

Buildings Sector Transformation: Top Strategic Imperatives and Growth Scenarios

Empowering Growth Through AI, Sustainability, and Operational Resilience in Smart Buildings

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FROM RISK TO RESILIENCE: ADAPTIVE APPROACHES

WHAT'S HOLDING US BACK

Escalating operations and maintenance expenses, plus ESG compliance demands

Complexities in Al adoption and data management

Concerns around data storage, privacy, and security

Limited availability of skilled labor for maintenance, repairs, and construction

Global market volatility and uncertainty

HOW WE MOVE FORWARD



Al-driven solutions to transform SaaS-based construction management and building operations



Unified Building Intelligence Platforms (UBIPs) to align business efficiency with facility performance

Data centers powering IoT-enabled HVAC and energy optimization opportunities

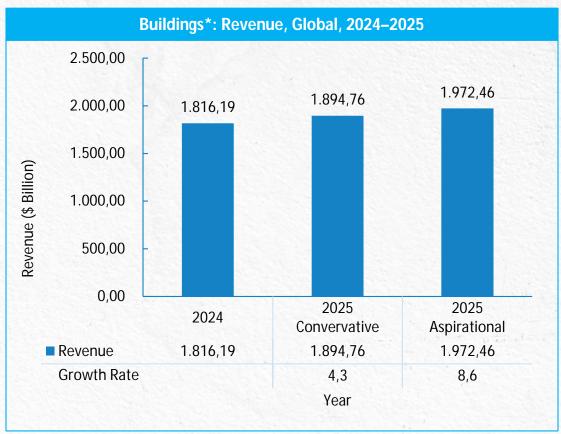
Integrated HVAC and aftermarket service models to accelerate decarbonization efforts

Workforce management tools to address global labor shortages in construction



Robotics and automation to promote sustainable and safe construction practices

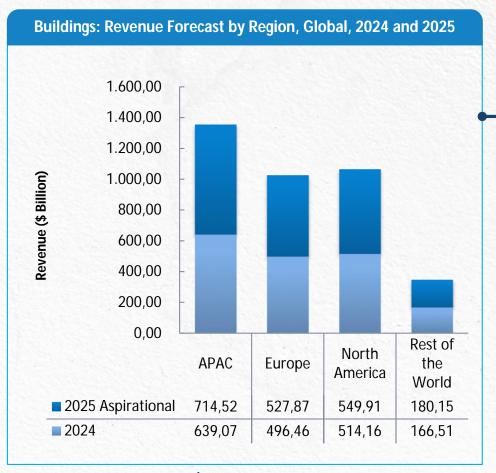
BUILDINGS SECTOR SCENARIOS AND STRATEGIC PRIORITY



^{*} Comprises smart building management, critical building equipment (HVAC, fire, security, elevator, etc.), lighting, facility management, construction management, and smart homes only

Smart Buildings as a Strategic Priority • Sustainable climate-smart systems • Digitized maintenance • Integrated smart building platforms **SMART BUILDINGS 50B** IoT devices by 2050 Building energy consumption from HVAC 70% and lighting 3 to 5 Smart buildings ROI years

BUILDINGS SECTOR SCENARIOS AND STRATEGIC PRIORITY Growth And Segment Focus





segments for

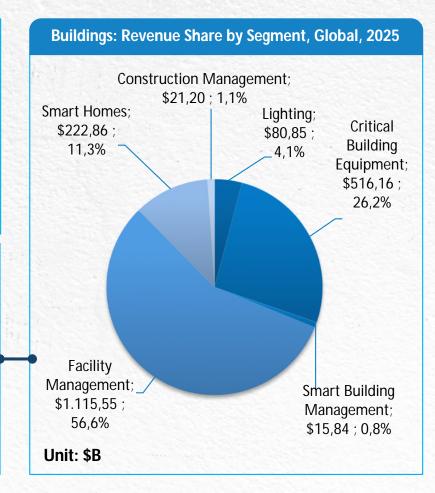
Smart Building

Critical Building

Management

Equipment

growth:



EVOLUTION FRAMEWORK OF BUILDINGS

VALUES AND SOLUTIONS



TRADITIONAL BUILDING

2

SMART BUILDING

3

COGNITIVE BUILDING

MANAGEMENT AND CONTROL

- Historical data
- · Centralized remote control
- Alerts

OPTIMIZATION

- · Real-time analytics
- Connected components
- Pervasive network

FORECAST AND PLANNING

- Predictive analytics
- Ubiquitous computing
- Forecasting and anticipation

EVOLUTION

MATURITY TO SOPHISTICATION

- O Interaction between buildings
- O Interaction between people and buildings
- O Space optimization solutions

CURRENT TO FUTURE



Connection

 Integrated sensors and smart devices working together to make buildings smarter



Network





Energy Management

Integrated building solutions with energy management

FUTURE



Information

- Building data, energy flow, and occupancy with BIM and operational twins combining design and live automation
- Big Data evaluation and integration powered by cloud and mobile networks for IoT analytics

Intelligence



- —Virtualization and AI
- —Scenario planning
- From diagnostic to predictive and prescriptive analytics

TOP 10 STRATEGIC IMPERATIVES IN SMART BUILDINGS

The Top Transformations Impacting Future Growth Potential

Transformative Megatrends



1. Evolution of Decentralized Energy

for net-zero goals, reducing grid reliance despite cost challenges Innovative Business Models



2. Al for Predictive Building Maintenance

uses IoT and digital twins for real-time alerts and equipment reliability Industry Convergence



3. Cross-industry Partnerships

drive innovation and cost savings, and BAS through shared resources

Value Chain Compression



4. Mobile Platforms

simplify BAS, enabling efficient control of HVAC, lighting, and security

Geopolitical Chaos



5. Resilient Infrastructure

to withstand disasters, geopolitical risks, and health crises

Disruptive Technologies



6. Augmented Reality

improves training, troubleshooting, and safety with visual guidance Internal Challenges



7. Data Privacy and Security

protect building data without compromising performance

Transformative Megatrend



8. Carbon-neutral Solutions

to drive buldings sustainability and efficiency Internal Challenges



9. Digital Resistance

must be addressed via training and phased deployment Competitive Intensity



10. Al Start-ups

drive innovation, pushing traditional providers toward partnerships

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TOP 10 STRATEGIC IMPERATIVES IN SMART BUILDINGS Highlights

Evolution of Decentralized Energy Al for Predictive Building Maintenance Al reduces unexpected equipment 40% Buildings use 40% of global energy 50% failures by nearly 50% Decentralized energy investment \$100B Digital twins, IoT sensors, and generative projected in next decade Al are the 3 major technologies Solar and wind dominate decentralized Up to 70% of HVAC issues can be 70% 70% energy mix prevented with predictive analytics 2050 Net-zero target year for many countries 2X 2X ROI vs traditional maintenance **Resilient Infrastructure Carbon Neutral Solutions** Estimated annual investment for global Global disaster-related losses in 2024 carbon-neutral infrastructure by 2050 Average supply chain disruption during Buildings worldwide could integrate 2 Weeks **1B** major geopolitical events renewable energy by 2050

\$130B Annual investment needed for climate-resilient infrastructure worldwide

geopolitical disruptions

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40% of project delays are linked to

Carbon-neutral policies cover 80% of

Renewable energy, efficient materials,

and digital analytics are the 3 solutions

global urban development plan

80%

CHALLENGES PREVAILING IN SMART BUILDINGS

Rising Construction Costs and Projects Delay



Construction costs have jumped since 2020

20%++

Retiring Skilled Workforce for General Maintenance and Repairs



FM workers may retire by 2030

4 in 10

Increasing O&M Costs and Pressure towards ESG Compliance



O&M as percent of building lifecycle cost

70%

Data Integration Challenges in Multi-site Enterprises



Firms with fully integrated building systems

16%

Capital Risks in High Value Infrastructure Projects



Percent of mega projects go over budget

60%

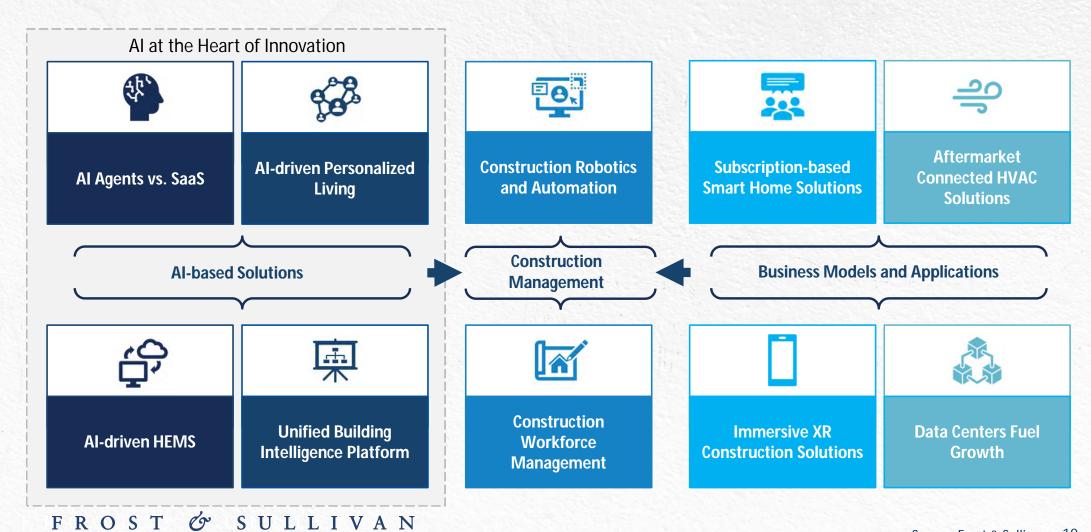
Lack of Integrated Approach in Equipment Maintenance



Unplanned downtime costs more than planned maintenance

OX more

NEXT-GEN APPROACHES IN SMART BUILDINGS



NEXT-GEN APPROACHES IN SMART BUILDINGS

Al Value Creation In Digital Lifecyle Management







Planning & Design

Al-driven insights to empower AEC design professionals to create a design vision for stakeholders.

30%

Al can cut design time by up to 30% by automating simulations and optimizing layouts.

Construction

Al-driven insights optimize construction efficiency and cost from design to delivery.

Al tools have helped reduce project delays by 3 months on large-scale developments.

Operations & Maintenance

Al streamlines energy use, minimizes downtime, and enhances operations.

40%

Al-driven maintenance can lower equipment downtime by up to 40%.

Facility Management

Al-enabled FM solutions will automate repetitive tasks and mainly improve health and wellness of occupants.

Al-enabled systems can adjust indoor environments every 5 minutes based on realtime occupancy and air quality.

Property Management

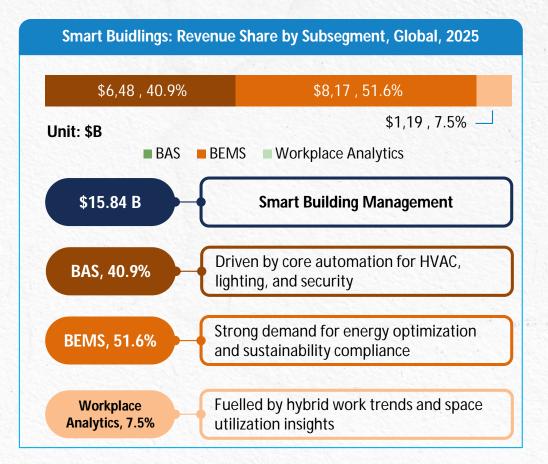
Al-driven property management solutions to improve overall customer experience.

80%

Al chatbots can resolve 80% of tenant queries without human intervention.

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NEXT-GEN APPROACHES IN SMART BUILDINGS Metrics and Strategic KPIs



KPIs	Trend	Comments
Al and loT- driven Solutions	•	Al-based smart buildings and infrastructure revenue to grow over 25% in 2025
Climate-smart Solutions	•	Climate-smart solutions revenue to grow by 12.5% in 2025
PropTech Innovation	•	 PropTech market to register over 9% growth in 2025
Al Agents vs. Software-as-a- service	•	 Vendors will build Al agents to automate tasks and link productivity tools with building OT
Energy Efficiency Policies	•	 Energy efficiency policies are being updated and favouring BEMS solutions





NEXT-GEN APPROACHES IN SMART BUILDINGS AI-Based Solutions and Growth Opportunities

As-built Verification during Construction

Al-enabled reality capture creates video documentation and supports as-built verification from pre-construction to handover.

Outcome-based BIM

Al simplifies design and unifies BIM workflows, shifting from traditional modeling to outcome-based design.

Data-driven Healthy Building Solutions

Al helps facility managers enhance occupant comfort and wellness through data-driven occupancy, cleaning, and pipe monitoring.



Cognitive Built Infrastructure

Al helps build low-carbon, cognitive megainfrastructures by reducing capital risks through digital twin-enabled Metaverse platforms.

Building Energy Optimization

Al-driven energy optimization using deep reinforcement learning analyzes multiple factors to set optimal performance parameters.

Building Asset Maintenance

Al-driven digital maintenance transforms building operations with remote services and a proactive approach.

CALL TO ACTION FOR SMART BUILDING ADVANCEMENT

Invest in R&D Cross-industry collaboration Boost Resilience 噩 **Secure and sustain Drive digital adoption** SULLIVAN FROST

- Decentralized energy + Al predictive maintenance can cut costs by 20-30%.
- These innovations accelerate smart building adoption and reduce reliance on traditional grids.
- Partnerships improve BAS efficiency; 70% of firms prioritize joint innovation.
- Collaboration fosters creativity and speeds up technology integration across sectors.
- AR-enabled BAS reduces downtime by 40%.
- Resilient systems protect operations during disasters and geopolitical disruptions.
- Carbon-neutral tech can lower emissions by 40%.
- Strong data protection builds trust and ensures long-term sustainability.
- Al and mobile platforms deliver 2X ROI vs traditional systems.
- Digital tools enhance user experience and streamline building operations.

THE EUROPEAN WAY FORWARD

In 2025, Europe's growth outlook is **moderate** compared to APAC and North America. While APAC leads in scale and speed, Europe stands out for **regulatory-driven sustainability** and **innovation in energy efficiency**.

Leverage ESG leadership

Turn compliance into competitive advantage by accelerating decarbonization and zero-emission building strategies.

Service-based business models

Move beyond product sales to subscription-based offerings and data-driven platforms.



Double down on digitalization

Expand AI, IoT, and smart building ecosystems to match APAC's tech adoption pace.

Health and wellness as driver

Position IAQ and adaptive HVAC as premium differentiators.

KEY TAKEAWAYS

ESG Leadership Drives Advantage

> Compliance becomes a growth lever through decarbonization and zeroemission strategies.

Digitalization is Non-**Negotiable**

Al, IoT, and smart ecosystems are critical to match global tech adoption.

Service-Based Models Gain Traction

Shift from products to subscription and datadriven platforms.

Health and Wellness as Differentiators

IAQ and adaptive HVAC remain premium features for occupant well-being.

Innovation and Resilience Secure the Future

R&D, collaboration, and carbon-neutral solutions ensure long-term competitiveness.

