connect, co-create, and align on standards, interoperability, and scalable smart-space frameworks. This platform enables knowledge exchange, cross-industry participation, and more informed decision-making.

- **Accelerator –** Acting as a growth accelerator for smart-space adoption through workshops, pilot programs, capability building, and ecosystem collaboration. By connecting the right people, technologies and use-cases, VPA helps organisations move from intent to implementation faster.

The journey toward sustainable smart spaces is promising, but not without challenges—legacy infrastructure, lack of standards, fragmented systems, cybersecurity concerns, and limited awareness often slow progress. Many organisations still invest in technology without a clear roadmap or lifecycle vision.
This is exactly why initiatives like VPA are essential—to unify effort, create shared direction, and accelerate industry maturity through knowledge, collaboration, and structured adoption.
Smart spaces are no longer a luxury or a distant vision—they are becoming the new baseline for responsible, resilient and future-ready development.

BY RAJILA JAIN
ASSOCIATE VICE PRESIDENT |
OFFICE ENGINEERING LEADER
CANNONDESIGN

AUTOMATION IN PROJECT MANAGEMENT: TRANSFORMING DELIVERY EXCELLENCE IN THE BUILT ENVIRONMENT

Automation is emerging as a crucial enabler of smarter decision-making, seamless collaboration, and predictable outcomes across the project lifecycle. Engineering and construction projects are larger, more multidisciplinary, and more time-intensive than ever before. Traditional manual coordination and supervision struggle to keep up with the new levels of complexity. Automation provides the structure, intelligence, and connectivity necessary for project teams to execute with higher clarity, accountability, and consistency.

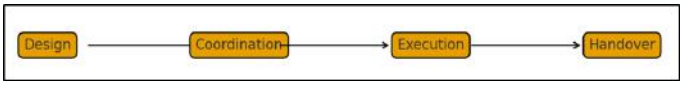
1. Automation as a Strategic Shift in Project Delivery

Automation in project management refers to digital systems that reduce manual inputs, accelerate routine tasks, and enable real-time visibility. These tools allow project managers to focus more on proactive decision-making and less time on administrative burden.

Key outcomes enabled by automation:
- Reduction in delays through automated workflows
- Data accuracy and error minimization
- Real-time communication across all stakeholders
- Predictable planning and cost control
- Digital traceability ensuring compliance and audits

Increasingly, organizations view automation not as a luxury, but as a core business strategy for delivery excellence.

Digital Workflow Automation Overview
Showing Project Data Flow



2. Technology Enablers: Tools Driving Automation

Digital transformation in the built environment is powered by several software ecosystems working together:

- **Autodesk BIM 360, Navisworks, Bentley ProjectWise**
  → BIM coordination, clash detection, model approvals

- **Primavera P6 EPPM, MS Project, Oracle Aconex, Asite**
  → Schedule management, project controls, procurement workflows

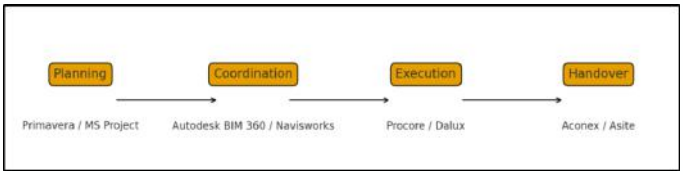
- **Procore, Dalux, Newforma**
  → Submittals, RFIs, document governance with timestamps
- HoloBuilder, OpenSpace, Trimble Connect, Drone-based Visual Captures
  → Automated progress validation and visual field inspection

- **InEight, SAP S/4HANA, Zoho Projects**
  → Commercial automation and risk tracking

- **AI-powered platforms like ALICE Technologies, Autodesk Construction Cloud Insights**
  → Predictive delay and resource optimization

These platforms interconnect to form a single source of truth, avoiding misalignment and rework across the entire lifecycle.

Figure 2: Project Management Software Ecosystem



3. Human-Tech Collaboration: The New Capability Framework

Automation does not replace human expertise. It enhances human decision-making through:

- Instant insights from rich project data
- Intelligent alerts before issues become critical
- Structured communications improving accountability
- Effortless documentation for governance and audits

The project manager evolves into a **digital ecosystem orchestrator** — managing interfaces, data quality, and performance analytics.

4. Quality, Safety & Sustainability Through Automation

Automation ensures that technical requirements are not compromised in the rush of execution. Digital inspection workflows and predictive analytics elevate safety and environmental performance.

Beneficial outcomes include:

- Reduced site hazards using automated safety compliance tools
- Sustainability dashboards tracking resource efficiency
- Better as-built record management → easier operations and maintenance
- Integration with green building rating systems (LEED, IGBC, WELL)

These capabilities strengthen long-term asset value beyond project delivery.

Key Points from Article

Automation is reshaping how modern projects are conceived and delivered. With greater emphasis on collaboration, transparency, and risk management, automated workflows form the backbone of high-performance development.

India's fast-advancing infrastructure landscape demands systems that scale — automation is that enabler. It empowers teams to deliver projects that are not only on time and within cost, but also sustainable, resilient, and future-ready.

The future of project management is automated, data-driven, and strategically intelligent — and the professionals embracing these tools will lead India's next wave of transformation in the built environment.

BY JITENDRA B. DHARMADHIKARI
PROJECT MANAGER
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AUTOMATING SITE INSPECTIONS IN MEP: A NEW ERA OF PRECISION, SAFETY & SPEED

Why MEP Site Inspections Needed an Upgrade

MEP installation inspections involve:

• Verifying code compliance (NBC 2016, IS standards)
• Checking installation accuracy of HVAC ducts, DB panels, fire lines, drainage slopes
• Ensuring safety clearances and material approvals
• Documenting and tracing deviations and corrective actions

Manual inspections often face pain points:

– Delayed reporting → delayed commissioning
– Inconsistent observation quality between teams
– Difficulty tracking thousands of components
– Limited traceability during disputes
– Paper-based records prone to loss or unauthorized modification

Automation addresses these longstanding inefficiencies directly.

Digital Tools Transforming MEP Inspections

Automation brings together field technologies and cloud workflows. Key categories:

1) Field Visual Automation
• 360° Site Capture – OpenSpace, HoloBuilder
• Drone Documentation – Geo-tagged progress imaging
→ Supports off-site review and historical comparison

2) Digital Checklist & Compliance Automation
• Safety, electrical earthing, fire stopping, pressure testing, insulation inspections
• Tools like Procore, Fieldwire, Dalux streamline approvals and NCR reporting

3) IoT Sensors & Live Commissioning Validation

Examples:
• AHU supply/return temperature probes
• Pump energy monitoring
• Pressure sensors in fire line hydrostatic testing
Automatic alarms improve commissioning efficiency.

4) AR/VR Assisted Verification
• Trimble Connect, VisualLive overlay BIM vs physical
→ Real-time mismatch detection for ducts, cable trays, pipe routes

5) AI-based Deviation Detection
• Algorithms compare photos to BIM model
• Flags missing supports, incorrect diameters, level mismatches
Automation enables continuous inspection instead of last-minute firefighting.

How BIM Strengthens the Inspection Cycle

BIM (Building Information Modeling) offers a single coordinated reference for installation accuracy:

✓ Exact routing and dimensions
✓ Tag-based asset traceability
✓ QR code scanning linking to model data
✓ Red-line updates instantly shared with all stakeholders

Digital site inspections evolve into model-based validation — a leap from subjective evaluation to measurable compliance.

Impact on Project Performance

Improvement Area	Manual Process Result	Automation Result
Documentation	Fragmented, late submissions	Instant cloud updates
Quality Control	Human-dependent consistency	Model & data-driven
Safety	Reactive findings	Predictive alerts
Cost Impact	High rework cost	Early detection reduces waste
Decision Making	Delayed understanding	Real-time dashboards

Automation is not replacing engineers — it enhances their capability to build safer, faster, and with higher technical precision.

Challenges: The Path to Adoption

- Insufficient skilled workers for digital tools
- Device & license cost perception by contractors
- Integration gaps between platforms
- Cybersecurity & data governance needs
- Resistance to change in traditional execution teams

These can be overcome through:

- Early planning of digital workflows
- Onsite training and standardization
- Contractual requirements for digital QA/QC
- Automated reporting tied to payment milestones

The Future: Continuous Validation + Predictive Commissioning

As project controls mature, automation will:

✅ Monitor MEP performance during construction
✅ Predict failures in life safety systems
✅ Provide digital twins for long-term O&M
✅ Support sustainability certifications (WELL, LEED, IGBC)

Commissioning documentation will soon be **generated automatically** from installed-system data instead of manual checklists.

The building doesn't just get inspected.
The building proves it meets performance criteria.

Achievement with Automation

MEP site inspection automation represents a significant advancement in how buildings are constructed and operated. It ensures:

- Reduced coordination clashes
- Verified workmanship quality
- Faster compliance approvals
- Long-term operational efficiency

India's rapidly urbanizing environment demands precision and speed — automation gives both.

Organizations that embrace digital inspections will lead the future of **climate-responsible, safe, and high-performance infrastructure**.

BY MR. DINESH DALPAT SABLE
CLUSTER HEAD
MS REALTY

Mr. Dinesh Dalpat Sable is a seasoned construction professional with over 22 years of experience in the construction industry. He holds a B.E. in Civil Engineering, a Postgraduate degree in Construction Management, and an LLB. Over the course of his career, he has been associated with reputed organizations such as K Raheja Corp, Indiabulls Real Estate Ltd, Lodha Group, and Turner Project Management India Pvt. Ltd. Currently, Mr. Sable is working as a Cluster Head with M S Realty Group, overseeing various prestigious residential developments in South Mumbai.

FUTURE OF BUILDINGS- WHERE SUSTAINABILITY MEETS INNOVATION

From Concrete Ambition to Conscious Construction

For decades, architecture celebrated scale, height, and spectacle. Yet the skyline of tomorrow must be judged not by how tall it stands, but by how gently it rests upon the earth. As a project controller and sustainability consultant, I have seen our built environment evolve from ambition to awareness - from constructing faster to creating wiser. The next revolution in building design will not come from concrete and steel, but from conscience and intelligence. The new frontier lies in designing buildings that think, adapt, and give back - where innovation becomes the instrument of sustainability. The construction industry contributes nearly 40% of global carbon emissions and consumes over a third of the world's energy. But with the right intent and innovation, it can become the planet's most powerful ally in climate repair.

The Intelligent Building Revolution

Sustainability today is inseparable from digital intelligence. Artificial Intelligence (AI), Building Information Modeling (BIM), and Digital Twin systems are redefining how we design, build, and operate. AI-driven generative design allows architects to simulate thousands of layouts in minutes - balancing daylight, material use, and energy flow to achieve the most resource-efficient structure. AI-based predictive analytics now enable climate-adaptive models that anticipate changing weather patterns and optimize performance over decades. Digital twins, fed by real-time IoT data, mirror building performance - monitoring energy, air quality, and occupancy patterns. They enable predictive maintenance, adaptive operations, and can reduce energy use by 20% and maintenance costs by 30%. When combined with BIM, these systems create a continuous, data-driven lifecycle - from concept to demolition - tracking embodied carbon and resource flow. Every wall, beam, and pipe becomes part of a living sustainability narrative.

Materials that Heal, Not Harm

The material story of tomorrow is one of regeneration, not extraction. Nature is re-emerging as a co-designer - giving us biomaterials like hempcrete, mycelium composites, and engineered bamboo that are renewable, strong, and low-carbon. Concrete itself is evolving, with carbon-negative mixes that absorb CO2 during curing and self-healing bio-cements that extend structural lifespan. New vacuum insulation panels and microporous materials achieve superior thermal performance with thinner profiles. 3D-printed sustainable composites and modular systems are redefining construction efficiency by reducing material waste by up to 25%. Yet among all these, one innovation stands out as a genuine game-changer for India's sustainable construction future - the Paulownia Phoenix1 Kiri tree.

Paulownia Kiri - India's Regenerative Timber Revolution

WGW Agroforestry & Vrikshlife Agrifarms, in collaboration with WeGrow Germany, have embarked on one of India's most ambitious afforestation and bio-timber programs. After extensive research and securing all government approvals, we have planted over 100 acres across Gujarat, Haryana, Uttar Pradesh, and Maharashtra - the beginning of a new collaboration and vision that WGW Agreen is initiating to expand planting 15,000 acres (6,000 hectares) over the next decade. The Paulownia Phoenix1 Kiri is the world's fastest-growing hardwood. It matures in just 7 years, producing a volume of wood comparable to teak, which takes 28 years to yield the same harvest. Once felled, it regenerates naturally from the same stump, providing up to 10 harvest cycles over 70-80 years - a true perennial tree for the planet. Technically, it is extraordinary: 1/3rd the weight of teak, yet 70% of its strength; higher acoustic insulation and thermal resistance; higher calorific value, making it a superior bio-energy source; consumes significantly less water than most hardwood species; its small canopy enables dense plantations, leading to the highest carbon sequestration per hectare among all known trees. Beyond its biological marvel, the Paulownia story carries a national mission - to make India self-sufficient in sustainable timber. We currently import hardwood worth over ₹100,000 crore annually. By creating regenerative wood from Indian soil, we protect our natural forests, strengthen our rural economy, and generate green livelihoods.

From Soil to Skyline - Regeneration as a Philosophy

My journey into sustainability began not in glass towers, but in rural fields. I have worked extensively with farmers across India to revive degraded soils naturally, using microbial inoculants, organic matter restoration, and inter-cropping with native tree species. This work - aimed at improving soil fertility, water table recharge, and biodiversity - has transformed not just farmlands but micro-climates. For this contribution, I was deeply honoured to receive the Chhatrapati Shivaji Maharaj Vanashree State Award - a recognition that I share with every farmer, forester, and collaborator who believes that climate repair begins with the soil beneath our feet. It is this same philosophy that now informs how I view buildings. A truly sustainable building is like a living ecosystem - it breathes, learns, regenerates, and nurtures its environment.

The Future: From Smart Buildings to Sentient Ones

The next generation of buildings will go beyond automation and efficiency. They will be sentient - aware of their resource footprint, adaptive to human behaviour, and integrated with renewable ecosystems. Building Integrated Photovoltaics (BIPV) will turn façades into energy farms. Solid-state and long-duration energy storage systems will smooth out renewable fluctuations. AI-controlled microgrids will allow clusters of buildings to exchange power like living organisms sharing energy. Adaptive façades will respond to sunlight, humidity, and occupancy, balancing comfort and efficiency dynamically. Air-to-water generators, resource-efficient fixtures, and closed-loop greywater systems will make water self-sufficiency practical even in dense cities. And perhaps most importantly, biophilic and human-centric design will define the emotional sustainability of space. Circadian lighting, low-VOC interiors, and AI-managed air quality will make wellness intrinsic to architecture.

Energy Positivity and Circular Economy

A decade ago, we aspired for energy-efficient buildings. Today, we must aim for energy-positive ones - structures that generate more energy than they consume and feed the surplus back to the grid. With smart façades, passive cooling, radiant systems, and renewable microgrids, this is no longer utopian. Buildings will soon act as prosumers - generating, storing, and sharing power within connected communities. At Beetles Consulting, our mission is to make this shift measurable and mainstream - through BIM-integrated energy modeling, real-time carbon dashboards, and data-driven project control frameworks. Circular economy principles like Design for Disassembly, Material Passports, and Urban Mining will ensure every component can re-enter the cycle. Sustainability is not a philosophy to us; it's a quantifiable metric, built into every decision from concept to commissioning.

Quantifying the Change

Innovation allows us to measure what was once only imagined. Digital twins can reduce operational energy by 20% and maintenance costs by 30%. AI-driven generative design can cut material waste by 25%. Long-duration batteries can provide clean backup power for over 10 hours. Smart water systems can reduce freshwater demand by 50%, while air-to-water systems produce up to 5 liters of clean water per square meter of panel each day. The result is not only efficiency but resilience - buildings that sustain themselves and the communities around them.

India's Moment to Lead

India is uniquely placed to lead this global transition. Our diverse climatic zones, vast rural potential, and technological depth make us an ideal living laboratory for climate-adaptive architecture. Policies under IGBC, GRIHA, and the National Building Code are already moving toward performance-based sustainability - but what we need now is integration. Integration between policy and practice, technology and tradition, forests and façades. We must recognize that the carbon we save in cities begins with the carbon we store in trees. Paulownia Kiri, bamboo, and other regenerative materials can transform our construction supply chain from extractive to circular - ensuring that our progress no longer costs the planet its forests. Emerging technologies such as offshore wind farms and desert solar fields will soon complement India's renewable energy mosaic.

A Regenerative Vision

The future of buildings will not be measured merely in kilowatt-hours saved or certifications earned, but in ecological impact restored - in soil revived, air purified, and communities empowered. Sustainability is no longer a checkbox; it is a moral contract between design and destiny. Our goal must be simple yet profound: to leave behind structures that heal, teach, and endure - like living forests of steel, wood, and light. The buildings of tomorrow will not just consume less - they will contribute more. Because the future of buildings is not just about how we build - it is about what we stand for.

About the Author

Ajit Thomas is the Founder & Principal of Beetles Consulting, a hospitality-focused Project Control and Sustainability Advisory firm shaping India's next generation of green hotels and intelligent infrastructure. Under his leadership, Beetles Consulting is currently involved in developing 7-9 new projects comprising over 1,800 rooms across multiple cities, integrating carbon intelligence, regenerative design, and measurable sustainability. A recipient of the Chhatrapati Shivaji Maharaj Vanashree State Award for his rural work in soil rejuvenation, biodiversity restoration, and microclimate improvement, Ajit continues to bridge the worlds of construction and conservation - proving that one can go from pouring concrete to planting trees with the same purpose & passion.

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RECIPIENT, CHHATRAPATI SHIVAJI MAHARAJ VANASHREE – STATE OF MAHARASHTRA

Building Technology BizBits Team

Innovation and intelligence in every space—Team BizBits at the heart of transformation.

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