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Bridging the Divide: How Data Centre Operators and Suppliers Align on Uptime, Efficiency, and Growth

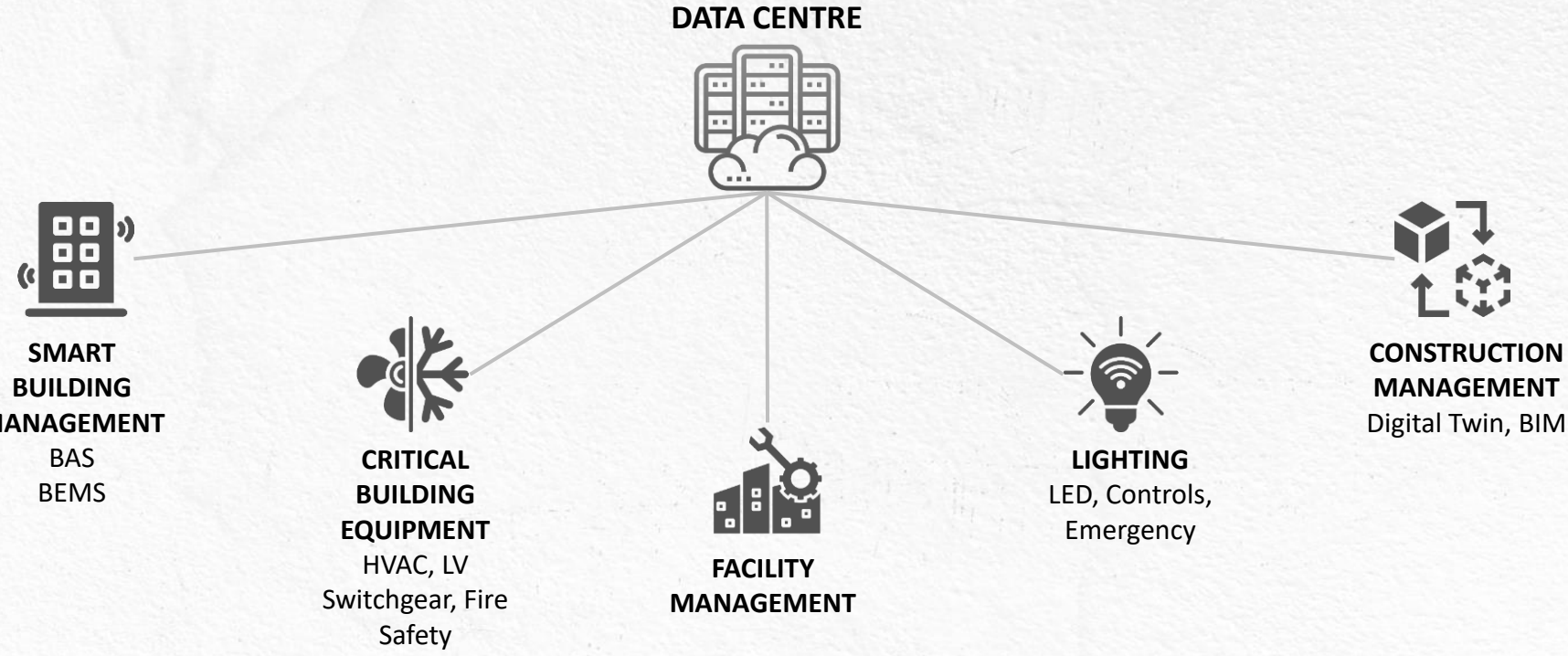
Navigating scale, complexity, and risk in mission-critical facilities

FOCUS POINTS

1	DATA CENTRE ECOSYSTEM
2	OVERALL PERSPECTIVES
3	PERSPECTIVES ON BUILDING TECHNOLOGIES AND SERVICES
4	GROWTH OPPORTUNITIES & CALL TO ACTION
5	KEY TAKEAWAYS

DATA CENTRE ECOSYSTEM

Building & Operations Ecosystem

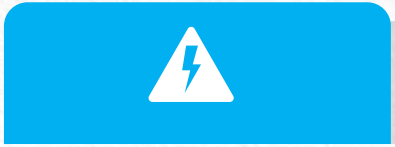


Data centres rely on a tightly integrated building and operations ecosystem.

DATA CENTRE ECOSYSTEM

Common Misconception

Thinking data centers are “just buildings”



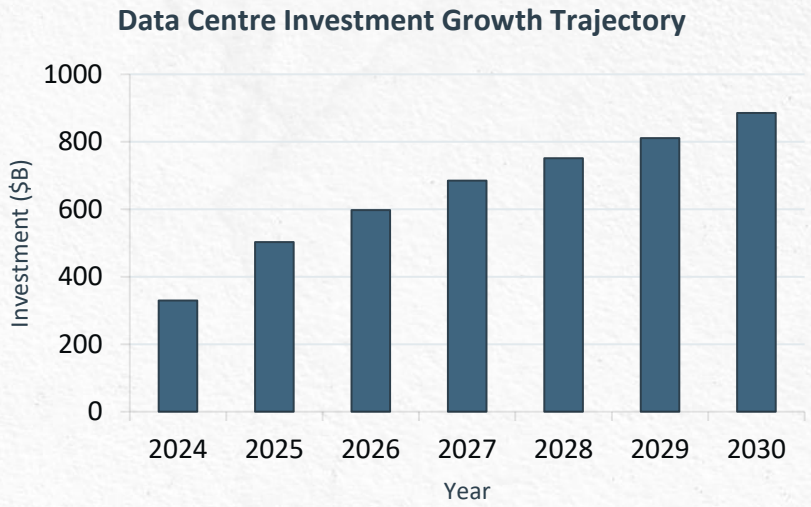
Underestimating the constraint of power availability

Assuming AI racks can run in legacy facilities

Over-optimizing white space while under-designing gray space

DATA CENTRE ECOSYSTEM

Challenges and Outlook



12%
CAGR, 2025-2030

$885B
2030 Market Size

1. **Business operations** face specialized workforce shortage, rapid technology obsolescence, and energy cost volatility as critical constraints
2. **Facilities teams struggle** with cooling efficiency and power constraints as rack densities rise and sustainability targets tighten
3. **Cybersecurity** and regulatory compliance add complexity
4. **Supply chain vulnerabilities** disrupt expansion schedules and maintenance operations

Data centre expansion is accelerating, but complexity is rising faster.

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Source: Frost & Sullivan

OVERALL PERSPECTIVES

Operators' Critical Pain Points

1. **Uptime and reliability – continuous operation during upgrades**
2. **Energy efficiency and thermal management**
3. **Integration with existing infrastructure**
4. **Cybersecurity and compliance**
5. **Scalability for future growth**

"Keeping high-density racks cool is a constant balancing act. Energy efficiency cannot come at the expense of uptime or compliance."

"Our BAS has to be fully redundant and integrated with security. In a mission-critical environment, failure is not an option."

"Fire detection must be ultra-sensitive and tightly controlled. Suppression must protect IT assets without causing damage."

Operators struggle to justify building upgrades against IT spend.

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Source: Frost & Sullivan

OVERALL PERSPECTIVES

Suppliers' Critical Pain Points

"Space and airflow constraints make high-density cooling retrofits costly and complex."

"ROI concerns slow decisions, while monitoring and response create ongoing support strain."

"Customers expect hard proof, better cooling efficiency, predictive failure insights, and credible carbon metrics, not just promises or dashboards."

Suppliers face rising complexity and tougher ROI scrutiny.

1. **Demonstrating operational ROI beyond energy savings**
2. **Complex high-density cooling retrofits**
3. **Extended procurement and approval cycles**
4. **Heavy post-installation support commitments**
5. **Customisation for variable load profiles**

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Source: Frost & Sullivan

OVERALL PERSPECTIVES

Constraints and Expectations

N+1 or 2N	99.999%	Zero-downtime
Redundancy	Uptime	Maintenance

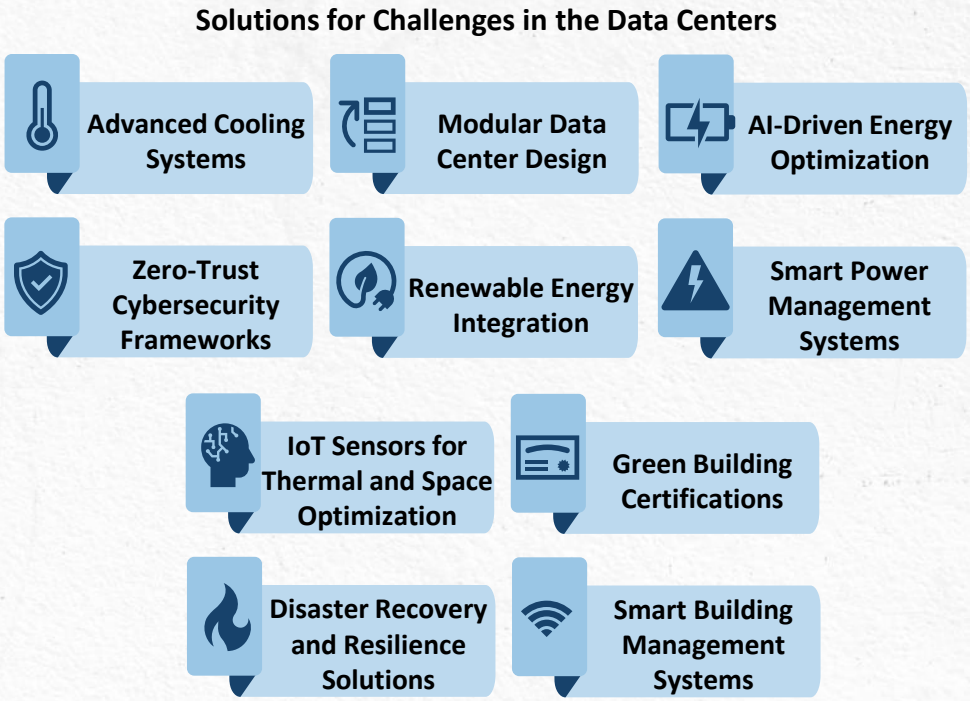
CONSTRAINTS and EXPECTATIONS

- **Retrofitting** requires compact controllers and wireless protocols to overcome space limitations whilst **minimising downtime**
- **Security** demands advanced encryption, compliance certifications, and hardening against OT-specific threats
- Demonstrating gains in **uptime and efficiency** beyond energy savings justifies premium solutions
- Customers require **granular sustainability metrics** with real-time carbon tracking dashboards for ESG reporting
- Solutions must support **modular expansion** without replacing controllers or rewriting core logic
- **Post-installation support** includes continuous monitoring, rapid response, and predictive maintenance analytics

Mission-critical uptime drives design, security, and support expectations.

OVERALL PERSPECTIVES

Technology Adoption



Up to 2027

Advanced cooling solutions
Energy efficiency and power management
Cybersecurity solutions

Up to 2030

AI and predictive analytics
Automation and robotics
Edge integration

Beyond 2030

Digital twins for data centres
Self-healing infrastructure
Quantum-ready infrastructure

Data centres are moving from efficiency to intelligence and autonomy.

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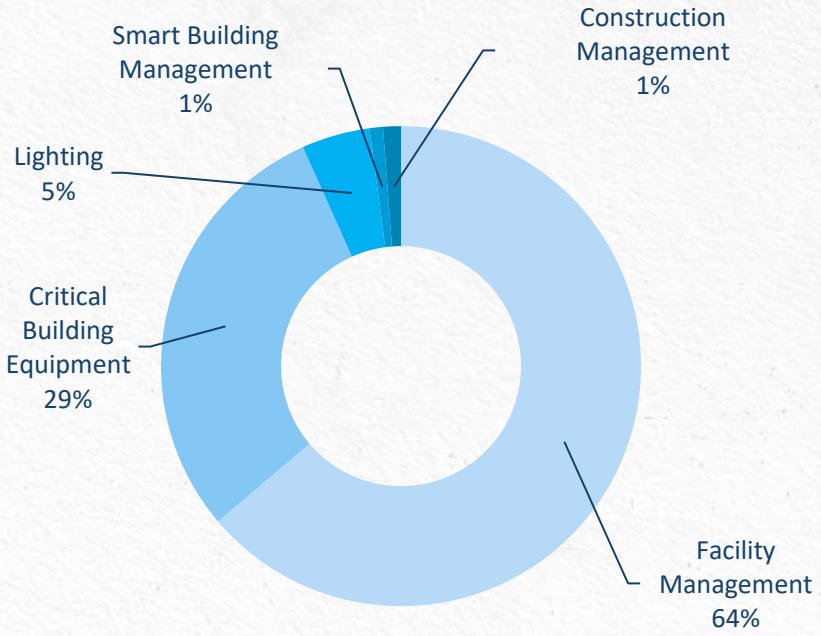
Source: Frost & Sullivan

PERSPECTIVES ON BUILDING TECHNOLOGIES AND SERVICES

Opportunity Landscape in All Building Types

Building Technologies Revenue by Segment (2025) (All Building Types)



$1,750B	8.8%	10,000+
Market, 2025	Growth, 24-25	Competitors

- Critical Building Equipment segment growing 10.9% driven by HVAC modernisation for AI workloads
- Construction management fastest-growing at 22.4% with BIM and digital twins
- Smart building platforms expanding 11.9% annually for mission-critical uptime

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Source: Frost & Sullivan

PERSPECTIVES ON BUILDING TECHNOLOGIES AND SERVICES

Smart Building Management in Data Centres

$1.23B	$0.36B	Sub-second
BAS, 2025	BEMS, 2025	Monitoring

"Clients demand granular sustainability metrics. Our BAS platforms include real-time carbon tracking dashboards and energy optimization analytics to meet ESG reporting requirements and improve transparency."

"Cybersecurity is a top priority. BAS must integrate advanced encryption and strict network segmentation to protect sensitive operational and client data while meeting global compliance standards."

Perspectives from Operators

1. **Uptime and reliability**—Continuous operation, even during upgrades
2. **Energy efficiency and cost control**—PUE, cooling optimisation, and ROI
3. **Legacy integration challenges**—Proprietary systems delay adoption

Perspectives from BAS / BEMS Providers

1. **High-density retrofits are complex**—Physical and operational constraints
2. **Tightening security expectations**—Encryption, segmentation, compliance
3. **ROI proof beyond energy**—Uptime, resilience, operational gains

Zero-tolerance uptime makes BAS the control backbone of data centres.

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Source: Frost & Sullivan

PERSPECTIVES ON BUILDING TECHNOLOGIES AND SERVICES

Critical Building Equipment–HVAC in Data Centres

$18.29B	9.0%	99.999%
HVAC, 2025	CAGR, 2025-2030	Uptime design target

"Maintaining precise airflow and humidity is critical. Even minor fluctuations can trigger thermal alarms and impact server reliability during high compute loads."

"Scalability is key. Our HVAC solutions support modular expansion without major reconfiguration, ensuring cooling efficiency as data centres grow and compute density increases."

Perspectives from Operators

1. **Precision cooling requirements**—Strict temperature and humidity control
2. **Energy efficiency targets**—Reduce cooling energy without risking uptime
3. **Legacy system integration**—CRAC and chiller upgrades complicate modernisation

Perspectives from HVAC Providers

1. **High-density retrofits are complex**—Physical limits and airflow constraints
2. **Energy savings beyond PUE**—Customers demand measurable outcomes
3. **Reliability expectations are extreme**—Failures carry catastrophic downtime risk

Cooling, power, and fire systems directly determine data centre uptime.

PERSPECTIVES ON BUILDING TECHNOLOGIES AND SERVICES

Facility Management in Data Centres

$20.34B	9.0%	SLA Compliance
FM, 2025	CAGR, 2025-2030	Tracking + Response

"Managing multiple sites under one FM platform is difficult. We need unified dashboards to track preventive maintenance and compliance without relying on manual spreadsheets."

"Mobile-first functionality is now essential. We deliver FM apps with secure offline access for technicians working in restricted zones and high-security environments."

Perspectives from Operators

1. **Maintaining uptime during maintenance**—Zero disruption to IT operations
2. **Managing specialised infrastructure**—Complex cooling, power, and fire systems
3. **High stakes of human error**—Minor mistakes can trigger major downtime

Perspectives from FM Providers

1. **Zero-downtime maintenance design**—Service without impacting operations
2. **High-density configuration challenges**—Complex layouts and airflow patterns
3. **Pressure to deliver predictive maintenance**—Analytics-driven failure prevention

FM value is now defined by uptime, compliance, and SLA delivery.

PERSPECTIVES ON BUILDING TECHNOLOGIES AND SERVICES

Lighting–LED in Data Centres

$0.80B	10.7%	Thermal Balance
LED, 2025	CAGR, 2025-2030	Low Heat + High Efficiency

"Heat load reduction from LEDs is vital. Even minor radiant heat can affect cooling balance in high-density racks."

"Uniform lighting across narrow aisles matters for safety and efficiency… shadow zones complicate maintenance."

Perspectives from Operators

1. **Energy efficiency under 24/7 operation**—Reduces power load in always-on facilities
2. **Thermal impact on cooling systems**—Even minor heat output affects cooling stability
3. **Reliability in restricted environments**—Long lifespan minimizes maintenance disruptions

Perspectives from LED Providers

1. **High-reliability design requirements**—Ultra-low failure rates are essential for uptime
2. **Thermal management for continuous use**—Must maintain performance under constant operation
3. **Design for confined rack spaces**—Precision optics needed for narrow aisles and vertical layouts

LED value in data centres is defined by thermal impact, reliability, and operational efficiency, not just energy savings.

PERSPECTIVES ON BUILDING TECHNOLOGIES AND SERVICES

Construction Management in Data Centres

$5.3M	17.2%	Operational Intelligence
BIM & Digital Twin, 2025	CAGR, 2025-2030	Simulation + Predictive Insights

"Digital twins should provide actionable insights, not just 3D visuals. Predictive failure alerts for cooling and power systems are critical for operational planning."

"Maintaining model accuracy is challenging. Frequent rack changes require automated updates to avoid discrepancies during audits."

Perspectives from Operators

1. **Enhanced asset visibility**—Real-time view of racks, power, cooling, and cabling
2. **Predictive maintenance and risk reduction**—Simulate failures before they occur
3. **Integration with DCIM platforms**—Seamless data exchange with live systems

Perspectives from BIM / Digital Twin Providers

1. **Integration with legacy infrastructure**—Aligning BIM with existing electrical and cooling systems
2. **Data accuracy and synchronization challenges**—Ensuring real-time updates across platforms
3. **Pressure to demonstrate operational value**—Moving beyond visualization to performance insights prevention

BIM and digital twin value is shifting from design tools to real-time operational intelligence and predictive decision-making.

GROWTH OPPORTUNITIES & CALL TO ACTION

$885B	$12.0%	$57B
Data Centre Investment, 2030	CAGR, 2025-2030	Data Centre Opp for Building Specialists, 2030

Next-Gen Cooling and Energy Optimisation

Redefine strategies for high-density environments

Operational Intelligence and Automation

Infuse automation into mission-critical operations

Green Energy Integration

Advance carbon-neutral transformation with smart frameworks

Rapid Capacity Expansion

Accelerate hyperscale deployment through modular innovation

KEY PRIORITIES FOR BOTH OPERATORS AND SUPPLIERS

- Demonstrate **measurable ROI beyond energy savings**, with cybersecurity embedded
- Deploy **edge-ready platforms** with decentralised control and AI-driven diagnostics
- Deliver **granular sustainability metrics** with **modular** expansion capability
- Adopt **digital twins** and automation to address workforce constraints

Source: Frost & Sullivan

KEY TAKEAWAYS

1 Uptime and Reliability Drive Design

Mission-critical facilities require N+1/2N redundancy, 99.999% uptime, and zero-downtime upgrades.

2 Cooling Complexity Intensifies

High-density AI racks push cooling beyond legacy limits, elevating thermal management as a top concern.

3 Data Centre Investment Surges

Investment is projected to reach $885B by 2030 at 12% CAGR, driven by AI workloads and hyperscale expansion.

4 Cybersecurity Adds Complexity

Zero-trust frameworks, OT-specific hardening, and regulatory compliance layer new demands onto operations.

5 Intelligence Replaces Efficiency

AI-driven optimization, digital twins, and predictive analytics are shifting data centres toward autonomy.