ZincFive

2025

Data Center Energy Storage Industry Insights Report

In partnership with

DATA CENTER Frontier

ENDEAVOR BUSINESS INTELLIGENCE

2025
Data Center
Energy Storage Industry
Insights Report

Executive Summary

As the data center industry continues to evolve, energy storage remains a critical focus, shaped by shifting priorities, emerging technologies, and the growing demands of AI, among other challenges. Conducted by Endeavor Business Intelligence on behalf of ZincFive, this report presents insights from 132 global industry professionals, examining current usage trends, key priorities, and evolving perceptions of energy storage. These findings provide a clear view of the industry's trajectory and the innovations set to define its future.

Key Findings and Trends

- **AI's Biggest Impact:** When asked about AI's effect on power and energy storage, 55% of respondents cited increased energy efficiency requirements, while 54% emphasized the growing need for higher power density and smaller footprints.
- **Drivers for Change:** Cost remains the primary driver for changes in energy storage technology (58%), followed by safety concerns (46%), cooling requirements (42%), product availability (40%), and reliability issues (39%).
- **Sustainability:** In 2025, sustainability continues to gain importance, with 87% of respondents considering it a priority, up from 81% in 2024. Additionally, nearly three-quarters (72%) report significant or moderate cost reductions from their organization's sustainability efforts, an increase from 63% last year.
- **Backup Runtimes:** In 2025, 37% of respondents expect their UPS battery backup run times to decrease in the future, a notable rise from 26% in 2024. Meanwhile, 31% anticipate no change, down from 38% last year.
- **Modular Power Solutions:** Two-thirds (68%) of respondents use modular power solutions and plan to continue, 22% deploy them at all locations, while 14% have no plans for adoption.

The data center energy storage landscape is rapidly evolving, shaped by shifting priorities, emerging technologies, and growing AI demands. Industry professionals cite power availability, cybersecurity and data privacy, sustainability, cooling, and AI as the biggest challenges of the next decade. At the same time, declining trust in existing UPS systems and expectations of shorter runtimes underscore the need for more reliable, adaptable energy storage solutions.

AI is fundamentally reshaping data center operations, driving higher power demands, evolving infrastructure needs, and a shift away from traditional power management strategies. Respondents identified two key impacts: increasing energy efficiency requirements (55%) and the need for higher power density with smaller footprints (54%). These demands are fueling the rise of customized and modular power solutions, which offer flexibility, scalability, and rapid deployment to address power constraints and accelerated build timelines.

Cooling strategies are also adapting to AI-driven workloads. Many respondents emphasized the need for hybrid cooling systems with multiple layers of redundancy – such as air, water, and redundant cooling loops – to mitigate first-line failures. AI-driven monitoring for optimization and predictive maintenance is becoming a key consideration in these strategies.

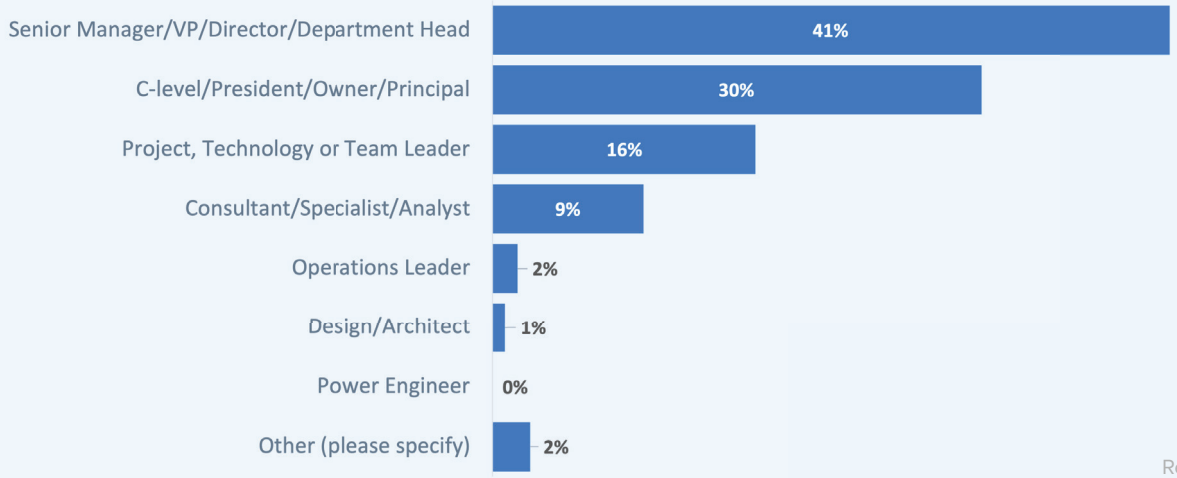
Finally, newer battery chemistries are gaining traction, offering a combination of benefits that align with data center operators' evolving priorities. As AI adoption accelerates and infrastructure challenges grow, the industry is shifting toward more innovative, efficient, and resilient energy storage solutions.

Demographics

Respondent Demographics

Two in five respondents (41%) identified as a senior manager, VP, director or department head, followed by C-level (3%) and project, technology or team leader (16%).

Which of the following best describes your job level?

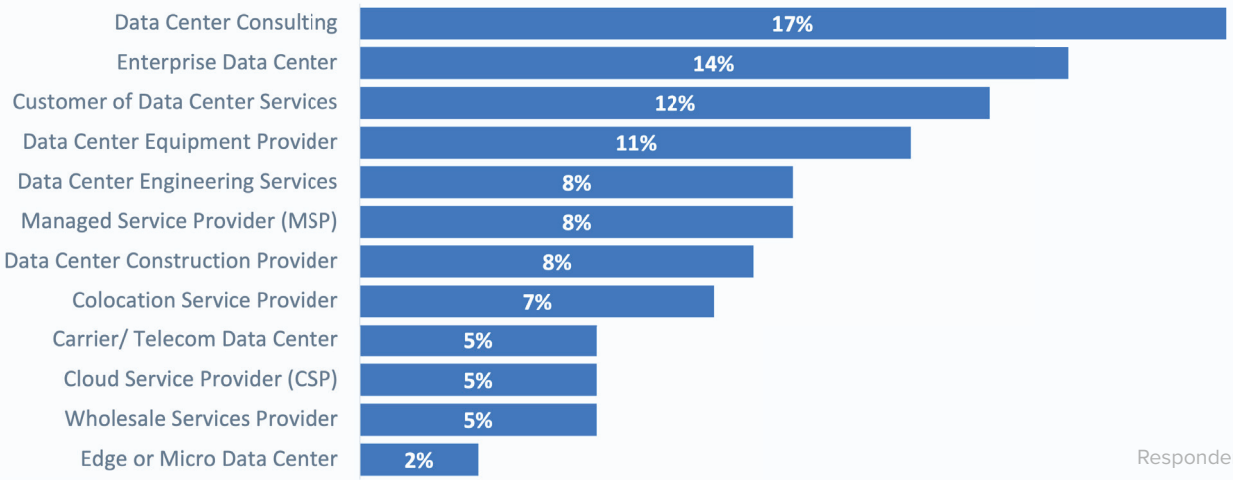


Respondents: n=132

Organizational Demographics

Nearly one in five respondent organizations (17%) is best described as data center consulting, followed by enterprise data center (14%), data center customer (12%), and data center equipment provider (11%).

Which of the following best describes your organization?

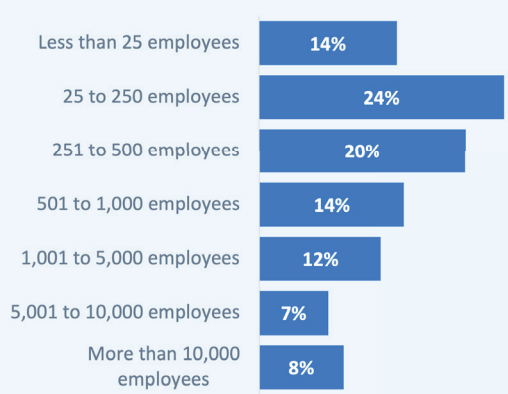


Respondents: n=132

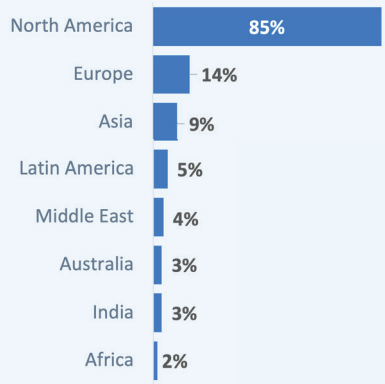
Data Center Demographics

Three in five (58%) respondent organizations had 500 or fewer employees, with a quarter (24%) having between 25 to 250 employees across all locations. Four in five respondent organizations (85%) had a location in North America.

How many employees are in your organization, including all locations?



In what region(s) are you located?

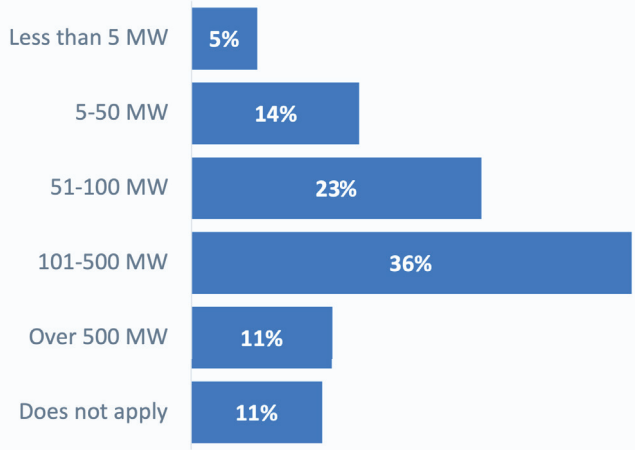


Respondents: n=132 Average number of responses given=1.2

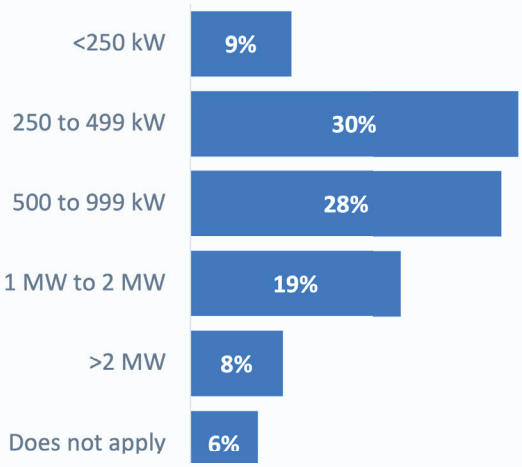
Data Center Demographics

More than a third (36%) of respondents say their organization uses 101-500 MW of total load across all campuses. Three in ten (30%) say their typical deployment UPS size is 250 to 499 kW, followed by 500 to 999 kW (28%).

How many megawatts of total load do your data centers use across all campuses?



What is your typical deployment UPS size?



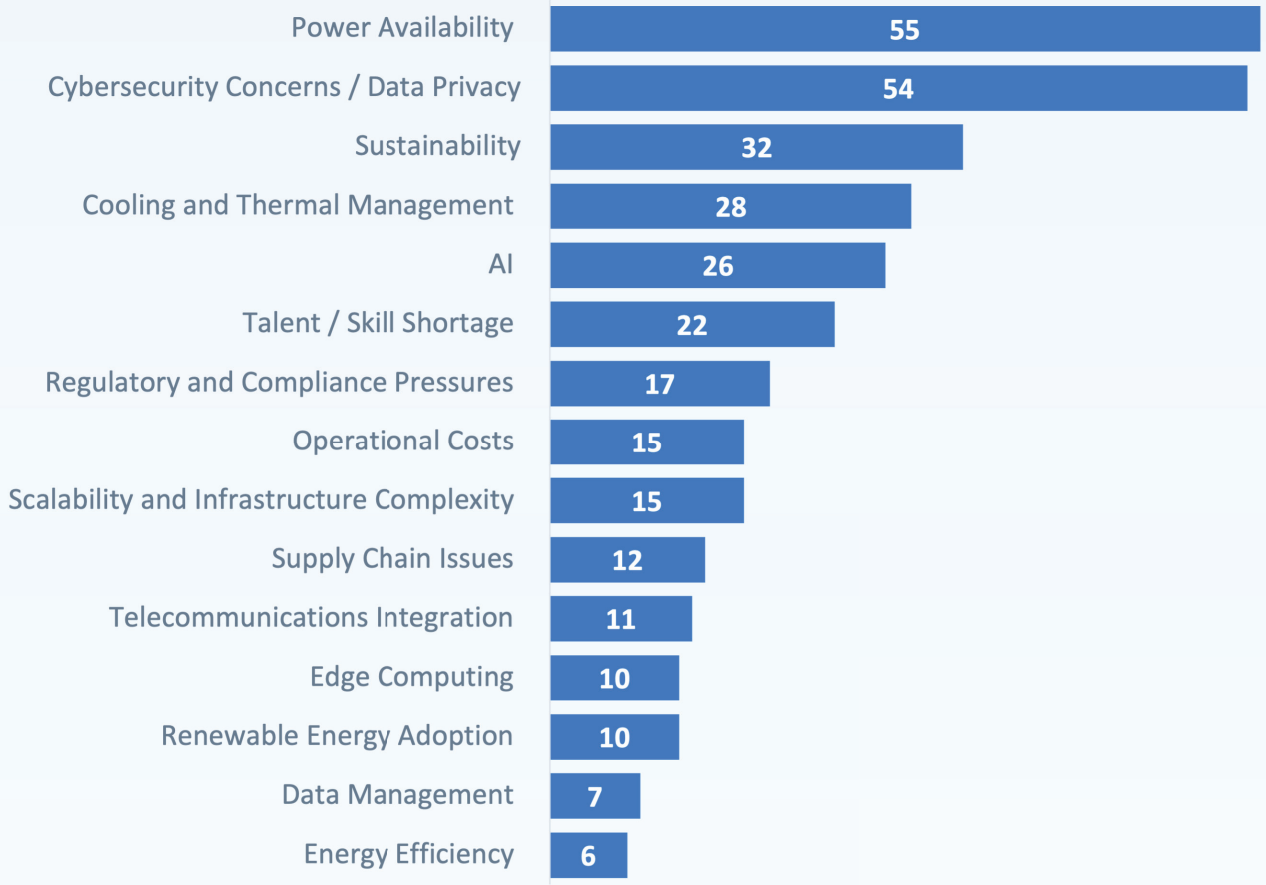
Respondents: n=132

Evolving Challenges in Data Centers

Challenges Impacting the Data Center Industry

When asked about the biggest challenges shaping the data center industry over the next decade, respondents identified power availability, cybersecurity and data privacy, sustainability, cooling, and AI as the top concerns.

Which 3 challenges do you foresee having the greatest impact on the data center industry in the next 10 years? (open end)



Number of responses to an open-ended question
Respondents: n=132

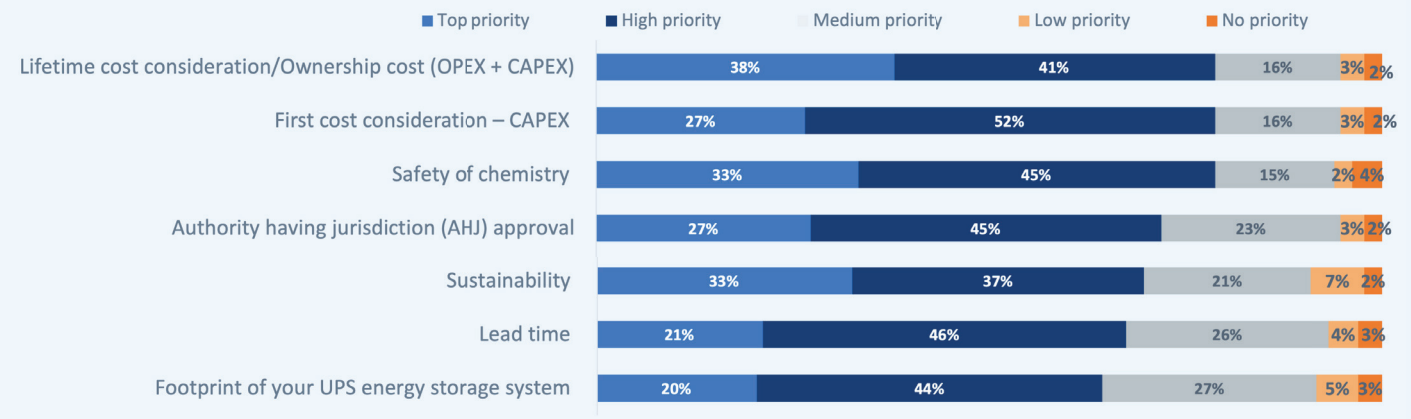
The 15 most frequently mentioned answers are featured

Energy Storage Solutions

Energy Storage Solution Feature Priorities

Lifetime cost remains a key factor, with 79% of respondents ranking it as a top or high priority. Safety and sustainability also hold strong importance, cited by 79% and 70% of respondents, respectively. These priorities continue to lead the way, consistent with findings from the 2024 report.

When selecting an energy storage solution, what priority does your organization place on the following features?

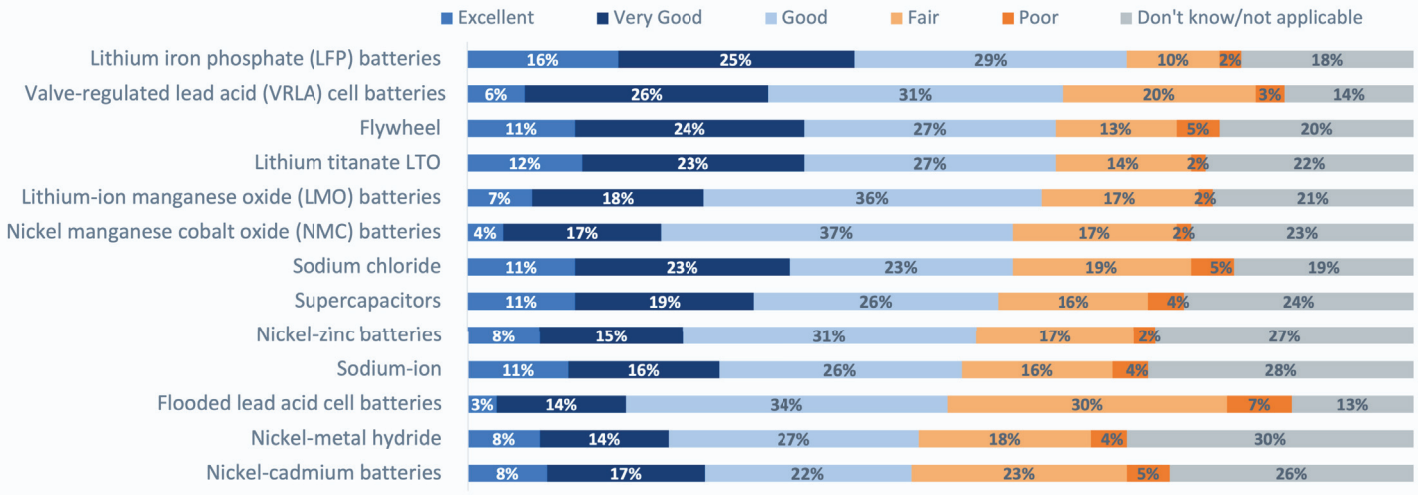


Respondents: n=132

Safety

When it comes to safety, seven in ten (70%) rate LFP batteries as good (Excellent + Very Good + Good), followed by VRLA at 63%.

Please rate each battery type based on SAFETY

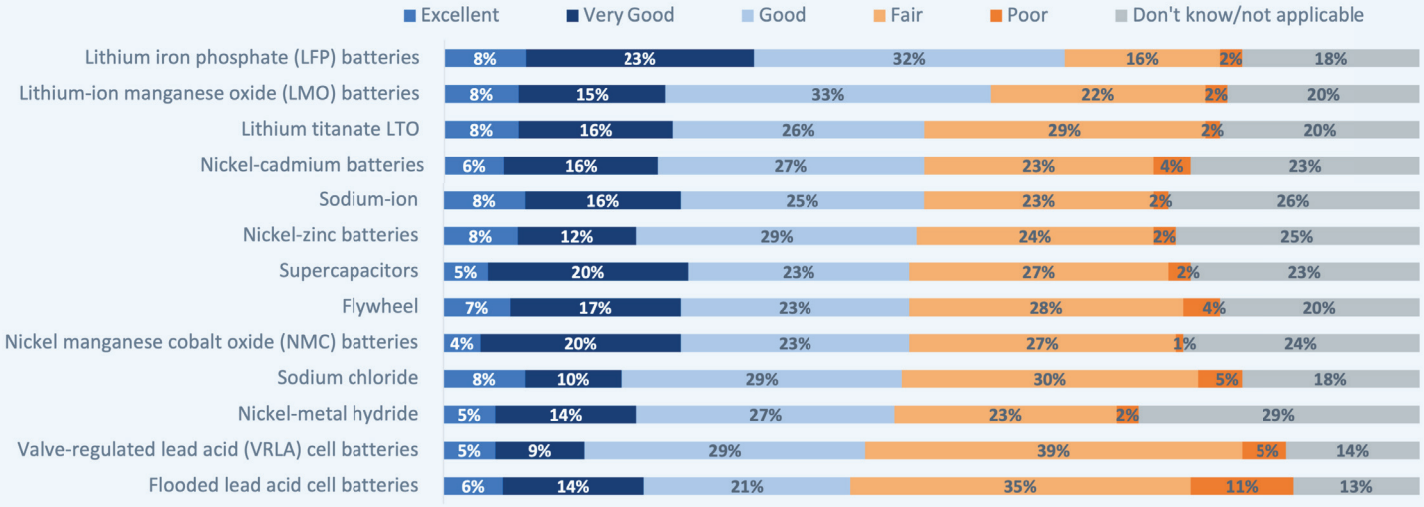


Respondents: n=132

Footprint

When it comes to footprint, two-thirds (63%) rate LFP batteries as good (Excellent + Very Good + Good), followed by LMO batteries at 56%.

Please rate each battery type based on FOOTPRINT

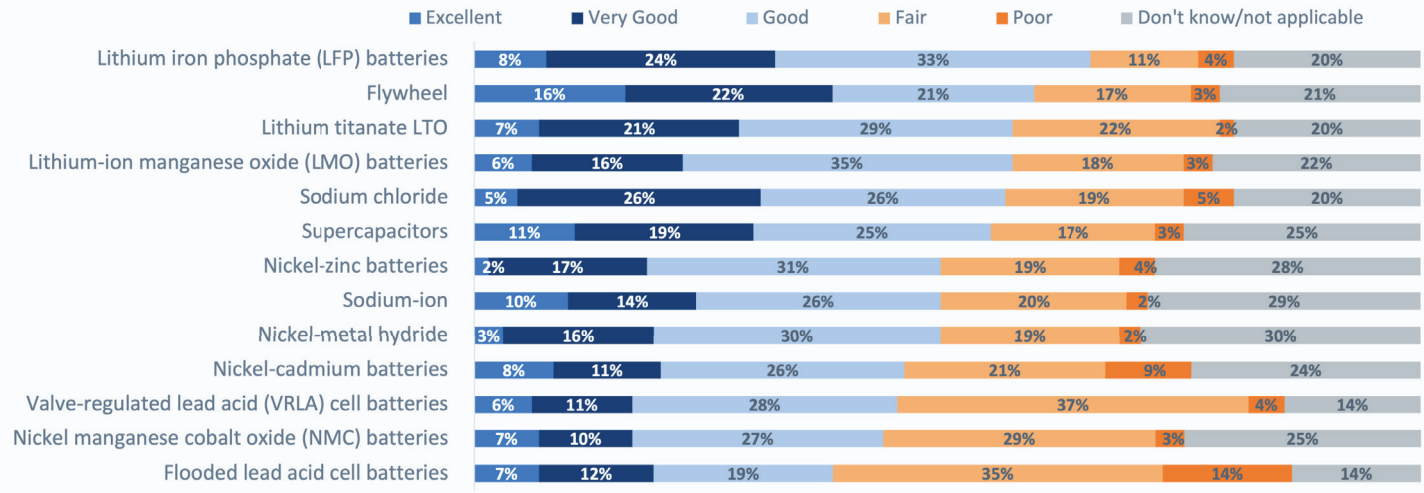


Respondents: n=132

Sustainability

When it comes to sustainability, two-thirds (65%) rate LFP batteries as good (Excellent + Very Good + Good), followed by flywheel at 59%.

Please rate each battery type based on SUSTAINABILITY

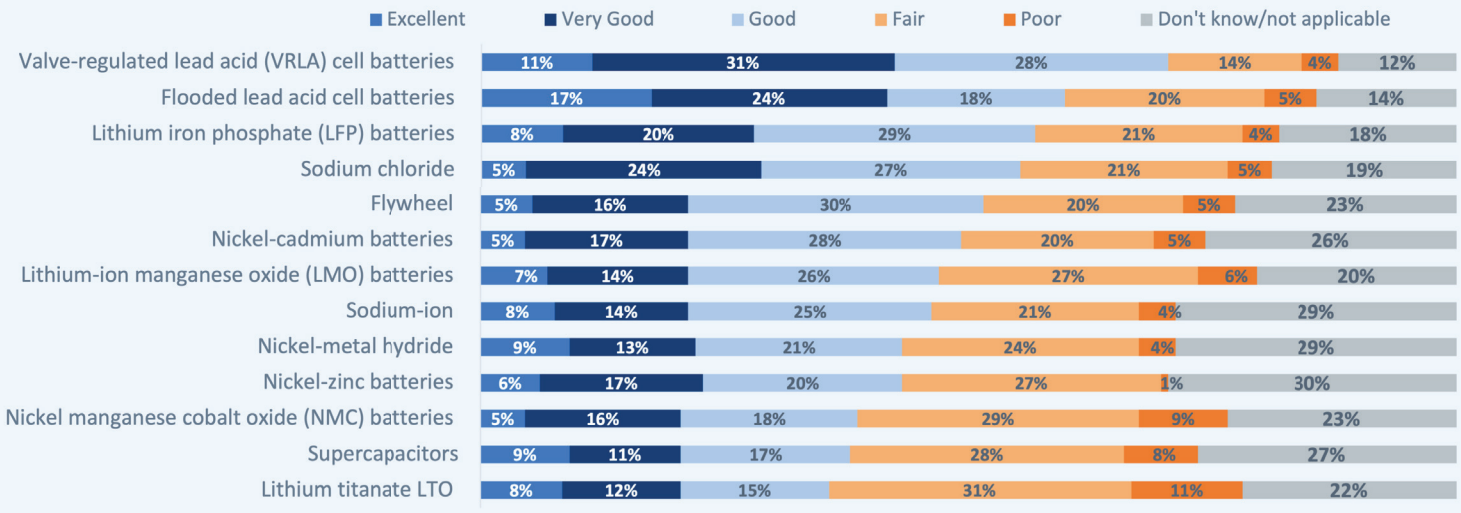


Respondents: n=132

Cost

When it comes to cost, seven in ten respondents (70%) rate VRLA cell batteries as good (Excellent + Very Good + Good), followed by flooded lead acid cell batteries at 59%.

Please rate each battery type based on COST

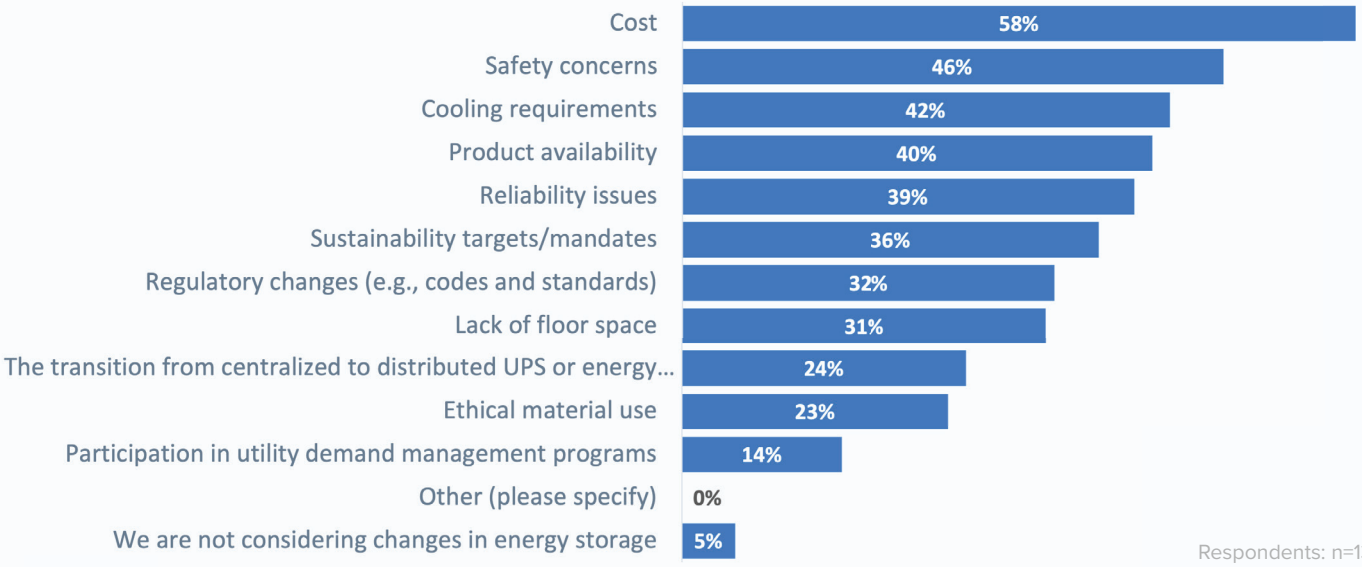


Respondents: n=132

Changes in Energy Storage Technology

Cost (58%) is the biggest driver of change in energy storage technology, followed by safety concerns (46%), cooling requirements (42%), product availability (40%), and reliability issues (39%).

Which of the following are driving the changes you are considering to your energy storage technology?

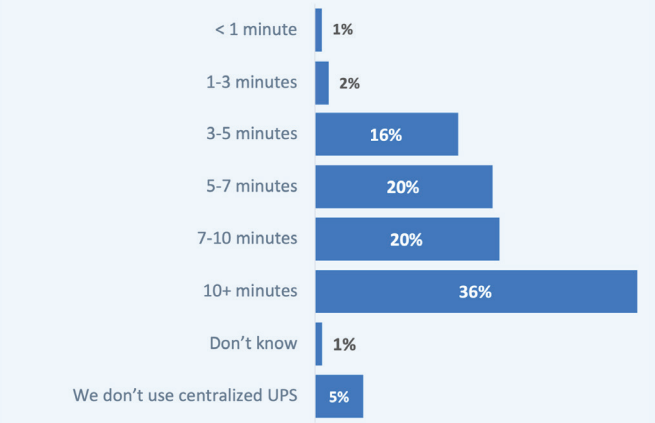


Respondents: n=132

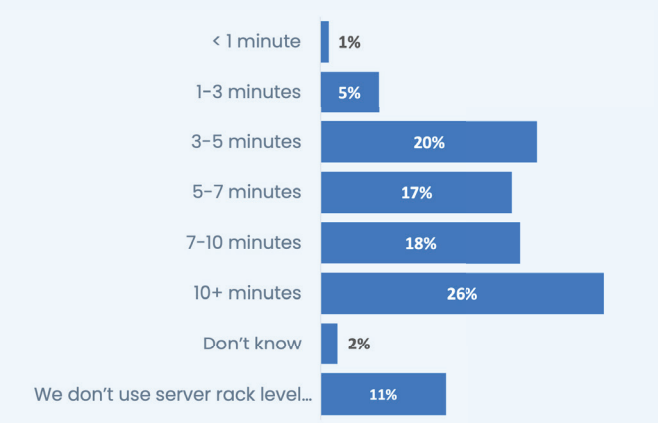
UPS Battery Backup Run Times

Five minutes or less—that's the battery backup run time for 19% of respondents using centralized UPS and 26% at the server rack level. Meanwhile, more than a third (36%) of centralized UPS users report run times of 10+ minutes, with the same extended duration noted by 26% of respondents at the server rack level.

If you use centralized UPS, what are your UPS battery backup run times?



If you use server rack level battery backup (BBU), what are your backup run times?

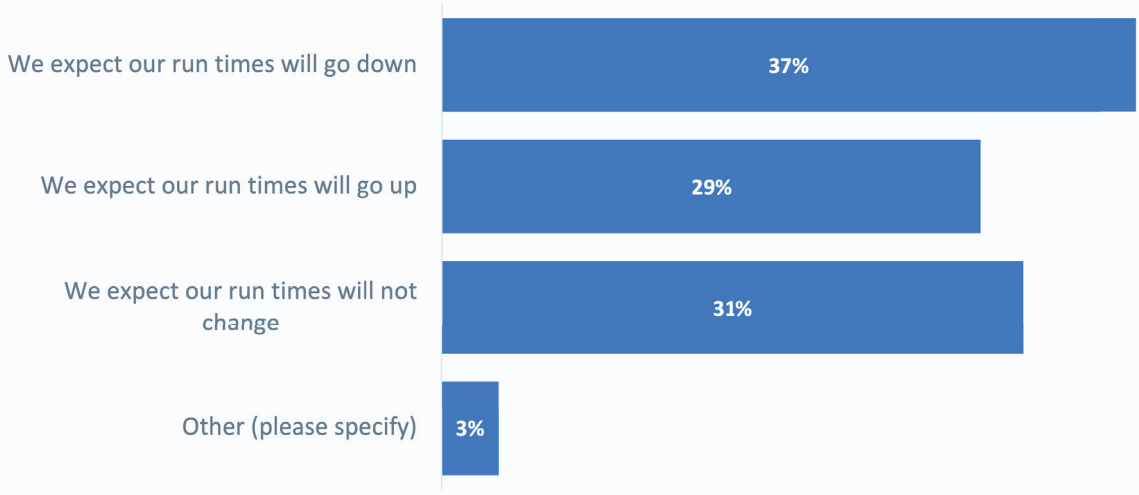


Respondents: n=132

Shifts in UPS Battery Backup Run Times

In 2025, nearly two in five (37%) expect their UPS battery backup run times to go down in the future, up noticeably from last year (26%). Nearly a third (31%) say they expect run times won't change, down from 38% in 2024.

How do you see your UPS battery backup run times changing in the future?

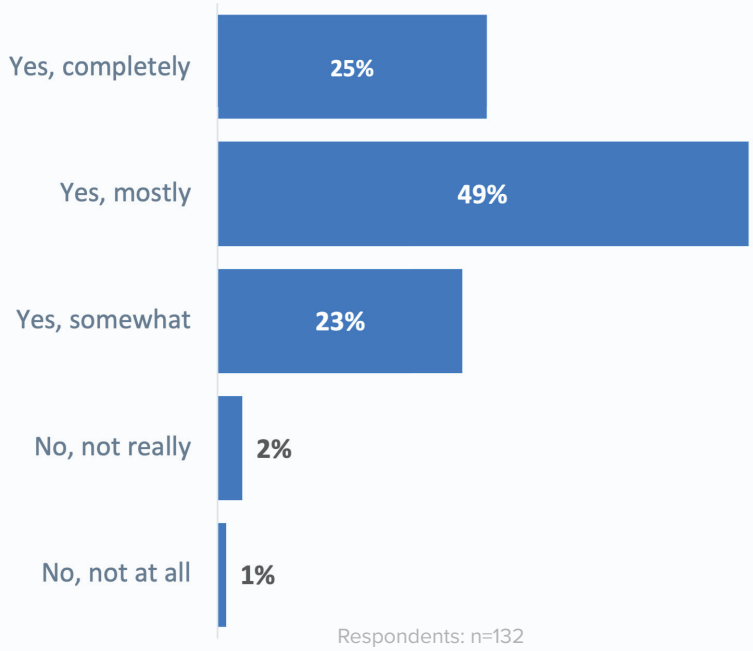


Respondents: n=132

Trust in UPS Backup Systems and Potential Failure Points

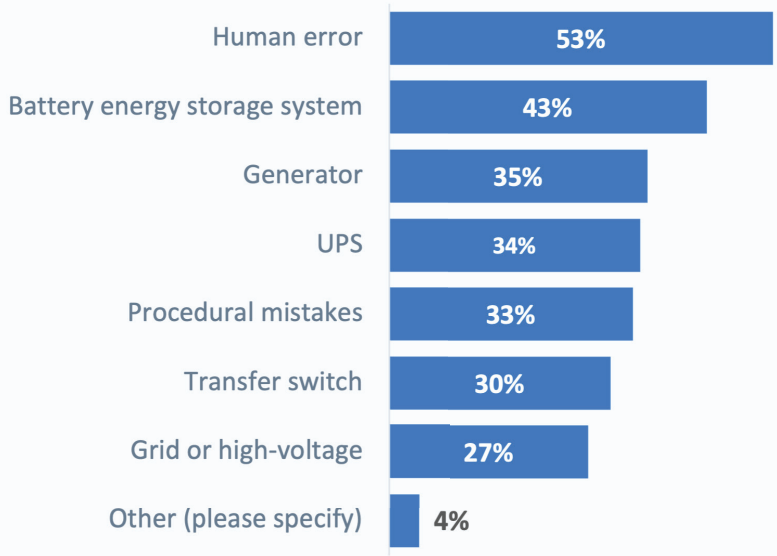
Confidence in the reliability of existing UPS backup systems has declined since 2024. In 2025, only 25% of respondents say they completely trust their current UPS backup system—a drop from 34% the previous year. Among those who did not completely trust their backup systems, both 2024 and 2025 show that participants believe that the biggest potential failure point in their system is human error (57% in 2024 and 53% in 2025).

Do you trust your existing UPS backup system?



Respondents: n=132

Where do you believe the potential failure points are in your existing UPS backup system?



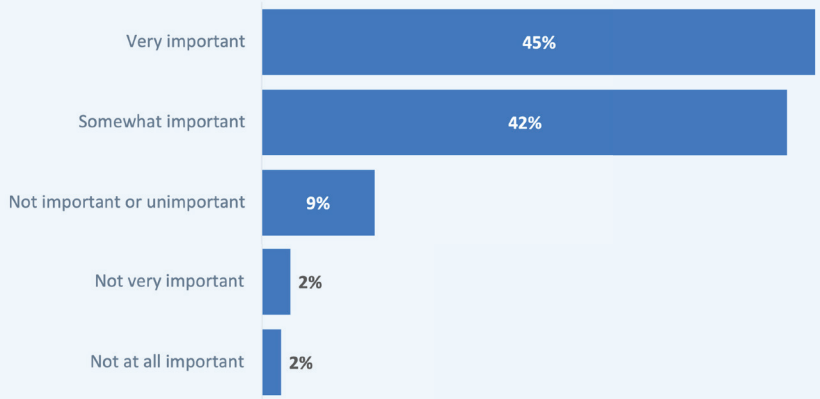
Respondents who did not say“Yes, completely” n=99
Average number of responses given=2.6

Sustainability

Sustainability's Role in Buying Decisions

In 2025, sustainability remains a growing priority, with 87% of respondents considering it important (very important + somewhat important), up from 81% in 2024.

How important are sustainability criteria in your power system buying decisions?

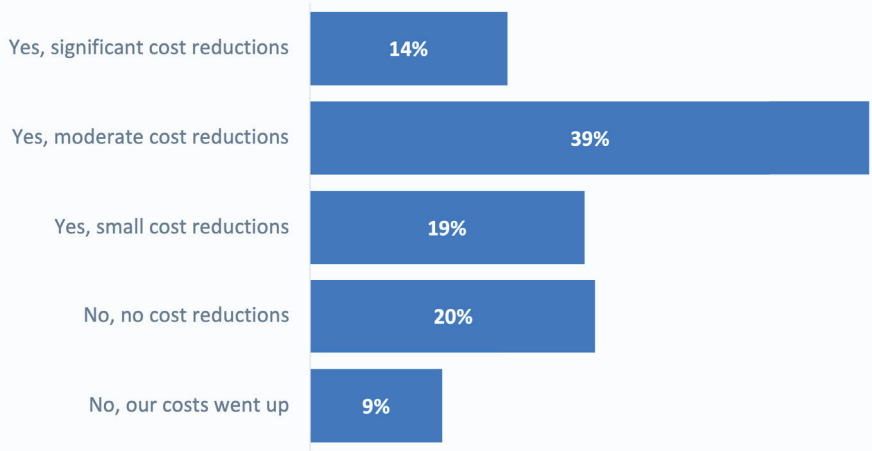


Respondents: n=132

Cost Savings from Sustainability Initiatives

In 2025, nearly three-quarters of respondents (72%) report significant or moderate cost reductions from their organization's sustainability efforts, up from 63% in 2024.

Have your organization's sustainability programs/efforts resulted in reduced costs?



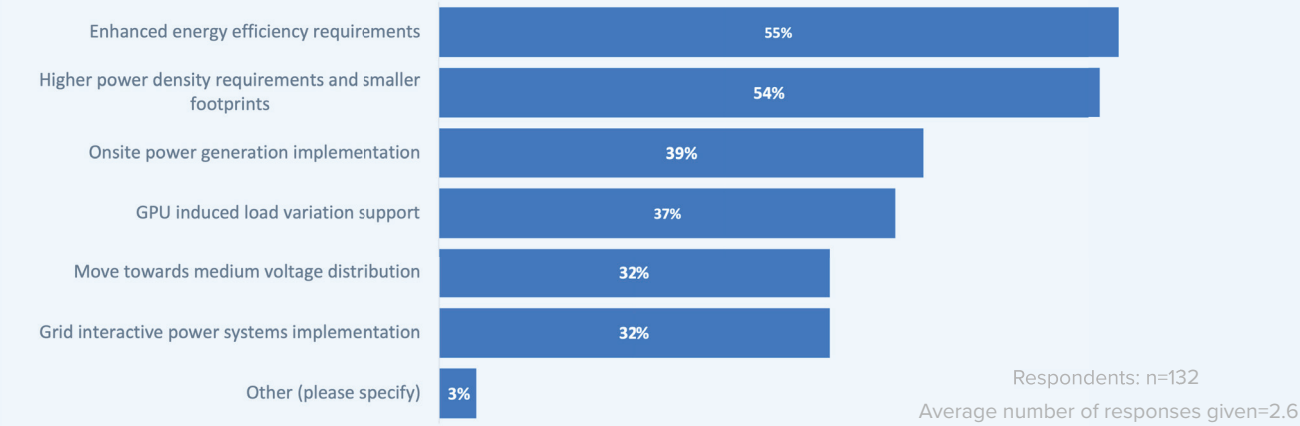
Respondents: n=132

Artificial Intelligence

AI's Biggest Impact on Data Center Power and Energy Storage

Half of the respondents say the biggest impacts of AI on power requirements and energy storage technology will be enhanced energy efficiency requirements (55%) as well as higher power density requirements and smaller footprints (54%).

What is the biggest impact on power requirements and energy storage technology artificial intelligence (AI) will have on your data center?

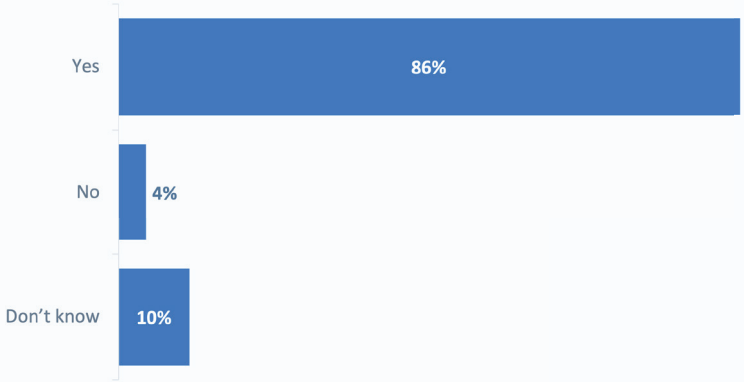


Respondents: n=132
Average number of responses given=2.6

The Shift Toward Customized Power Designs for AI

Nearly nine in ten respondents (86%) anticipate a shift toward more customized power designs to meet AI demands, while only 4% expect no changes.

As AI reshapes data center power architecture, do you expect a shift toward more customized power designs to accommodate its demands?



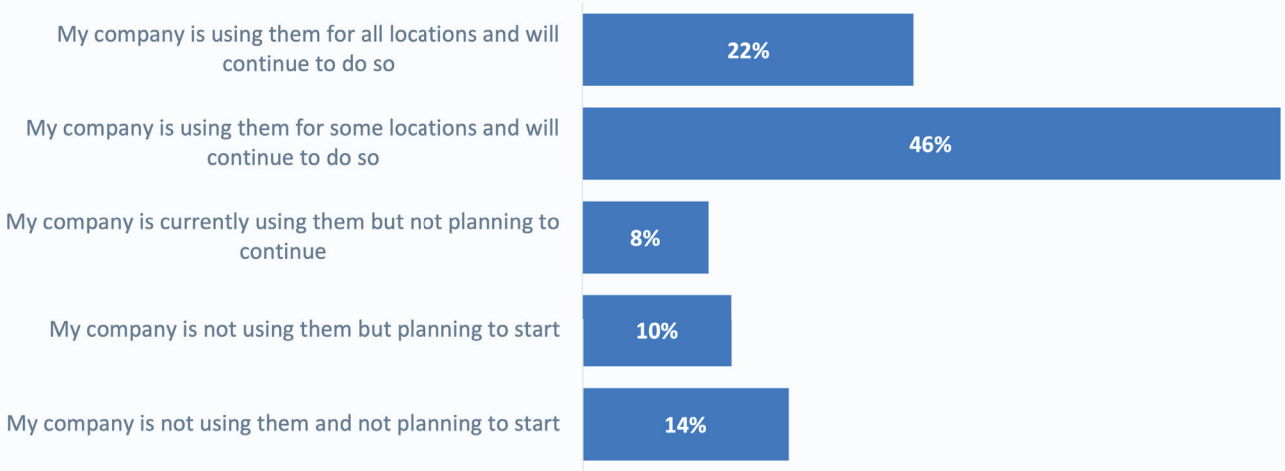
Respondents: n=132

Modular Power Solutions

Modular Power Solutions Usage

Two-thirds of respondents (68%) say their organization is currently utilizing modular power solutions and will continue to do so, with one in five (22%) saying it is used at all locations. Just over one in ten (14%) have no plans to use modular power solutions in the future.

How is your organization currently utilizing modular (containerized or skid-mounted) power solutions?



Respondents: n=132

Open Ended Questions & Write-In Responses

QUESTION

Which 3 challenges do you foresee having the greatest impact on the data center industry in the next 10 years? First challenge (open end)

ANSWERS

5G and Telecommunications Integration	Companies will need to balance cost efficiency with sustainability and performance demands.	Edge Computing Growth
Adopting new tools/approaches		Emerging or disruptive technology
AI	Cooling	Energy availability
AI	Cooling	energy consumption
AI	Cooling	energy consumption
AI Infrastructure	Cooling and Heat Management	Energy Consumption and Sustainability
AI, cloud, and IoT are driving unprecedented power demands.	Cooling and Thermal management	Energy Consumption and Sustainability
	Cooling Efficiency	Energy consumption growth
Artificial intelligence	Cooling Fluids and Environmentally	Energy consumption in data centers is a challenge, and the need to adopt renewable energy is key
As users demand faster access to data and applications, data centers need to minimize latency.	Friendly Practices	
	Cybersecurity	Energy creation and grid access
Availability of power for market expansion	Cybersecurity & Data Privacy Risks	Energy efficiency
Balancing upfront capital expenditures with operational expenses	Cybersecurity issues	Energy Efficiency and Sustainability
	Cybersecurity Privacy	Energy Efficiency and Sustainability
blockchain	Cybersecurity threats	Energy Efficiency and Sustainability
Budgets	Data compression	Energy Efficiency and Sustainability
Capacity range	Data Explosion	Energy Sustainability
Carbon Footprint	Data Privacy and Security	Ensuring cost-effective procurement of hardware and software.
Carbon Footprint	Data Privacy and Security	
Carbon Footprint Reduction	Data Security	Ensuring low-latency connections across vast geographic areas.
Challenges with power and cooling as adoption of energy efficient hardware is still slow	Data Security	
	Data Security	Ensuring the agility and flexibility of IT resources
Changing/Evolving ITE Load Profiles	Data Security & Privacy	Growing Utilization of Energy
Chip performance	Disaster Recovery and Business Continuity	I think there will be an increased market competition

Open Ended Questions & Write-In Responses

QUESTION / CONTINUED

Which 3 challenges do you foresee having the greatest impact on the data center industry in the next 10 years? First challenge (open end)

ANSWERS

Highly qualified staff will be needed due to the growing complexity of data center operations.	Managing hardware lifecycle	Rise of edge computing the require for a little localized data centers near end users will rise as IoT.
	Modular data centers	
I think an increased competition in the data center market will pressure pricing and service offerings.	One challenge could be Energy Efficiency. As demand for data centers grows, improving energy efficiency will be crucial to reduce operational costs and environmental impact.	Rising energy consumption
		Rising operational cost
I think there will be skill shortages because in recent times, there have been a growing need for skilled professionals in the data center sector.		Rising power demands will challenge sustainability efforts.
	Power	
I think with the rapid growth of cloud computing and the Internet of Things (IoT), data centers will need to be more scalable and flexible to accommodate fluctuating demands.	Power	Security and Data
	Power	Security is the big one. Hackers are getting smarter and are making money out of data so it is become more and more of a target when data in consolidated in our data centers
Increase cyber threats, ransomware attacks	Power availability	
Increased energy consumption	Power availability	
Increasing energy	Power availability	Security threats
Increasing energy demands and sustainability concerns	Power availability from grid	shortage of skilled workers
	Power Costs	Specialized hardware will be necessary for
Infrastructure Limitation	Power equality	Striking a balance between scalability and energy consumption.
Infrastructure Limitation	Power requirements	
Infrastructure Limitation	Power Supply & Reliability	Supply chain disruptions
LA SEGURIDAD DE LOS DATOS	Prevention of data breaches	Sustainability
labor	Procurement / Supply Chain	Sustainability
Latency and growth of edge	procuring plant and equipment	Sustainability and Energy consumption
Limited availability of renewable energy sources	Protecting sensitive data	Tackling the vulnerabilities introduced by IoT devices connected to data centers.
Liquid cooling	Regulatory and Compliance Pressures	
Maintenance	Regulatory Compliance	Technology
Managing global supply chain issues for hardware components	Reliability	The complexity of handling hybrid-cloud environments.
	resilience	

Open Ended Questions & Write-In Responses

QUESTION / CONTINUED

Which 3 challenges do you foresee having the greatest impact on the data center industry in the next 10 years? First challenge (open end)

ANSWERS

- The continuous increase of cybersecurity threats
- The growth of AI and GenAI
- the move to liquid cooling
- The rollout of 5G will impact data center
- The rollout of 5G will impact data center
- The rollout of 5G will impact data center design and operations.
- Thermal cooling
- Tough cooling requirements
- Transmission Lines
- Use AI-powered detection of threats and negotiate around tight regulations.
- utility power
- Viruses / Malware
- Well, I think a global supply chain issues can affect hardware availability and lead times, impacting data center operations.

QUESTION

Which 3 challenges do you foresee having the greatest impact on the data center industry in the next 10 years? Second challenge (open end)

ANSWERS

- 5G
- Addressing bottlenecks in cross-data-center connectivity.
- advocate for stronger efficiency standards and emission-free regulations.
- AI
- AI
- AI
- AI & Automation Adoption
- AI & Automation integration
- AI and high-speed computing demand huge quantities of processing power, necessitating more effective server structures.
- AI Complexity
- AI development
- AI training models require massive computational power, increasing the strain on data center resources.
- Algorithm calculations
- Another challenge I could think of would be security threats. Data centers must invest heavily in security to protect their data.
- Automating data center expansion and upgrades.
- Available energy
- Blockchain and Data Integrity
- bugs due to technology advancement
- Carbon emission control
- Chain supplier
- Challenges pertaining to supply chain of essential equipment
- Cloud Provider Dominance
- Confidential Computing
- Cooling costs
- Cooling Technology
- Cooling technology adoption
- Cost management will be a challenge too because managing costs effectively while maintaining service quality will be a constant challenge.
- Cost-effective energy storage solutions to ensure round-the-clock operations.

Open Ended Questions & Write-In Responses

QUESTION / CONTINUED

Which 3 challenges do you foresee having the greatest impact on the data center industry in the next 10 years? Second challenge (open end)

ANSWERS

Cost-effective scaling of server and storage capabilities	Efficiency	Infrastructure complexity
Cyber security with new technology	Efficiency and energy usage. These data centers are massive and use tons of energy. larger centers are harder to operate	Infrastructure Scalability
Cybersecurity	Efficient heat management will become increasingly difficult.	Interconnection and Network Performance
Cybersecurity	Energy consumption and power grid	Keeping up with rapid technological changes such as advancements in hardware and software and infrastructural management, will be essential.
Cybersecurity Threats	Energy costs	Keeping up with rapid technological changes, such as AI and machine learning integration, will require ongoing investment and adaptation.
Cybersecurity threats due to growing data volumes and sophistication of attacks	Energy draw	Labor
Data centers consume massive amount of electricity.	Ensuring reliable network connections will be	Labor Shortages and Skilled Workforce
data centers to be highly scalable	Environmental impact	Lack of training for new workers
Data Privacy	Environmental issues	Land
Data Privacy	Equipment availability	Land Management
Data Security and Compliance	eradication of diesel generators	Latency and Network Performance
Data security and cyber threat	Government	Latency-Sensitive Applications
Data Security and Cyber Threats	Government sustainability regulations	Local building restrictions
Data Security and Privacy	Green Energy Transition	long delivery times
Data Sovereignty	Grid energy availability	Maintaining affordable pricing for customers amid growing demand.
Data Sovereignty	Hacking	Managing data sovereignty and cross-border data transfer restrictions.
DE LA DISPONIBILIDAD DE LOS MISMOS	Hacking risks will grow with evolving attack strategies.	Managing the cost of data transfers, especially in multi-cloud environments.
Edge Computing	Hardware Advances and Obsolescence	Managing the increasing complexity of data center architecture.
Edge Computing & Decentralization	Hiring employees	
Edge Data Centers and Localized Computing	Hybrid Cloud Architecture	
Efficiency	Increasing sophistication of cyberattacks	

Open Ended Questions & Write-In Responses

QUESTION / CONTINUED

Which 3 challenges do you foresee having the greatest impact on the data center industry in the next 10 years? Second challenge (open end)

ANSWERS

Meeting environmental regulations and certifications	Regulation	Transitioning to renewable energy sources
Meeting growing customer demands for speed, reliability, and flexibility will be challenging.	Regulations	Utilities to support all coming on line
mismatch of internet services to skillsets in the marketplace	Regulations	With rapid advancements in technology, data centers need to keep up with emerging trends like edge computing, AI and machine learning.
Need for better UPS batteries and grid-inde-pendent storage.	reliability	
network security	Renewable energy integration	
Our operations are growing very fast and we are experiencing challenges with data center scalability	Scalability & Growth	
Power	Scalability and Adaptability	
Power	Scalability and Edge Computing	
Power	Schedule performance	
Power	Securing AI and machine learning-based infrastructure	
power load	Security and Privacy	
Power reliability	Security breach	
Power requirements	site location opposition	
Predictive maintenance for infrastructure and equipment	Sustainability	
Price	talent shortage	
procuring labor to build and run	The demand for energy in data centers is also	
Protecting data centers from cyber threats	There may be Regulatory Compliance which certainly means adapting operations and ensuring that data handling practices meet legal requirements.	
Quantum computing disruption	There will be a need for new cooling and infra-structure as specialist AI and machine learning hardware becomes more prevalent.	
	Threats to Cybersecurity	
	Training staff members to change & learn the new tools	

Open Ended Questions & Write-In Responses

QUESTION

Which 3 challenges do you foresee having the greatest impact on the data center industry in the next 10 years? Third challenge (open end)

ANSWERS

Achieving carbon neutrality in data centers.	cooling	Edge Computing and Network Expansion
AI and Machine Learning	cooling	Edge Computing Growth
AI Integration	Cooling & heat management	Education
AI- powered automation, and improved connectivity solutions	Cooling Efficiency and Innovation	electric power
	Cooling Technologies	Energy management/ESG
AI workloads	Cooling technology advancements	Ensure data centers comply with legal and regulatory requirements
Data Center Consolidation	cost	
Automation and Robotics	cybersecurity	Ensuring compliance with evolving data protection regulations
Availability	Cybersecurity and counter threat mitigation	
availability of power	Cybersecurity threat is also one of the challenges that is gonna have an impact on the data center industry in the future	Ensuring security in edge computing environments
Balancing between on-premises and-cloud-based infrastructures	Data center construction, energy, and operational costs are steadily increasing, making profitability a challenge.	Environmental Concerns
Blockchain and Data Integrity		Equipment Availability
Broadband stability	Data center supply lagging demand	ESG
Business continuity	Data Growth and Management	designing highly scalable physical infrastructure.
Data Security and Cyber Threats	Data security & privacy	Evolving Technologies
CAGR for tech/data center industry	Data Volume	finding qualified labor
Change of Business Models	DC Operators	Foreign Agencies
Compliance requirements	Decentralization will strain traditional data centers.	Handling the costs of compliance and security certifications.
Conflicting privacy laws must be negotiated by multinational data centers.	Developing reliable AI and machine learning models for automation.	Hardware Obsolescence
connectivity		Hackers
construction support	Difficulty in predicting future data storage requirements accurately.	Heat Management and Cooling
Consumer confidence		High cost of security labor

Open Ended Questions & Write-In Responses

QUESTION / CONTINUED

Which 3 challenges do you foresee having the greatest impact on the data center industry in the next 10 years? Third challenge (open end)

ANSWERS

Hyperscalers may disrupt traditional data center models.	Multi-cloud places will keep growing, ensuring an easy switch between on-premises and cloud services.	Safeguarding infrastructure from insider threats
In addition, traditional cooling methods may not be sufficient, leading to the need for innovative cooling technologies that can efficiently manage heat in high-density environments.	New technology	safety concerns
	Nuclear energy	Scalability & Infrastructure complexity
	OEM's supporting this market	Scalability and infrastructure management
Increased cost pressures due to sustainability requirements.	Older employees aging out of our industry	Scalability to meet the rapidly growing demand for data processing power driven by technologies like AI and cloud computing
	Operating in multiple countries will require data centers to adapt to diverse regulations and market conditions.	
Industry interruptions		Security
Infrastructure as Code	Optimization	Security and Resilience
Infrastructure demand	People / Talent	Security Threats and Cyber-Attacks
Infrastructure Scalability and Edge Computing	Permitting delays	Service and Support
Integrating AI for operational efficiency and predictive maintenance will be necessary.	Political Stability	Shortage of skilled professionals will also be a challenge.
	Post Quantum Encryption & Store Now Decrypt Later (SNDL)	
Integration of green technologies such as solar and wind.		Security
	Power	Security and Resilience
Interoperability issues	Public outreach	Security Threats and Cyber-Attacks
LA VELOCIDAD CON LA CUAL SE ACCEDERAN	Rapid improvements in software and technology could cause obsolescence to occur more quickly.	Service and Support
Latency Concerns		Shortage of skilled professionals will also be a challenge.
Liquid cooling, immersion cooling, and heat reuse strategies.	Regulations & Compliance	
	Regulatory pressure and compliance	Skilled worker shortage
Local Power availability	Renewable energy adoption	Space Constraints
Managing cooling systems efficiently to reduce energy waste	Rising Operational Cost	Speed to market
	Rising operational costs due to increasing energy prices	Staff Training
NA		suitable place

Open Ended Questions & Write-In Responses

QUESTION / CONTINUED

Which 3 challenges do you foresee having the greatest impact on the data center industry in the next 10 years? Third challenge (open end)

ANSWERS

- Suitable place
- supply chain challenges
- Supply chain disruptions
- Supply Chain Issues
- support distributed networks
- Sustainability
- Sustainability as we focus on sustainability in all our business issues, unfortunately, data centers that we use still need improvement in sustainability
- Takes time to build, can't be speedily set up to meet market demand
- Talent availability
- Technology improvements making data centers obsolete. Need to keep reinventing to improve upon the data center
- The ability to scale infrastructure quickly to meet growing demand without compromising performance will be a key challenge.
- The challenge of providing disaster recovery solutions without increasing costs.
- The high increase in data generation from various sources like IoT devices, social media, and more means data centers must find efficient ways to store, process, and analyze massive amounts of information. Managing this growth without compromising performance can be tough.
- The last challenge I could think of is Sustainability.
- The rapid iteration of technology requires data centers to continuously invest in new equipment
- The Shift to Hyperscale and Modular Data Centers
- Trained manpower
- Transmission
- Water resources
- Water usage concerns
- zero carbon footprint

QUESTION

Are evolving cooling demands for ai – such as liquid cooling – leading you to consider different backup strategies? If yes, what specific approaches are you exploring? (Open end)

ANSWERS

- Advanced containment strategies that prevent cooling failure by directing airflow in a controlled manner, minimizing hot spots.
- Advanced Liquid Cooling with Integrated UPS
- Advanced monitoring systems are crucial for keeping tabs on liquid phases, system temperature, and cooling efficiency.
- AI algorithms that dynamically adjust cooling efforts based on workload demand, ensuring backup systems kick in only when necessary.
- AI cooling demands are driving backup strategies toward more resilient, energy-efficient infrastructure.
- AI-Driven Monitoring for Predictive Maintenance
- AI-powered systems Integrated Fire Suppression and Cooling
- AI-powered systems that not only detect cooling faults but also automatically re-route cooling resources to backup systems.
- AUN DE MOMENTO NO HAY UN PLAN EMERGENTE

Open Ended Questions & Write-In Responses

QUESTION / CONTINUED

Are evolving cooling demands for ai – such as liquid cooling – leading you to consider different backup strategies? If yes, what specific approaches are you exploring? (Open end)

ANSWERS

Backup Generators for Cooling Units

Backup heat exchangers to ensure heat can be effectively transferred even if one system malfunctions.

Backup Power for Cooling Systems

Backup storage units that have their own independent cooling solutions to ensure continued operation.

Building up systems of redundancies

Certainly, We are committing resources to modular UPS systems and generator supported cooling solutions to guarantee continuous operations in the event of cooling failures.

Combining air, liquid, and phase-change cooling methods in a hybrid approach to offer multiple layers of backup.

Consideration of coupling power design for both mechanical and electrical loads

Considering more prime power applications (e.g., onsite power generation) to meet power demands.

Considering whether UPS should cover liquid cooling CDU's--generally yes.

Conventional backup power systems, such as UPSs, are expanded to incorporate cooling system

Creating multiple cooling zones with individual backup systems to ensure localized cooling even if one zone fails.

Definitely- we are really focusing on double downing on the lithium-ion batteries and continuing to expand that footprint as they seem to perform quite well

Depends on complex and reliability and warranty

Designing cooling infrastructure that can easily scale up or down with changing demands can help manage costs while ensuring adequate cooling capacity is always available.

Designing cooling system components to be hot-swappable without requiring full system downtime.

direct to chip

Direct to chip Single phase immersion

Direct-to-chip or immersion cooling systems rely on active pumps, chillers, or dielectric fluid circulation, which require power.

Dynamic Cooling Allocation

establishing hybrid cooling systems that, in the instance that liquid cooling fails to function properly, allow airflow to take over.

Exploring thermal energy storage systems to store excess cooling capacity for use when liquid cooling systems experience high demands or fail.

Free Air/Water cooling systems Liquid to the Chip Immersion cooling

Having extra liquid cooling for flexibility.

For pure HPC loads, enough backup is provided to securely shut down devices. There will need to be considerations for graceful shutdown of CDU and other components of liquid cooling to racks. Just dropping the power will not be sufficient and will cause damages. These will likely be from centralized UPS (for controls, transfer switch to genset for pumps as these are enormous loads that could not be met by a UPS).

Hybrid Backup Systems (Battery + Flywheel + Generator)

hybrid cooling system redundancy

I don't know

I think one of the specific approaches should be establishing protocols and training staff on emergency procedures for power and cooling failures.

I think there should be back up generators in a way that installing diesel or natural gas generators as a secondary power source to support cooling systems during outages.

Implementing backup cooling solutions like additional in-row cooling or supplementary liquid cooling systems to maintain consistent temperatures during high demand.

In the event of a system failure, air cooling is used as a backup to liquid cooling.

Incorporating dual-phase or redundant liquid cooling systems to maintain effective heat dissipation even if one system fails.

Incorporating fire suppression systems that also aid in cooling during emergencies, providing a dual-purpose backup.

Open Ended Questions & Write-In Responses

QUESTION / CONTINUED

Are evolving cooling demands for ai – such as liquid cooling – leading you to consider different backup strategies? If yes, what specific approaches are you exploring? (Open end)

ANSWERS

Leveraging IoT and AI-driven analytics to anticipate cooling issues and address them before they lead to system failure.

Likely. Shift to hybrid UPS systems and/or more modular power systems. Systems must handle both power failure and cooling system failures.

Liquid cooling

Liquid cooling as a more cost-effective approach

Liquid cooling backup solution

Liquid Cooling is what all DC's should be using

Liquid Cooling Redundancy Incorporating dual-phase or redundant liquid cooling systems to maintain effective heat dissipation even if one system fails.

Liquid cooling technology involves immersing servers in non-conductive liquid and circulating the liquid to dissipate heat

Liquid cooling.

liquid-cooling and UPS solutions

Local power with storage to replace partial generation from diesels

Mechanical static UPS Flywheel for mechanical equipment backup support. Continuous cooling water tanks and pumps, with UPS support.

Multi-tiered Airflow Cooling

not yet but AI and its power requirements will change the data center overall requirements

On chip cooling

One of the approach I will be exploring is upgrade UPS systems to handle the increase power demand from liquid cooling setup.

One of the specific approaches I could think of is to have an advanced energy storage solution. This can help to provide a reliable backup power.

One specific approach could be developing integrated systems that combine cooling and power management for greater efficiency.

One specific approach is that some are looking into integrating renewable energy sources, like solar or wind, along with battery storage. This can provide an additional layer of backup power while also being more sustainable.

Open to learning

Optimize the structural design of heat exchangers to improve heat exchange efficiency, thereby reducing the usage and energy consumption of coolant.

Optimizing backups with AI driven energy management

Optimizing backups with AI driven energy

prevents power-hungry AI workloads from consuming all available UPS energy before cooling stabilizes.

Redundant cooling system implementing backup liquid cooling systems to ensure continuous operation in case of failures.

Redundant Cooling Systems

Scalable cooling solutions that can be added or removed as needed, making backup systems more flexible.

Scaling Power Capacity: As AI workloads increase rack power density, battery backups (such as uninterruptible power supplies, or UPS) are scaled to meet higher power demands. This involves upgrading to larger capacity batteries or modular systems that can expand as needed. Redundancy and Scalability: To handle increased densities, redundancy is a critical feature. Many server racks employ N+1 or 2N configurations, ensuring continuous operation even if one UPS unit fails.

Secondary HVAC systems dedicated to cooling AI hardware, ensuring uptime if the primary system fails.

Site close to generation

Systems that automatically recover and re-distribute heat, reducing reliance on external cooling and improving energy efficiency.

Thermal Buffering

Too big a topic for such a little box. I do think you will see larger more centralized backup strategies (CUP) with larger scale facilities as repetitive/aggregate equipment designs challenge maintenance routines -- just too many pieces to service!

Two-phase immersion cooling systems that operate with integrated UPS power

Under research

Unknown at this time. Too many variables for us at this time to know.

Use of distributed cooling networks across multiple sites, so a failure at one location doesn't affect the entire infrastructure.

Open Ended Questions & Write-In Responses

QUESTION / CONTINUED

Are evolving cooling demands for ai – such as liquid cooling – leading you to consider different backup strategies? If yes, what specific approaches are you exploring? (Open end)

ANSWERS

Using AI-driven analytics to optimize cooling and power usage in real time

Using AI-driven predictive analytics to detect and prevent cooling system failures before they happen.

Using dedicated backup UPS for cooling systems alongside those for the servers themselves, ensuring redundancy for both systems.

Using energy-efficient automated systems for quick response to failures, minimizing downtime. Using liquid cooling technology

We are developing backup techniques to manage AI's changing cooling demands, including redundant circuits and automated switchover to assure continuous optimal temperature management.

We are implementing backup liquid cooling loops to prevent system failure during primary cooling outages.

We have already implemented liquid cooling systems in a lot of our power supplies and will continue to improve on making our sources more reliable

We haven't considered these backup strategies yet, impact to be analyzed in future

We're basically trying to keep our computer systems cool and running smoothly while handling super-powerful AI machines that generate tons of heat.

Yes - hybrid cooling systems and AI powered cooling orchestration

Yes - more Additionally, backups and ways we can tackle ransomware

Yes ,Since water conducts heat about 30 times better than air, it is a highly efficient method of data center cooling

Yes, as liquid cooling necessitates denser UPS configurations for rapid failover.

Yes, evaluate existing equipment, consider costs and operational risks, make a gradual transition, and replace equipment

Yes, evolving cooling demands for AI, like liquid cooling, are leading to considerations of different backup strategies. Approaches include integrating UPS systems compatible with liquid-cooled environments, implementing rack-level BBUs to reduce dependency on centralized systems, transitioning to higher-efficiency batteries like LFP or LTO, prioritizing critical AI workloads during outages through dynamic load shedding, and exploring flywheel energy storage for seamless power continuity and reduced heat OU

Yes, evolving cooling demands for AI, like liquid cooling, are leading to reconsideration of backup strategies. We are exploring approaches such as modular backup systems, redundant liquid cooling loops, and hybrid cooling setups that combine traditional and advanced cooling to ensure reliability during failures.

Yes, evolving cooling demands for aluminum applications, especially in high-performance industries like electronics or manufacturing, are pushing the adoption of advanced cooling. As power densities increase, traditional air cooling might not suffice.

Yes, growing cooling demands for AI, particularly liquid cooling, are forcing us to revaluate backup plans. We're looking into redundant cooling loops, hybrid systems that combine liquid and air cooling, and improving UPS systems to assure stable power for these advanced cooling technologies during outages. The objective is to ensure cooling efficiency and system resilience.

Yes, growing cooling demands for AI, particularly liquid cooling, are forcing us to revaluate backup plans. We're looking into redundant cooling loops, hybrid systems that combine liquid and air cooling, and improving UPS systems to assure stable power for these advanced cooling technologies during outages. The objective is to ensure cooling efficiency and system resilience.

Yes, exploring immersion cooling's impact on battery backup design for AI driven workloads.

Yes, I will be exploring an integrated backup solution and modular backup system in such that it allows for flexibility and scalability as cooling demands change.

Yes, liquid cooling requires robust redundancy, and we are exploring dual power sources and enhanced battery backups for continuous uptime in critical systems.

Yes, modifications in backup strategies are being driven by AI's cooling requirements. Pumps and chillers are necessary for liquid cooling. cooling can be disrupted more quickly by power outages than by air-cooled systems. Businesses are investigating UPS cooling systems. Additionally, under consideration are automated leak detection and hybrid cooling.

Yes, more AI research on cooling demands. We do not disclose the details.

Yes, providing UPS power to cooling pumps

Yes, the evolving cooling demands for AI, particularly the rise of liquid cooling, are absolutely leading to a reevaluation of backup strategies.

Yes, the shift towards liquid cooling for AI workloads is cooling, data center operators to re-evaluate their backup strategies, as liquid cooling systems present unique challenges and require different approaches to ensure redundancy and continued operations in case of failure.

Yes, with AI's growing cooling needs, like liquid cooling, we're looking into backup strategies that focus on flexible UPS systems and energy storage solutions to keep power stable and support cooling in high-density AI setups.

Yes. We are considering liquid cooling, but our strategies are still in the process of development. We also have a lot of concerns with security of AI applications.

Open Ended Questions & Write-In Responses

QUESTION

Which of the following best describes your job level? (Other responses)

ANSWERS

Procurement Manager	Sales	Sales

QUESTION

How do you see your ups battery backup run times changing in the future? (Other responses)

ANSWERS

N/A	N/A	Will very to match standby generation

QUESTION

Where do you believe the potential failure points are in your existing ups backup system? (Other responses)

ANSWERS

deferred maintenance	N/A	Failure mitigation

QUESTION

What is the biggest impact on power requirements and energy storage technology artificial intelligence (ai) will have on your data center? (Other responses)

ANSWERS

Change in floor area use ratios	HPC loads will generally have less UPS run time or no UPS at all

Methodology

Endeavor Business Intelligence and Data Center Frontier conducted data collection and analysis on behalf of ZincFive Inc. The data was collected from January 23 to February 6, 2025, resulting in 132 qualified survey responses. The methodology adheres to standard marketing research methods, practices, and procedures.

About ZincFive, Inc.

ZincFive is the world leader in innovation and delivery of nickel-zinc batteries and immediate power solutions. Supported by an impressive portfolio of international patents, ZincFive technology harnesses The Power of Good Chemistry® to propel the world forward. ZincFive technology leverages the safety and sustainability of nickel-zinc chemistry to provide unparalleled high power density and performance for mission critical applications. ZincFive is a privately held company based in Tualatin, Oregon.

For more information, visit www.zincfive.com

Contact ZincFive

Contact ZincFive today to learn more about its innovative NiZn technology and Immediate Power Solutions (IPS).

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