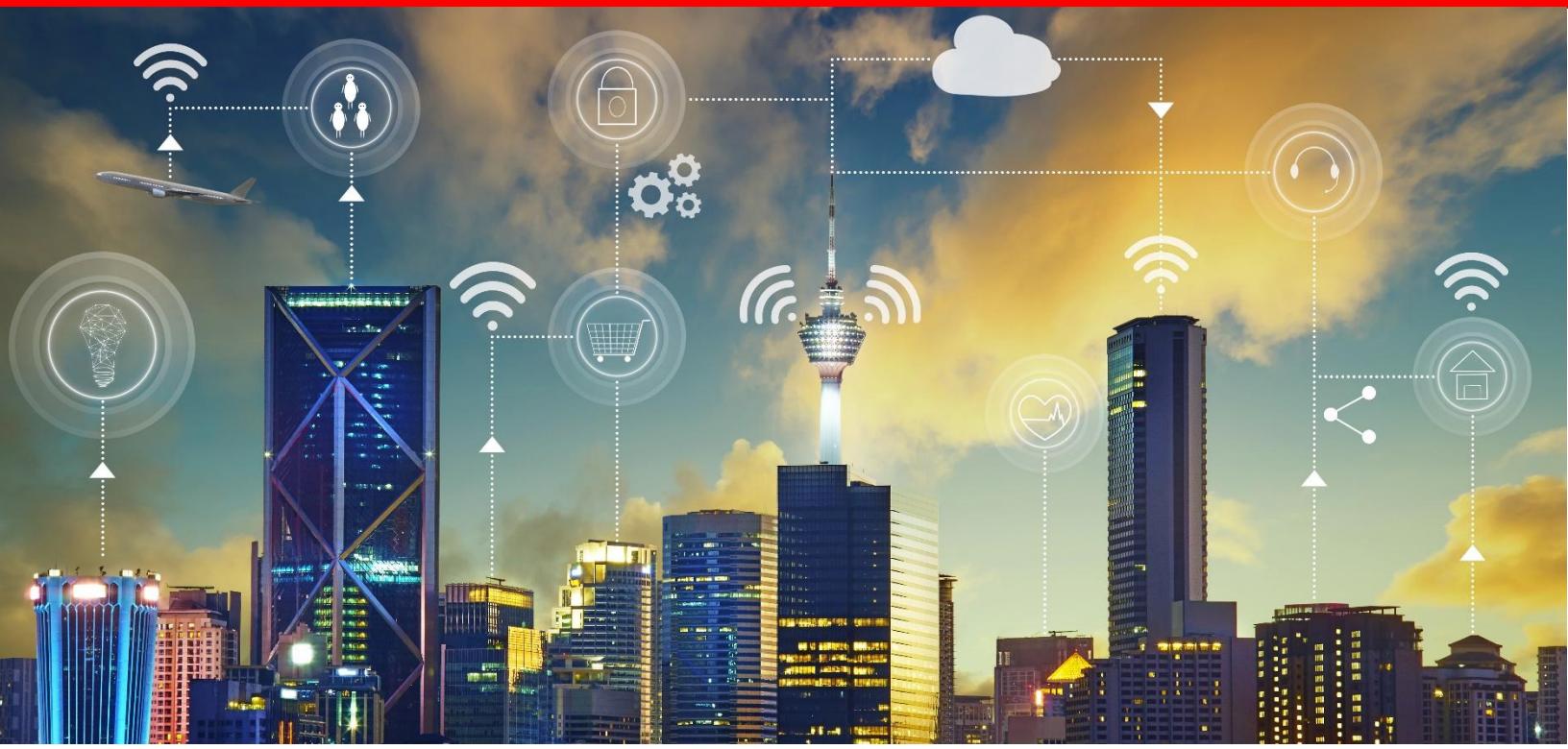
ASHB
Association for Smarter Homes & Buildings

2025 Smart Building Trends & Technology Adoption

LANDMARK RESEARCH PROJECT

EXECUTIVE SUMMARY



ASHB AND THE FOLLOWING ASHB MEMBERS FUNDED THIS RESEARCH PROJECT

SILVER

BELIMO · DAIKIN · DELTA · DISTECH CONTROLS · DWYER OMEGA · EBTRON a measurable difference! · Functional Devices, Inc. · Honeywell · Johnson Controls · National Research Council Canada / Conseil national de recherches Canada · Schneider Electric · SIEMENS · Southwire · TRANE

BRONZE

KMC CONTROLS · neea

Introduction

In support of ASHB's research and analysis of smart building opportunities, Harbor Research fielded a comprehensive survey on smart building technologies and trends. The 2025 Smart Building Technology Trends Survey gathered responses from 308 individuals involved in the ownership, operation, or management of buildings across the United States (82%) and Canada (18%), with a focus on understanding the perceptions, preferences, and challenges influencing smart technology adoption in commercial, institutional, and mixed-use facilities.

The survey sample reflected a diverse mix of stakeholder roles: Property Owners (34%), Building, Property, or Facilities Operators/Managers (26%), Operations Staff (25%), and, for the first time in 2025, IT Leaders (13%). This expanded representation provides technical perspectives on smart building systems and infrastructure. The largest segment of respondents manages Commercial Office space (60%), along with representation from Multi-dwelling Residential Buildings (42%), Industrial/Manufacturing (38%), Retail/Hospitality (24%), and Mission-Critical facilities including Data Centers and Hospitals (14%).

Compared to 2024, the 2025 survey reflects greater representation from larger building portfolios, with 49% of respondents managing 6 or more buildings, up from 44% in 2024. Additionally, 71% of the buildings represented were constructed after 2000, indicating a shift toward newer facilities with potentially greater smart technology readiness. Smart building technology adoption remained consistent, with 91% of respondents reporting deployed smart devices, systems, or software in their facilities, nearly identical to the 90% adoption rate observed in 2024.

Smart Building Technology Adoption Drivers

Organizational priorities in 2025 remained largely consistent with 2024, reflecting stable market needs and strategic imperatives. The top priority continues to be improving operational efficiency and reducing costs (56% of respondents), followed by implementing sustainable practices and technologies (44%). Other significant priorities include retrofitting buildings for new uses (36%), improving occupant experience and amenities (36%), and improving facility and system resiliency and reliability (32%). Notably, regulatory compliance was cited by 25% of respondents, while indoor environmental quality and workforce augmentation received 16% and 11% respectively.

When examining specific drivers of smart technology adoption, the landscape shifts somewhat compared to 2024. Operational cost reduction and energy efficiency remain the primary motivators, but sustainability as a

standalone driver saw reduced emphasis in 2025. This change is partially attributable to survey methodology adjustments—in prior years, sustainability and energy efficiency were grouped, whereas in 2025, energy efficiency was categorized under "reducing operating costs," which may explain the apparent decline in sustainability's prominence. Among current smart technology users, the top drivers include operational efficiency, enhanced safety and security, improved occupant health and comfort, system resiliency, and equipment lifespan extension. For non-users (the remaining 9% of respondents), high initial and ongoing costs, along with unclear return on investment (ROI), remain the primary barriers to adoption.

Critical system priorities also inform technology investment decisions. HVAC/Climate systems and Electrical Power Distribution rank as the #1 and #2 most critical building subsystems across all building types. These rankings suggest that organizations prioritize reliability, uptime, and optimization for the systems with the greatest operational impact. Security, elevator/escalator systems, fire/life safety, and power quality/backup constitute a secondary tier of criticality, with importance varying by building type—elevators in commercial multi-unit buildings versus security in mission-critical facilities.

Smart Building Technology General Adoption Trends

Smart building technology deployment in 2025 reflects both broad adoption and varying levels of sophistication. HVAC/Climate control leads in adoption, with 68% of respondents reporting smart capabilities in these systems. Lighting systems (66%), Electrical Power Distribution (58%), Security/Access Control (58%), and Fire/Life Safety (54%) also demonstrate high adoption rates. Other systems with notable smart features include Audio/Video systems (52%), Power Quality/Standby/Backup (47%), and Elevator/Escalator systems (43%).

However, adoption rates do not necessarily correlate with system sophistication. When evaluating systems on a five-level capability scale—from Level 0 (No Smart Features) to Level 4 (Predictive/Self-Learning AI/ML)—Lighting, Fire/Life Safety, Security/Access Control, Audio/Video, and Electrical Power Distribution systems achieve the highest sophistication scores. These systems exhibit greater prevalence of Level 3 (Automated/Optimized) and Level 4 (Predictive/Self-Learning) capabilities. In contrast, HVAC/Climate systems, despite having the highest incidence of smart features, tend to remain at Level 2 (Connected/Monitored) and Level 3 (Automated/Optimized) with less penetration of advanced AI/ML-driven predictive capabilities.

Maintenance practices reveal an area for improvement. Despite widespread connectivity and data availability, routine and corrective maintenance approaches still dominate across most building systems. Fire/Life Safety

(44%), HVAC (39%), and Electrical Power Distribution (39%) see the highest reliance on routine maintenance schedules. Only modest adoption of condition-based maintenance (monitoring equipment performance indicators) and predictive/prescriptive maintenance (using data analytics and AI to forecast failures) was observed. The gap between data connectivity and actionable intelligence represents a significant opportunity for the industry to transition from reactive to proactive maintenance strategies.

BMS/BAS Smart Building Technology Adoption Trends

Building Management Systems (BMS) and Building Automation Systems (BAS) serve as the central nervous systems for smart buildings, and adoption remains robust. 78% of respondents report having a BMS/BAS installed and in use, with only 17% lacking such systems and 6% unsure of their status. Among those with BMS/BAS, the top managed functions mirror overall smart system adoption: HVAC/Climate Control (45%) and Lighting Control (21%) lead, followed by Electrical Power Distribution (31%), Security/Access Control (26%), and Fire/Life Safety (27%).

System age distribution indicates a relatively modern installed base. 44% of BMS/BAS systems are under 5 years old, while 39% are between 5-10 years old, and only 7% exceed 10 years in age. This suggests active investment in upgrading or replacing legacy systems, aligning with broader digital transformation initiatives.

Cloud adoption represents a notable trend in BMS/BAS deployment. In 2025, 47% of organizations use cloud-based BMS for most or all systems, a substantial increase from prior years. 42% maintain on-premise hosting, while 17% employ hybrid models. Among organizations actively planning to adopt cloud-based BMS, an additional 28% are planning adoption, indicating continued momentum. However, concerns persist: data security risks (49%), loss of control over systems/data (34%), and compliance/data residency requirements (36%) remain the top concerns limiting cloud adoption. Organizations demonstrate clear preferences for how data is managed in cloud environments, with 44% requiring all data to remain fully private/encrypted and 44% accepting anonymized/aggregated data sharing for optimization purposes.

BMS/BAS satisfaction levels are generally positive, with 63% of respondents reporting they are "very satisfied" and 23% "somewhat satisfied" with integration between building software platforms. Key features driving satisfaction and future investment priorities include centralized monitoring and control (38%), integration with legacy systems (35%), recommended actions/remediation steps (33%), and automated reporting/alerts (33%). As organizations seek to maximize the value of their BMS/BAS investments, data

analytics and visualization (26%), automated AI-driven optimization (22%), and cybersecurity features (30%) are gaining importance.

AI and Digital Twin Technology Adoption

Artificial intelligence and digital twin technologies represent the frontier of smart building innovation, and adoption rates in 2025 demonstrate significant momentum. AI-powered applications are being deployed or planned across multiple use cases. The top five AI applications include:

1. Energy Optimization (62%)
2. Predictive Maintenance/Fault Detection (51%)
3. Security and Safety (50%)
4. Occupant Comfort Personalization (48%)
5. Space Utilization Analytics (34%)

When evaluating the actual impact of AI solutions, respondents report overwhelmingly positive results. For energy efficiency/cost reduction, 46% report "very positive" impact and 42% "positive," yielding a weighted average impact score of 4.34 out of 5. Similarly, operational efficiency (4.34), occupant comfort/experience (4.28), security and safety (4.28), and predictive maintenance/reduced downtime (4.27) all receive high marks. Only a negligible percentage report negative or neutral impacts, suggesting that organizations successfully deploying AI are realizing measurable value.

Digital twin technology adoption is even more impressive. Over 52% of respondents report active use of digital twins, with another 22% piloting or planning deployment. Only 17% express interest without concrete plans, and a mere 5% are not interested. Adoption correlates strongly with building and portfolio size—buildings larger than 250,000 sq. ft. and portfolios exceeding 50 buildings show over 75% adoption rates with defined digital twin roadmaps. Institutional and Retail/Hospitality segments lead adoption, while Commercial Multi-Unit and Mixed-Use buildings, though lower in current adoption, exhibit the highest rates of piloting or planning.
The top three purposes for digital twins align consistently across building types:

1. Real-time monitoring and visualization (56%)
2. Energy optimization (43%)
3. Predictive maintenance (41%)

Additional valuable use cases include lifecycle cost analysis (31%), space utilization planning (25%), and sustainability tracking (26%). IT Leaders demonstrate particularly strong recognition of digital twin value, with over 50% citing energy optimization and lifecycle cost analysis as critical use cases.

Digital twin deployment models vary: 47% use dynamic, real-time optimization and operational control, 40% employ both static simulation and dynamic optimization, and 37% focus on static simulation and scenario analysis.

Underlying digital twin capabilities, organizations report varying levels of data readiness. 59% have Building Information Modeling (BIM) data available and up to date, 54% possess installed equipment inventory and data sheets, and 51% have energy consumption and submetering data. However, 15% indicate data is incomplete or fragmented, and 5% are unsure of their data status, highlighting ongoing challenges in data management and integration necessary for comprehensive digital twin deployment.

Smart Building Technology Adoption Challenges

Despite robust adoption rates and positive ROI outcomes, organizations continue to face significant barriers to smart building technology deployment and value realization. The top challenge cited by 33% of respondents is the high initial cost of purchase and implementation. This is followed by data privacy and cybersecurity concerns (25%), high ongoing cost of operation and maintenance (23%), limited compatibility with existing systems or old building infrastructure (21%), and lack of in-house skills to operate/manage smart technology (21%).

Cost-related barriers extend beyond initial expenditures. Organizations express concern about unclear ROI (12%), difficulty identifying useful or actionable insights from devices (15%), and limited vendor support or poor after-sales service (15%). These findings indicate that while smart technology offers substantial value, the path to realizing it involves financial, technical, and organizational hurdles that many organizations struggle to overcome.

When examining barriers to realizing more value from building data, the challenges become even clearer. High data/software costs (37%) rank as the #1 barrier, followed by lack of skillset to analyze data (33%), system integration complexity (31%), and data software usability challenges (31%). Additionally, insufficient or unreliable data from building systems (27%), poor data management or disconnected data silos (22%), and poor network coverage (17%) further impede value realization. Notably, 27% of respondents report no issues realizing value from their data, suggesting that a subset of organizations have successfully navigated these challenges.

For AI-based technology adoption, barriers mirror broader smart building challenges. High cost of adoption (34%) leads, followed by lack of in-house expertise to use or manage AI models and tools (26%), difficulty integrating with current systems (25%), and resistance from staff or stakeholders (23%).

Privacy and security concerns specific to AI (22%) and scalability/adaptability concerns (22%) also appear prominently. These findings underscore that AI deployment requires not only financial investment but also organizational change management, technical expertise, and robust cybersecurity frameworks.

Smart Building Financing Trends and Spending Patterns

Financing for smart building technology in 2025 comes from diverse sources, with Internal IT Budgets (52%) and Internal Building/Facility Management Budgets (47%) leading the way. External funding sources include External Government Funding (20%), External Performance Contracting (19%), External Utility Incentives (14%), and External NGO Funding (11%). Internal HR Budgets also contribute at 26%, reflecting investments in workforce-related technology. The diversity of funding sources suggests no single dominant financing model, indicating fragmented capital allocation processes across organizations.

Spending patterns reveal substantial investment in smart building technology. Respondents report spending between $80,000 and $100,000 on average per technology category, including sensors/data collection systems, networks/connectivity, control system hardware, BMS/BAS, cloud/IT infrastructure, cybersecurity systems, specialized software solutions, and emerging technologies. Total average spending across all categories exceeds $550,000 annually per organization. Importantly, the majority of respondents expect budgets to increase for each category in the coming year, with sensors/data collection systems (64% expect an increase), cybersecurity systems (58%), and BMS/BAS (56%) seeing the highest anticipated growth.

Purchasing intentions for 2025 indicate HVAC systems will see the most investment in major operating equipment (43%), while software purchases will focus on Electrical Power Distribution (33%), Security/Access Control (30%), and HVAC (28%). Security emerges as a key target spending area across all categories—major equipment, minor equipment/upgrades, and new software—reflecting heightened concerns about physical and cybersecurity in an increasingly connected building environment.

Stakeholder influence on purchasing decisions varies by building type. Building/Facility Management ranks as the top influencer overall, with IT Management, C-Suite Officers, and Building/Facility Tenants also exerting significant influence. In Commercial Multi-Unit buildings, C-Suite Officers are most influential, while in Mission-Critical segments (Industrial, Data Centers, Hospitals), IT Management plays a critical role. This underscores the need for smart building technology vendors to tailor engagement strategies to the specific stakeholder dynamics of each building segment.

Sustainability and Energy Efficiency Initiatives

Sustainability continues to be a major driver of smart building technology investment, though its prominence has evolved. 75% of organizations have formal net-zero carbon emissions goals, a slight increase from 74% in 2024. More significantly, 53% now have clear roadmaps and timelines to achieve net-zero, up from 44% in 2024. This indicates growing organizational maturity in sustainability planning and execution. An additional 22% have net-zero goals without clear roadmaps, while 13% have other formal sustainability goals. Only 8% of organizations lack sustainability objectives.

Net-zero goal prevalence correlates strongly with building and portfolio size. Buildings larger than 250,000 sq ft and portfolios exceeding 50 buildings demonstrate 75% adoption rates with defined roadmaps, while smaller buildings and single-site portfolios lag in goal clarity. Retail/Hospitality segments lead in net-zero commitment, followed by Mission-Critical and Commercial Multi-Unit buildings.

The primary driver of energy efficiency and sustainability initiatives is reducing operating costs (31%), underscoring the economic imperative behind green investments. This is followed by meeting corporate sustainability or ESG goals (19%), regulatory or compliance requirements (18%), and enhancing occupant health, comfort, or productivity (14%). Smaller percentages cite improving asset value or marketability (8%), attracting/retaining tenants or employees (3%), and reducing environmental impact/carbon footprint (3%) as primary drivers, though these factors likely serve as secondary motivations.

Technology priorities for energy and sustainability management remain consistent year-over-year. Real-time energy monitoring is the top feature priority across all building types, followed by automated energy optimization and predictive energy analytics. Occupancy-based controls are gaining attention, reflecting a growing understanding of how occupancy patterns can optimize energy consumption. Real-time water monitoring also appears among top priorities, indicating a holistic approach to resource management beyond energy alone.

Despite strong goal-setting, organizations face substantial challenges in measuring and reporting on sustainability performance. The top challenge is the high cost of measurement/reporting solutions (47%), followed by insufficient or unreliable data from building systems (37%), lack of internal expertise or resources (31%), and lack of integrated systems/data silos (28%). Additional barriers include difficulty aligning with reporting standards/frameworks such as GRI and TCFD (25%), limited executive or

stakeholder buy-in (21%), and unclear ROI or business case for investment (21%).

Tracking and reporting methods reflect a hybrid approach. 65% of organizations use automated software/platforms, while 49% still rely on manual tracking/spreadsheets, and 32% engage third-party audits. Only 8% do not currently track or report on sustainability, suggesting near-universal recognition of its importance. When it comes to execution, organizations employ an even split between internal management, outsourcing to suppliers, and hybrid approaches, indicating no single preferred delivery model has emerged for sustainability initiatives.

Payment Models and Monetization Preferences

Understanding how organizations prefer to pay for smart building solutions provides critical insights for technology vendors and service providers. In 2025, annual subscriptions dominate both current usage (52%) and preferred payment models (37%). One-time purchases remain significant at 38% current usage and 29% preference, while monthly subscriptions account for 39% usage and 19% preference. Pay-per-use or outcome-based models are used by 23% and preferred by 7%. Indicating modest but growing interest in performance-based pricing. Bundled services represent 14% of current usage and 6% preference.

Payment model preferences vary by building and portfolio size. Larger buildings (>250k sq ft) and portfolios (>50 buildings) show a stronger preference for annual subscriptions and contract flexibility, while single sites and small portfolios prioritize integration with existing systems and one-time purchases. As building and portfolio size increase, the number of factors influencing purchasing decisions also expands, reflecting greater organizational complexity.

The top three factors influencing willingness to pay for smart building solutions are:

1. Flexibility of contract terms (53%)
2. Integration with existing systems (48%)
3. Clear ROI/cost savings (47%)

Other important factors include support/training included (36%), vendor reputation (35%), and regulatory or compliance needs (19%). When evaluating solution value relative to price, organizations prioritize operational improvements (62%), cost savings (59%), and sustainability impact (52%), with occupant satisfaction (32%) also playing a role.

Regulatory and economic policies also shape investment decisions. Surprisingly, 68% of respondents report that recent volatility in economic policy and the regulatory environment is accelerating their investment in smart building technologies. Only 24% report no impact, 6% report a negative impact, and 3% are uncertain. This suggests that despite—or perhaps because of—policy uncertainty, organizations are proactively investing in technologies that reduce costs, enhance operational resiliency, and ensure regulatory compliance.

Regulatory and Standards Impact

Regulations and standards play a significant role in shaping smart building technology adoption. When ranking the impact of various regulations on building upgrades and technology adoption, Building Codes and Standards (e.g., International Building Code) now rank as the #1 driver, followed by Energy Efficiency Standards (e.g., Energy Star, LEED certification). Environmental Regulations (e.g., EPA guidelines, City/State Building Performance Standards) have gained prominence compared to prior years, ranking third. Other influential regulations include Occupational Safety and Health Regulations, Data Privacy and Security Regulations, and Accessibility Regulations (e.g., ADA).

The elevated importance of Environmental Regulations reflects the growing impact of building performance standards enacted by cities and states, which mandate carbon reduction targets and penalize non-compliance. Organizations must navigate this rapidly evolving regulatory landscape while balancing operational, financial, and strategic priorities.

Outlook and Solution Development

Looking ahead, the 2025 survey reveals a market environment characterized by robust spending, accelerating AI and digital twin adoption, and persistent challenges related to cost, integration, and organizational readiness. Expected spending trajectories are stable or increasing across all technology categories, with cybersecurity, sensors/data collection, and BMS/BAS leading anticipated growth. The combination of strong ROI outcomes (81% report ROI met or exceeded expectations), positive AI impact assessments, and high digital twin adoption rates suggests that organizations successfully deploying smart building technologies are realizing measurable value.

However, the dual financial and environmental motivations behind smart building investments remain tempered by concerns. High costs, integration complexity, data management challenges, and lack of in-house expertise continue to slow broader adoption and value realization. Organizations that can navigate these challenges—through strategic partnerships, phased deployment approaches, robust data infrastructure, and workforce

development—are best positioned to capitalize on the opportunities smart building technologies offer.

The convergence of sustainability mandates, digital transformation imperatives, and occupant experience expectations creates a compelling business case for continued investment. As cloud-based BMS, AI-driven optimization, and digital twin platforms mature, the smart building industry stands at an inflection point where technology capabilities, market readiness, and regulatory pressures align to drive the next wave of adoption and innovation.

For more information on the survey and related report, please visit ASHB's website: https://www.ashb.com/