BEFORE AI, AFTER AI

Surveying the Data Center Industry as It Enters a New Age of Constrained Energy Supply

Authored by:

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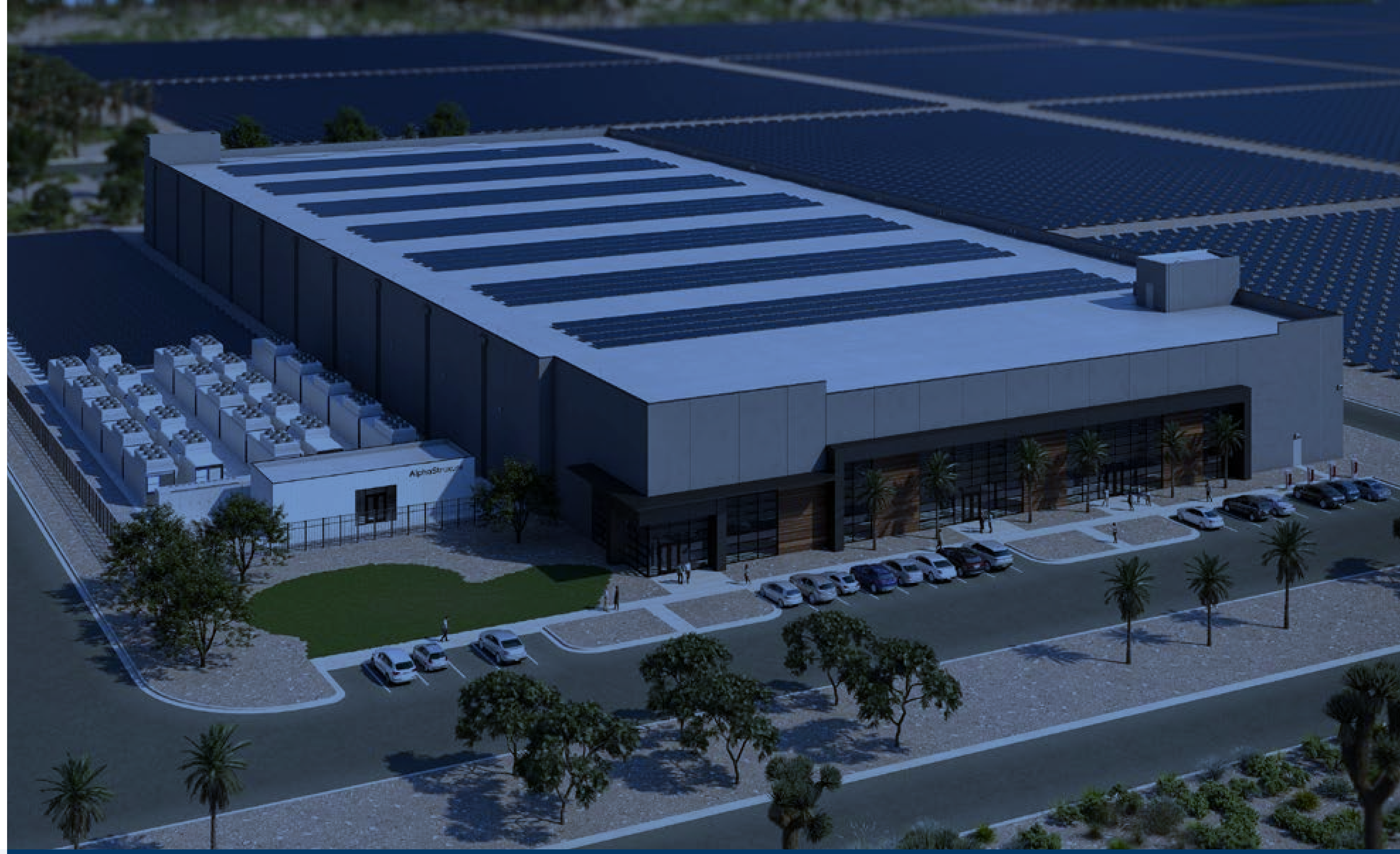

In the beginning ...

… the North American data center industry operated in a relatively stable status quo for securing grid power. For decades, data centers would secure dozens, or hundreds, of megawatts of utility capacity at a time. They would receive power on a workable timeline. No problem.

Then, in late 2022, in the halls of utility regulators and at boardroom tables, everything changed. As generative AI arrived on the scene, the industry entered a steeplechase race to win the AI prize, with obstacles arising across the course. A lack of chips. A lack of land. In a matter of months, top markets became tapped out of available real estate, while utility wait times stretched out to seven, nine, or even 12 years. Secondary markets are also seeing rapid growth and long waits, as data centers soak up the last-remaining pockets of available capacity. Although the race may be entering a new phase, with some in the industry starting to scale down their growth projections, the overall trajectory remains clear: more demand, more data centers, and more energy.

Taking stock of the early days of the "After AI" age

In such a pivotal time for energy in the industry, the leaders in data center energy management, AlphaStruxure and Schneider Electric partnered with Data Center Frontier to survey 149 senior industry professionals. This is the first major survey undertaken to measure how they're adapting to the unfolding energy crunch. The results tell a stark story of how much the industry's outlook has changed in such a short time – and the ways it's innovating to secure the energy supply in the After AI age.

How the industry is transitioning from “Before AI” to “After AI”

Theme #1: Barriers to build-out

44% of respondents indicate their average quoted utility wait times are longer than **4 years.**

48% of respondents report the size of a single new data center project averages over **100 megawatts.**

6 IN 10 are building more than **10 data centers** over the next five years, with **25% building at least 30.**

Theme #2: Tradeoffs and timelines

#1 ranked barrier slowing down data center projects is **grid constraints**, with 92% seeing it as an obstacle.

#1 ranked barrier in getting more electrical capacity is overly **long quoted wait times** from utilities.

35% reported their **carbon emissions accelerated** over past two years, since the AI race began.

Theme #3: Assessing the alternative

6 IN 10 report they would deploy **on-site power** generation systems if they ran into concerns about power availability — the top-ranked option.

#1 region for “**Plan B**” power availability if the first choice couldn’t provide timely power was the Midwest.

#1 & #2 ranked on-site power generation solutions were **solar and battery storage**.

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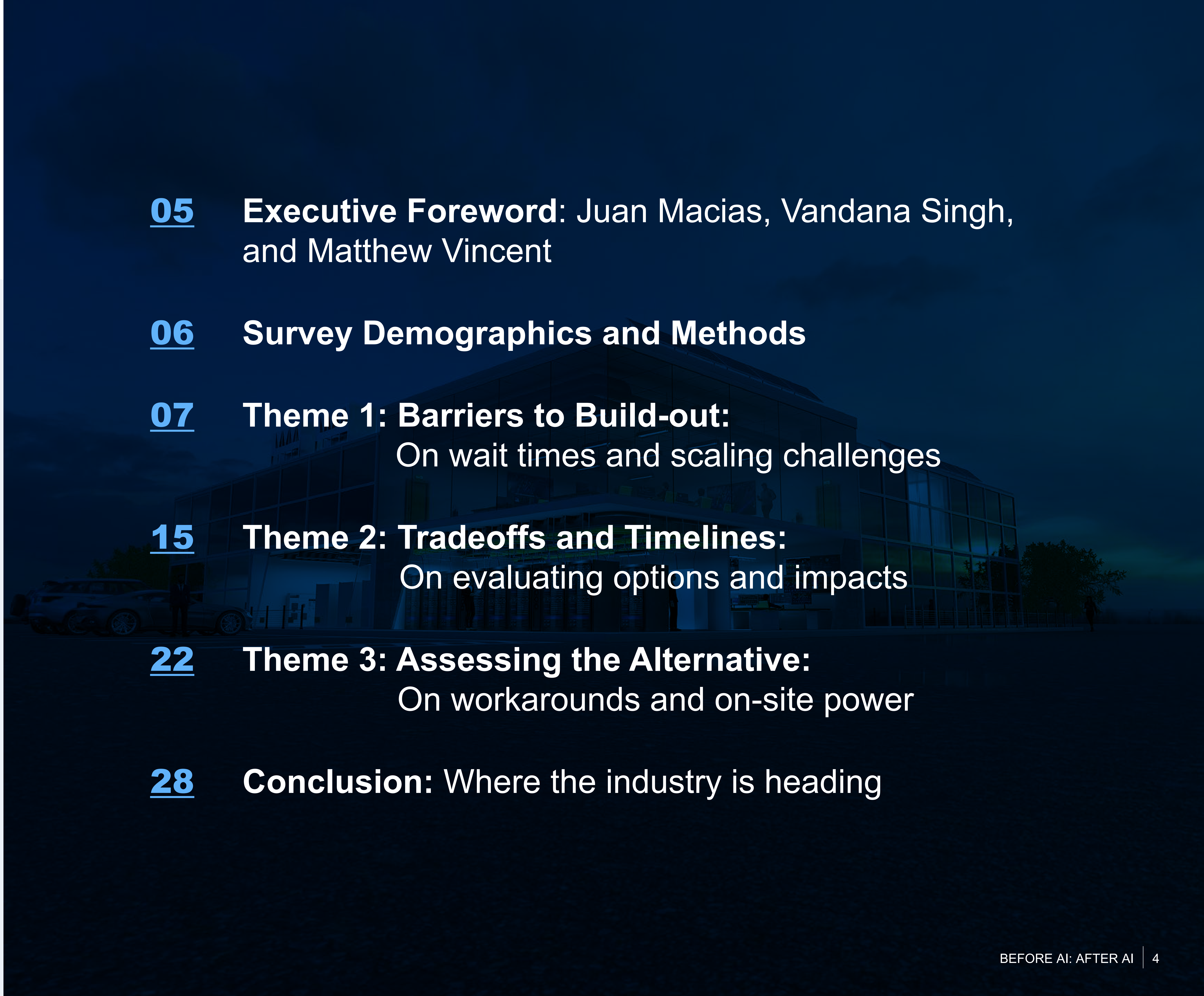

Executive Foreword

The energy crunch in the "After AI" era: How data centers are adapting

We are all witnessing an unparalleled moment in data centers, one characterized by a high-stakes race for more power and compute capacity. Although we collectively hold decades of experience in the data center and energy industries, we've never seen anything like this.

For decades, securing grid capacity was a manageable process. But in late 2022, as generative AI took off, everything changed. Utility wait times in key markets have stretched to seven, nine, even potentially, twelve years,[1] forcing operators to rethink their approach to energy procurement, deployment, and sustainability.

To better understand how the industry is responding, **Data Center Frontier**, in partnership with **AlphaStruxure and Schneider Electric**, surveyed **149 senior industry professionals** on the shifting energy landscape. The findings reveal just how much the industry's outlook has changed in a short time—and the strategies being deployed to secure power in the **"After AI" age**.

Here's what this report tells us about what is going on today:

- **Grid constraints are the #1 barrier: 92%** of respondents see it as a major challenge, with long utility wait times slowing down expansion.
- **New projects are bigger than ever:** Nearly **half (48%)** of respondents say their new data centers now average **100+ MW**, signaling an unprecedented scale of development.
- **Longer lead times are the new normal: 44%** report utility wait times of **4+ years**, while demand is spilling into secondary markets, stretching available capacity.
- **The AI boom is reshaping sustainability goals: 35%** report an increase in carbon emissions over the past two years as the industry races to keep up with new demand.
- **Alternatives are emerging: 62%** of respondents reported exploring on-site power generation. With no slowdown in sight, data center operators are rethinking power procurement strategies.

On behalf of AlphaStruxure, Schneider Electric, and Data Center Frontier, we are pleased to offer the first large-scale survey of how the data center industry is navigating a pivotal era in its history: the "After AI" era.

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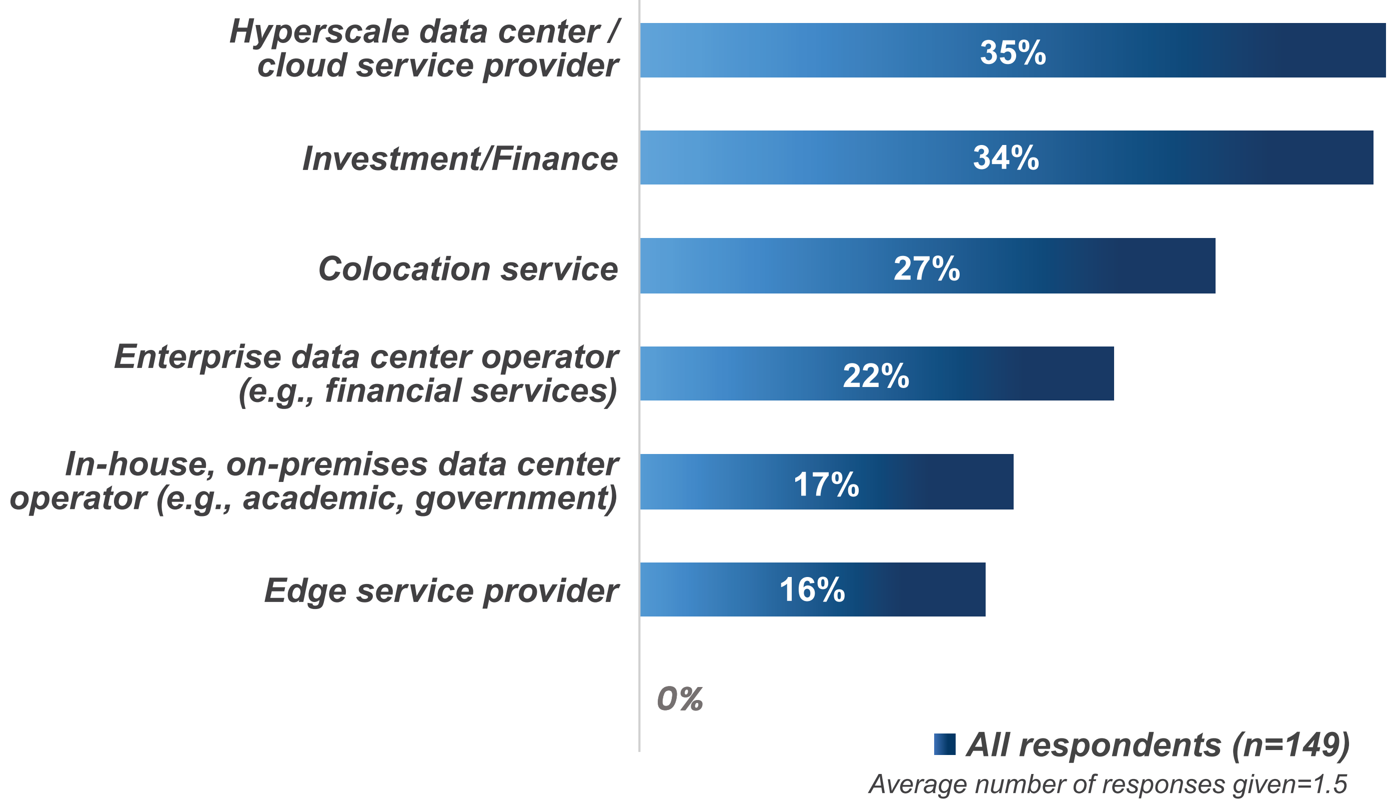
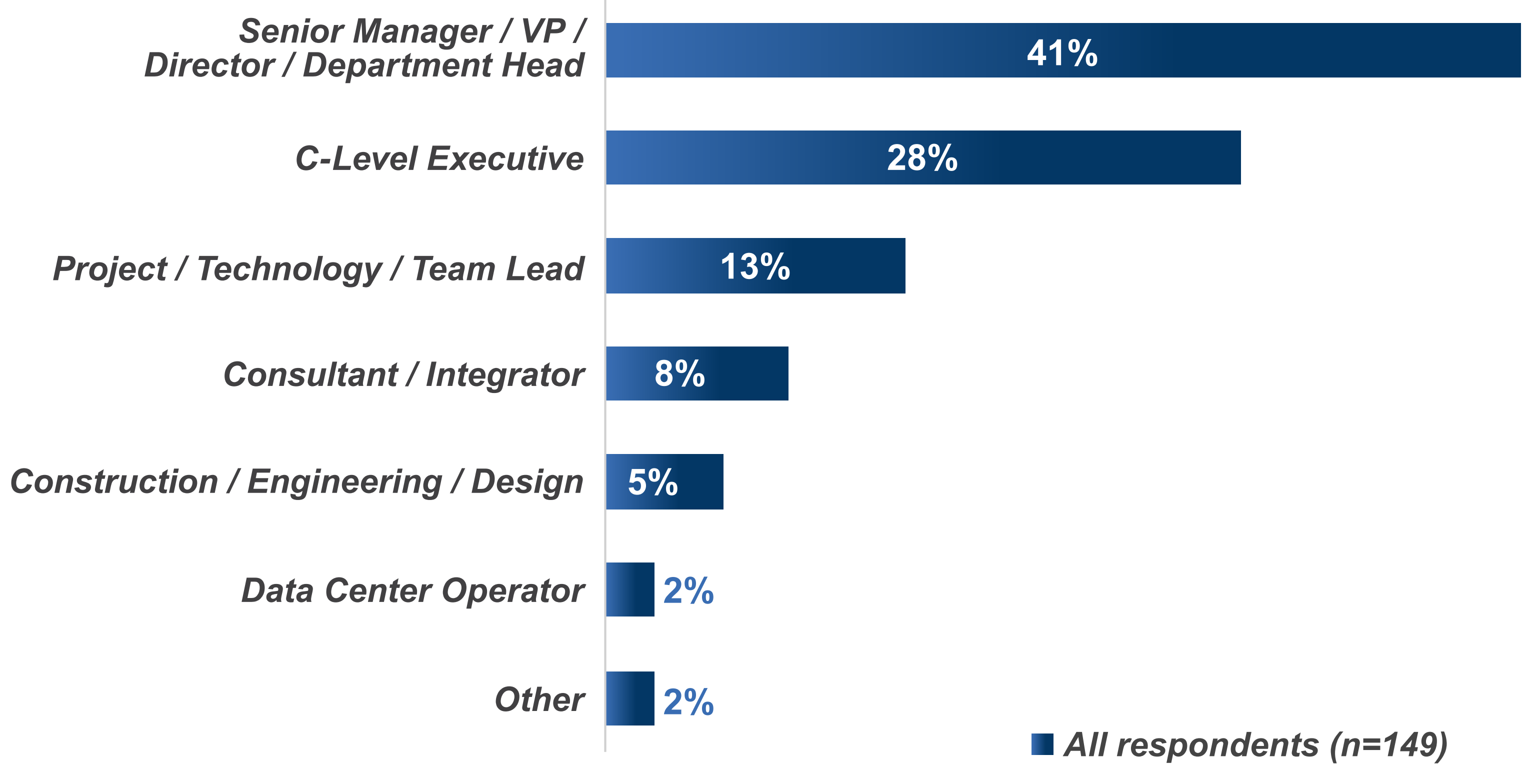
[1] Publicly reported timelines for large-scale capacity increases via new substations, transmission upgrades, and data center-specific capacity upgrades are as high as nine years in California, seven years in Northern Virginia, and 12 years in Ohio. Results will vary by region and project.

Demographics

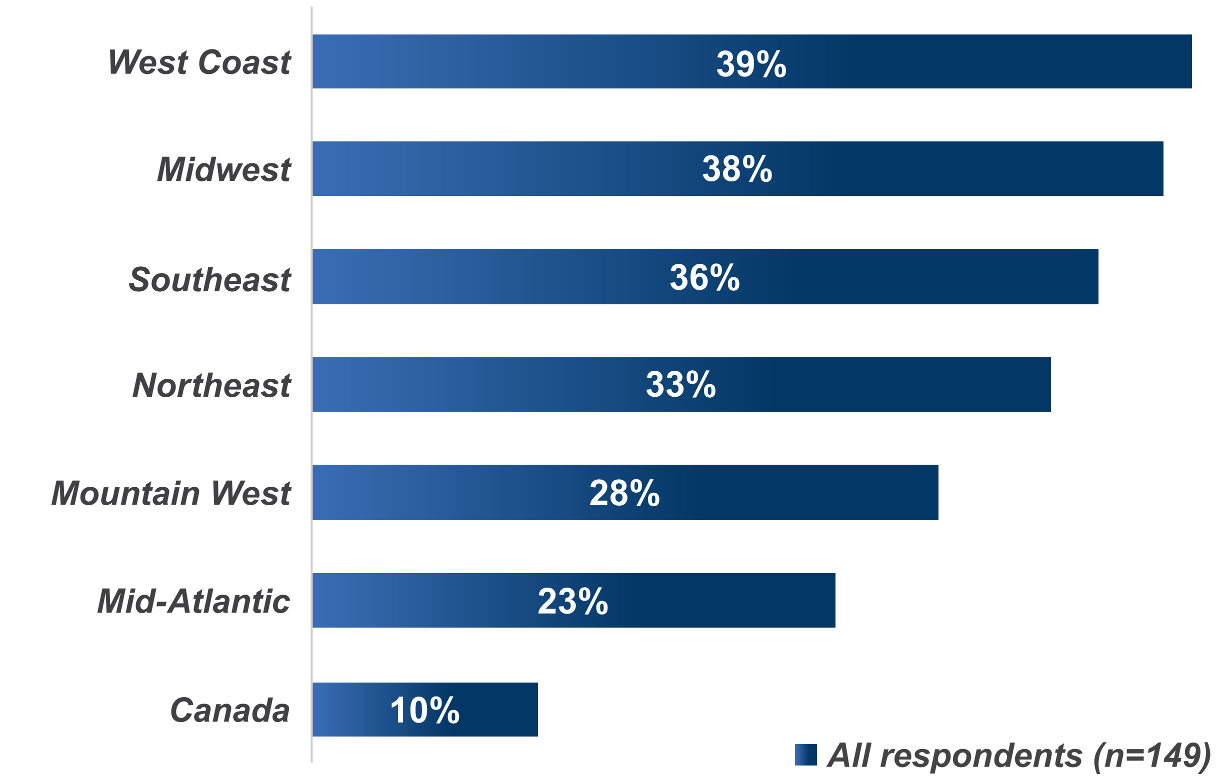
Industry Segment



Role & Seniority

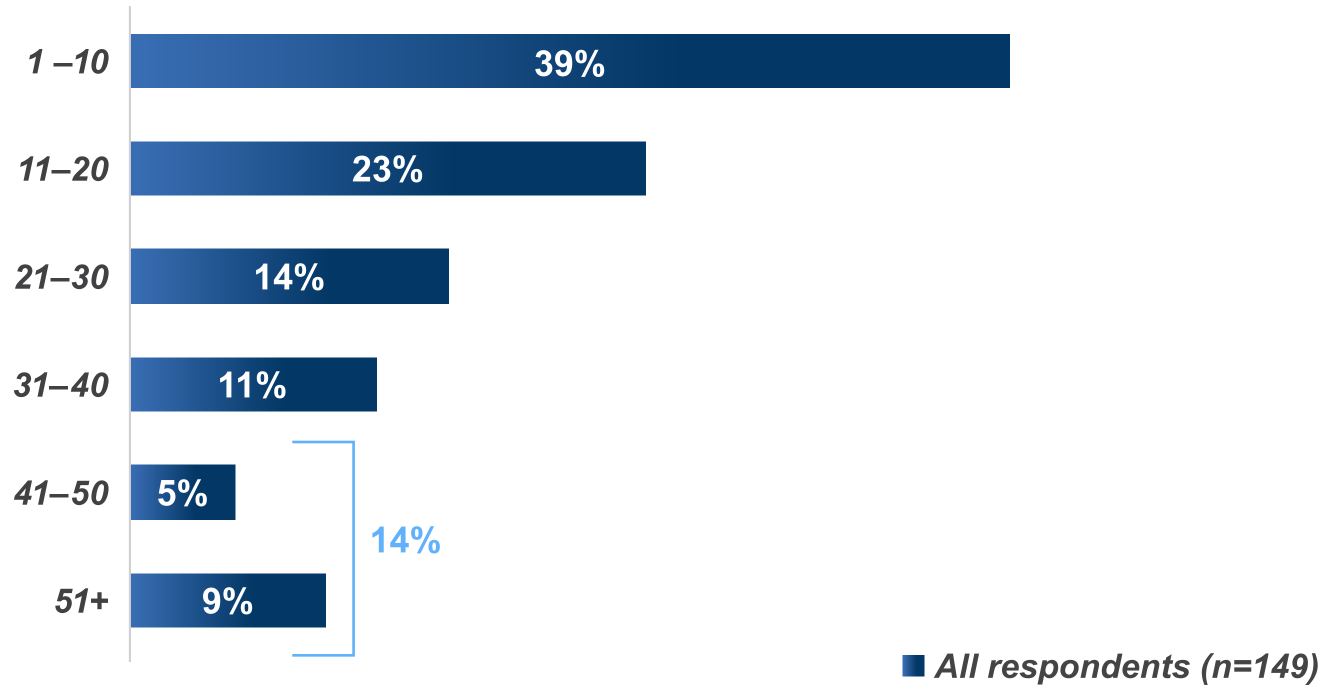


Regional Presence



Data Center Construction Activity

Overall, how many new data center projects is your company building over the next five years?



Methods

Over the first two months of 2025, we surveyed Data Center Frontier readers who met several criteria. Respondents needed to be senior employees of American or Canadian data center firms. They needed to be actively building out new data centers and work in roles that involve in energy-related topics. Participants who did not fit these criteria were screened out. Rigorous data cleaning standards removed any participants that straight-lined responses, demonstrated a lack of expertise in the subject matter, or sped through the survey. Overall, 149 respondents successfully completed the survey.

Theme 1

BARRIERS TO BUILD-OUT:

On wait times and scaling challenges

The race for AI is a race for electrons, coast to coast.

As demand for AI contunes to build, so too does demand for energy. Utilities are flooded with requests for more power, and in turn, their forward guidance to regulators reveal the scale of the situation. Across the country, a feverish build-out ensues.

Northern California

In Silicon Valley, the utility reports that data centers have requested 3.5 gigawatts (GWs), the equivalent of three large nuclear plants, putting further stress on a strained grid.

3.5 **Gigawatts** Requested

Texas

The Texas grid operator, ERCOT, releases a forecast that warns the regional grid's capacity may need to grow by 76%, from 85 gigawatts (GWs) to 150 GWs.

76% **Capacity** Growth needed

Northern Virginia

In 2024, the local utility tells data centers the minimum wait time will be seven years. Meanwhile, an already saturated market is expected to add another 1.4 GWs by 2027.

11 **Gigawatts** Added by 2030

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1. Data Center Frontier, "Silicon Valley Data Centers Gird for Surging Energy Demand Fed by New Data Centers," 2024.
2. Forbes, "ERCOT CEO Stuns Texas Officials with New Estimate for Power Needs," 2024.
3. Aurora Energy Research, "The PJM Market Operator Expects 11 GW of new data centers by 2030 in Northern Virginia Alone," 2024.

Survey data:

Sentiment on build-outs and barriers

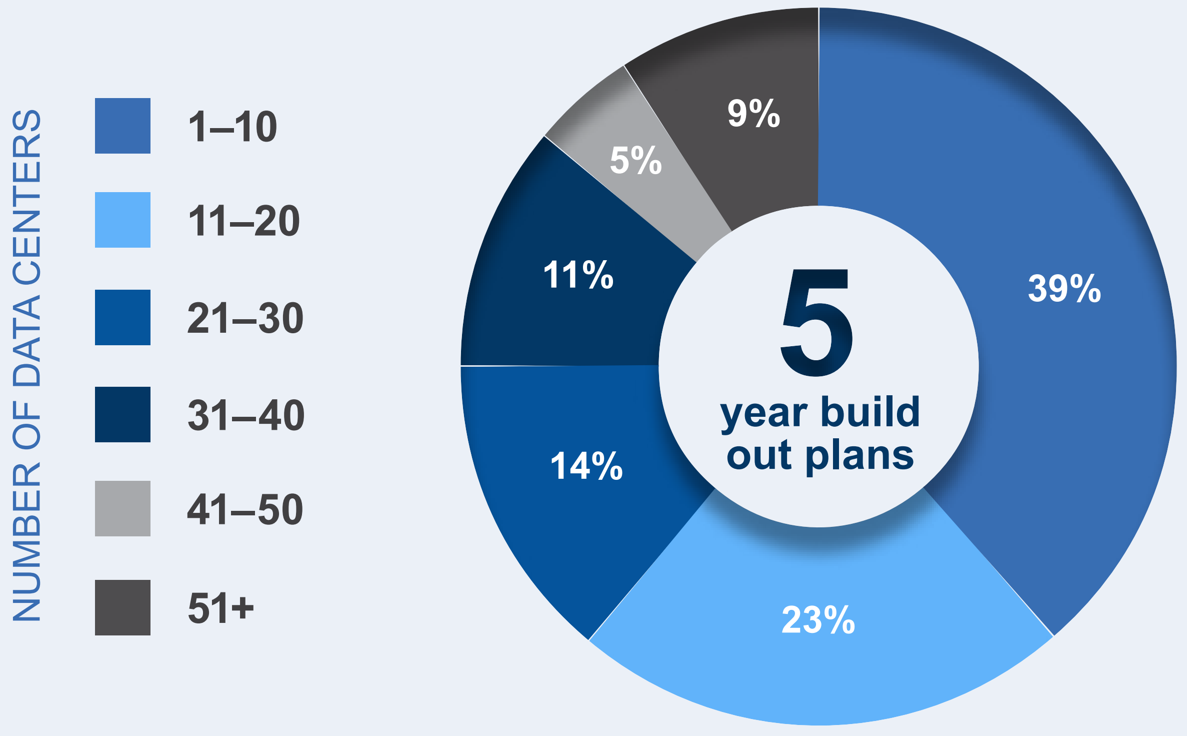
So, what does the actual data say about the rate of building new data centers and the struggle to find electrons during in the first few years of the A.A.I. (After AI) era?

This section presents first-of-its-kind data on the big picture.

The industry is on a building spree.

Six in ten respondents building at least 11 data center projects over the next five years, while 25% are building at least 30.

Overall, how many new data center projects is your company building over the next five years?

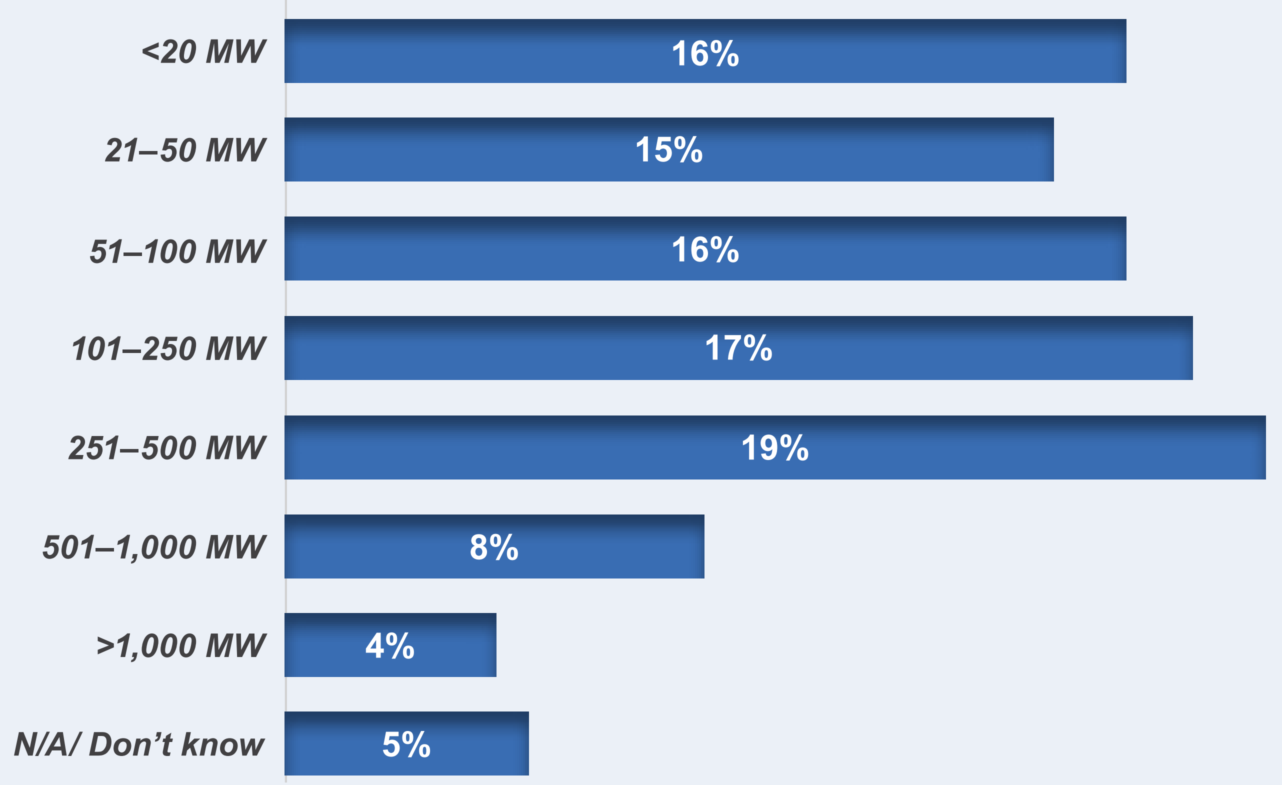


All respondents (n=149)

100 MW+ projects are on the rise.

With higher rack densities and greater demand for compute, nearly half of respondents reported their average data center project will be over 100 megawatts (MWs), while 4% were already in the gigawatt scale.

What is the average amount of capacity for a single new data center project that your company needs?

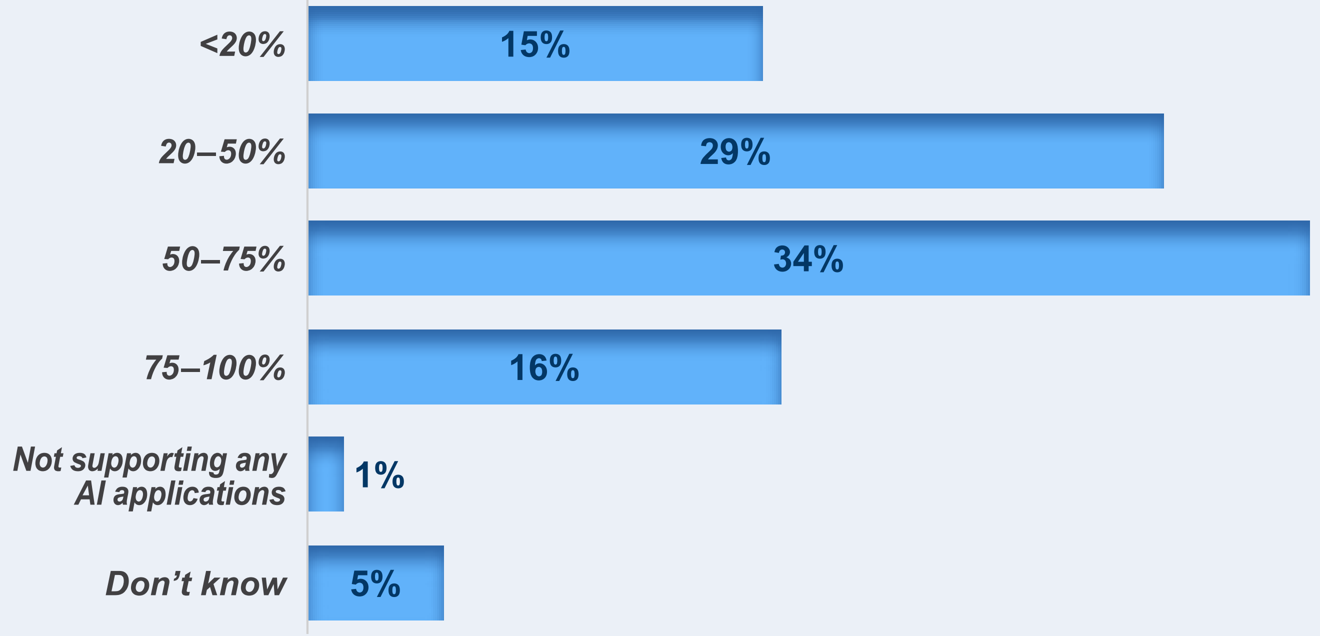


All respondents (n=149)

AI workloads are expected to be significant.

Much of this new demand is driven by high-performance and parallel compute to support AI workloads. But just how much? For half of respondents, it was at least 50% of all new workloads.

What percentage of new data center load for your company will be accelerated parallel compute / high-performance compute to support AI workloads?

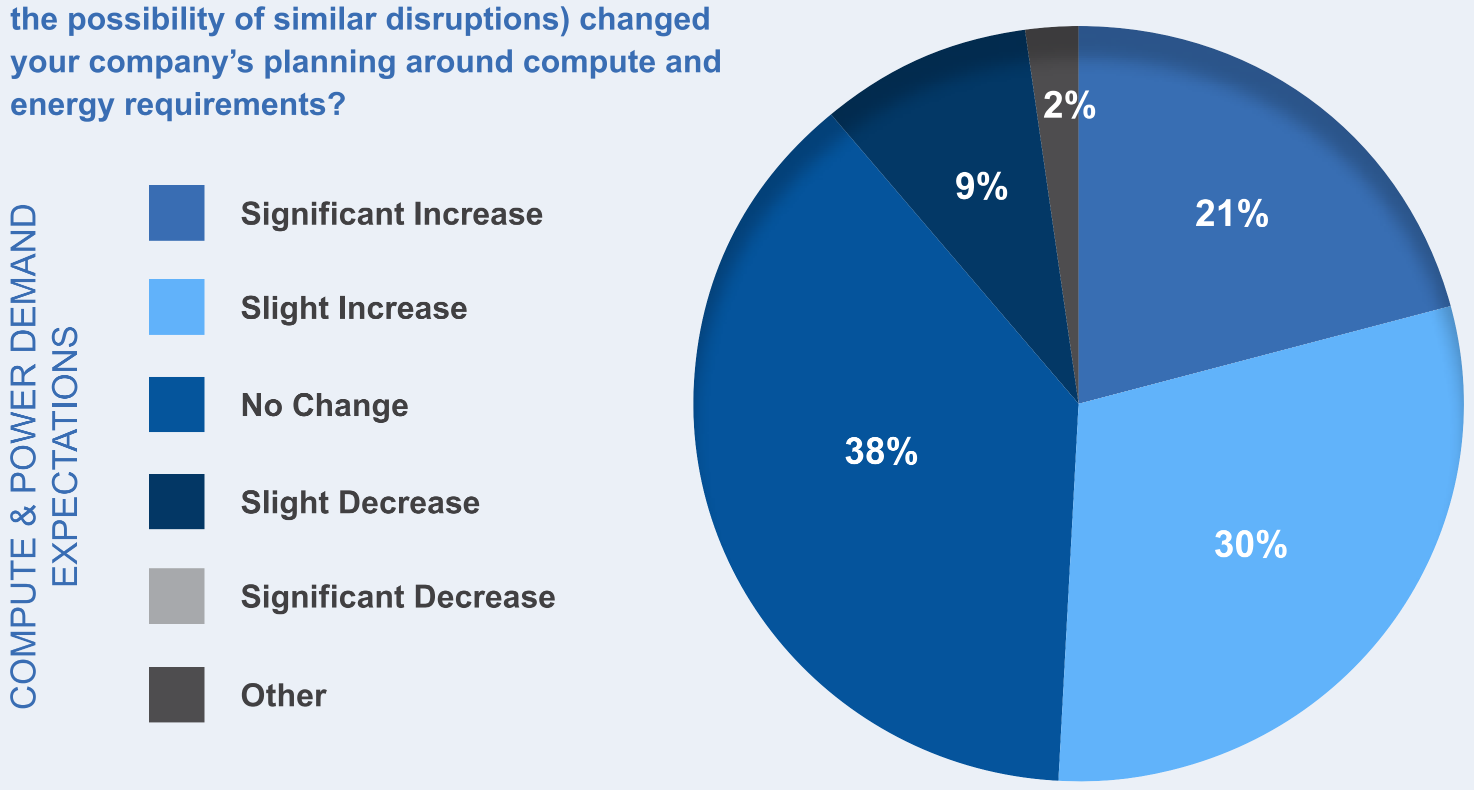


All respondents (n=149)

Despite DeepSeek, energy demand is increasing.

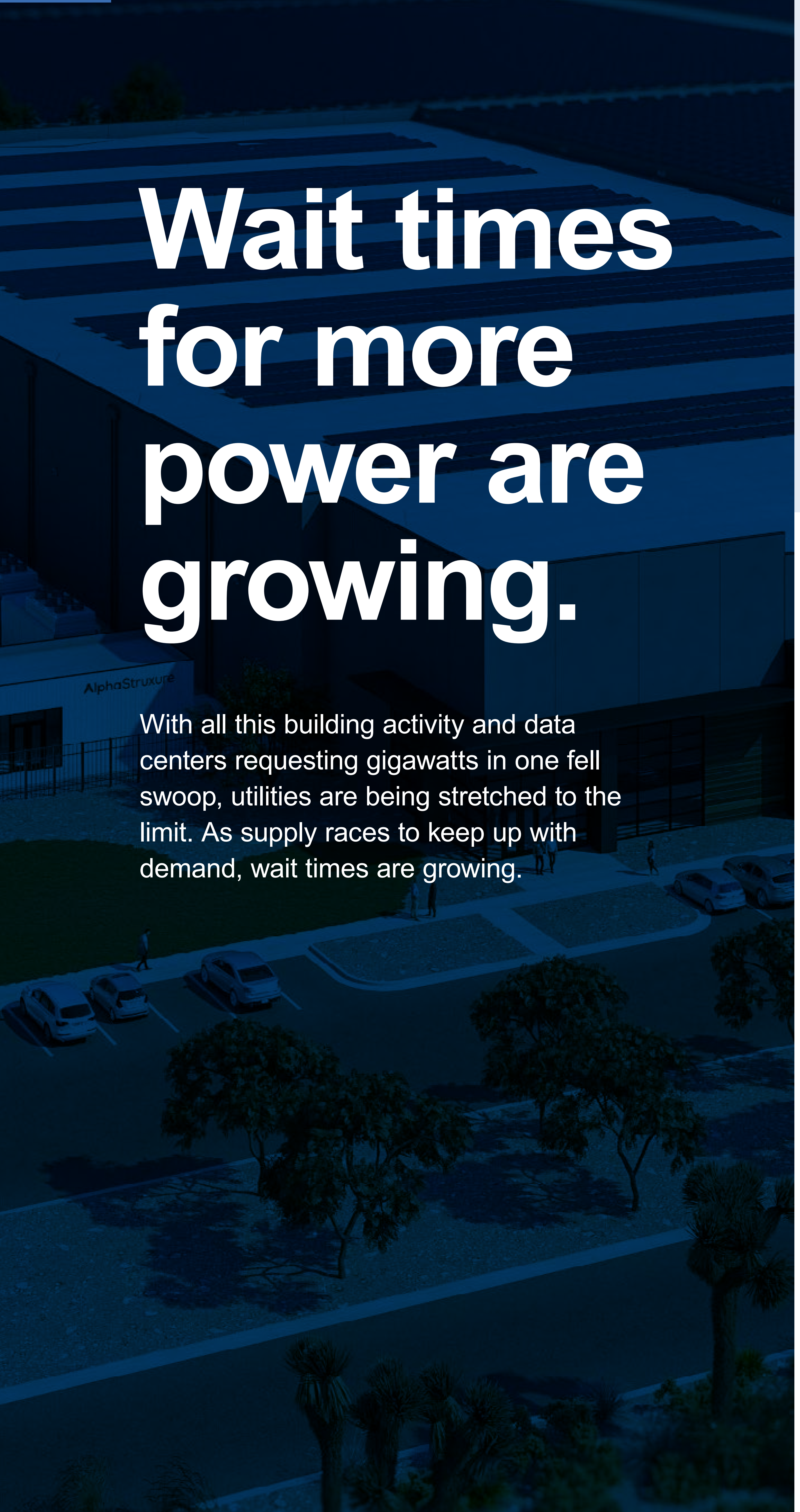
DeepSeek posed the potential to dramatically reduce compute needs for training. Turns out that the hype here was overblown, as less than 10% expected lower demand, while four in ten expected no change.

How has the launch of DeepSeek's app (or the possibility of similar disruptions) changed your company's planning around compute and energy requirements?



All respondents (n=136)

Note that early respondents were not asked this question due to a questionnaire change after the survey launch.



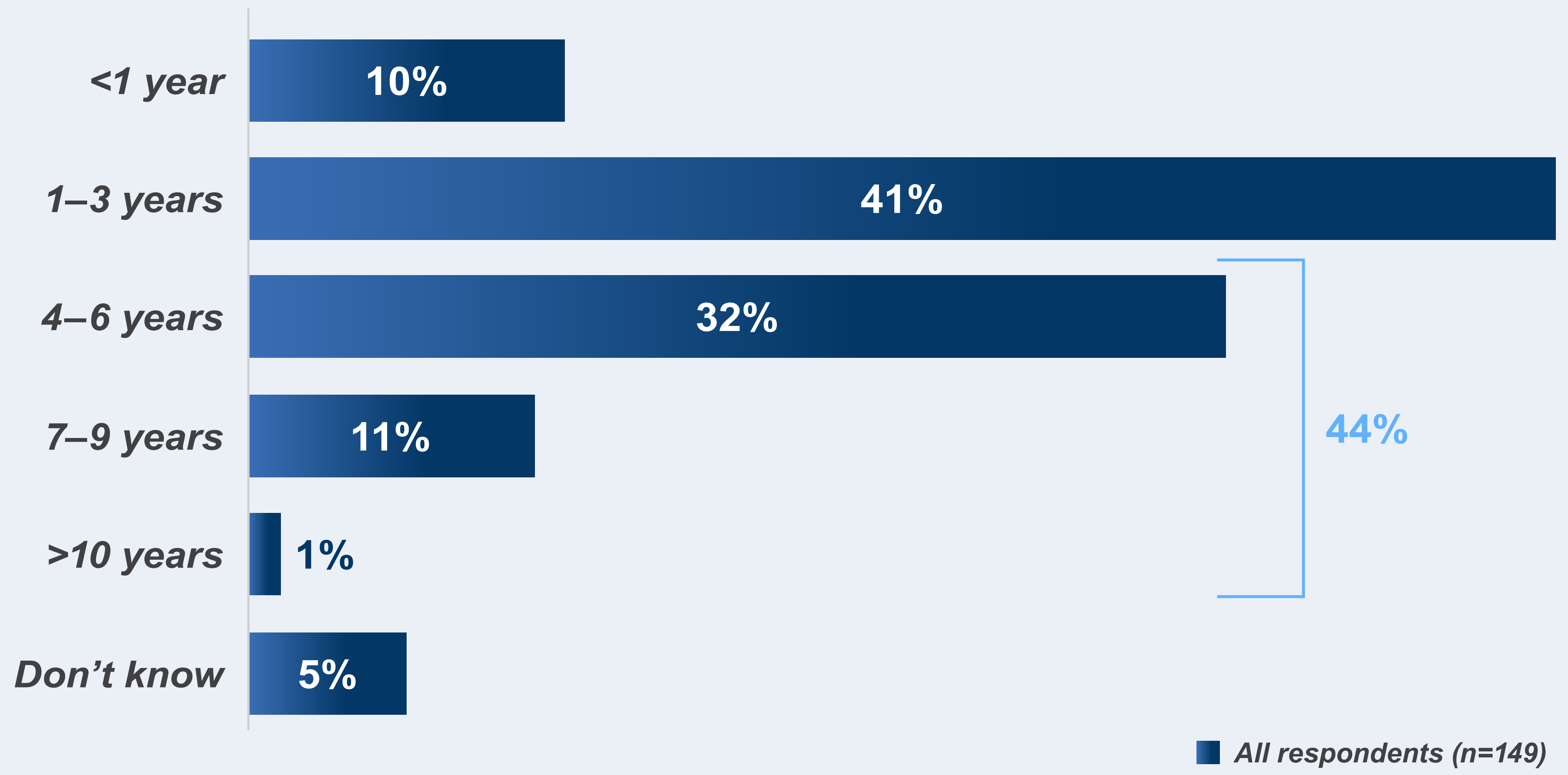
Wait times for more power are growing.

With all this building activity and data centers requesting gigawatts in one fell swoop, utilities are being stretched to the limit. As supply races to keep up with demand, wait times are growing.

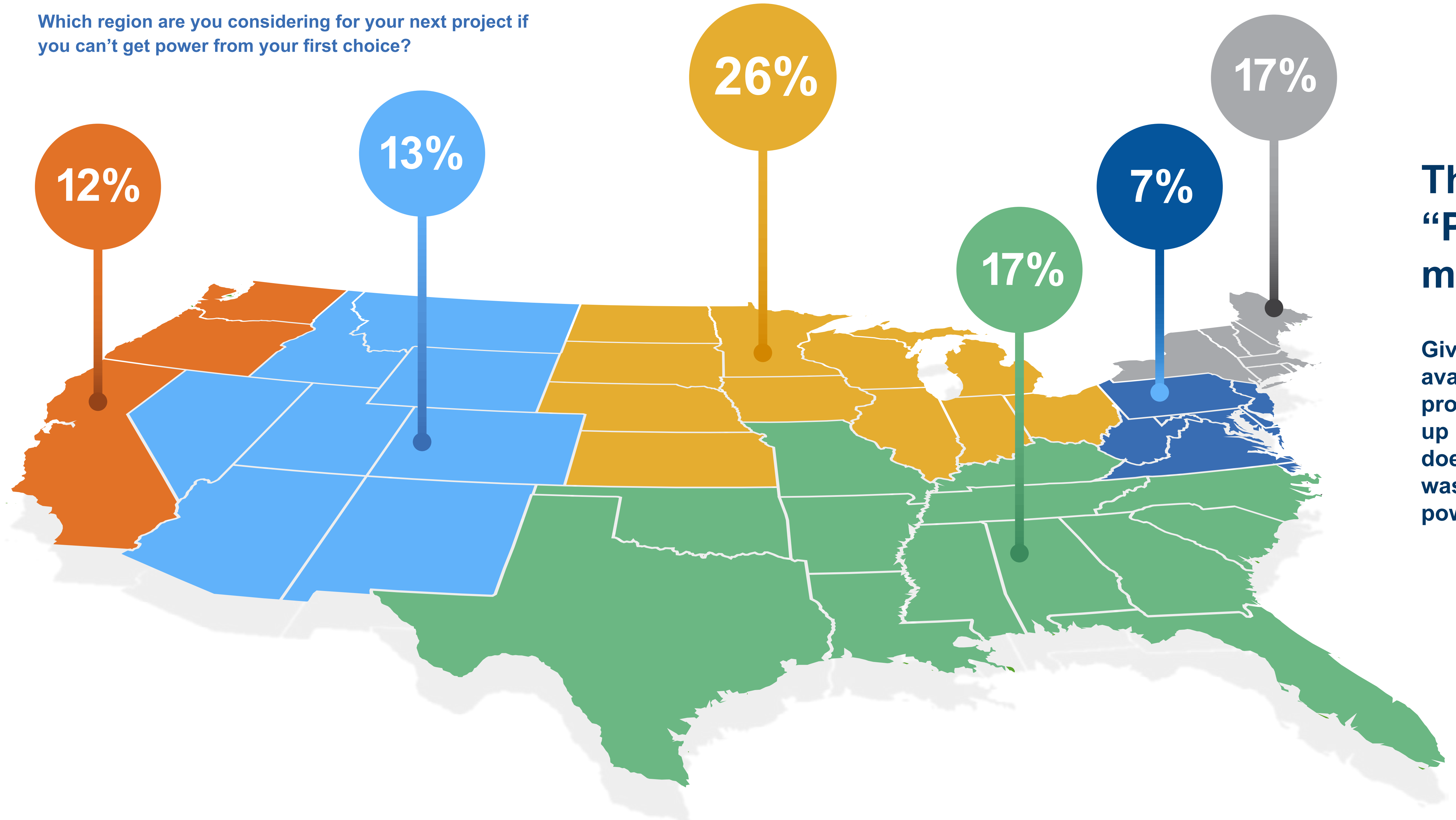
Energy wait times are climbing.

Despite nearly half of respondents indicating their utilities could energize their facilities in fewer than three years, a concerning amount, 12%, are creeping out into the fat-tailed region of 7 to 10+ years — as an average wait time, not an outlier. And nearly 1 out of 2 are waiting, on average, at least four years.

Over the last two years, across all your company's new data center projects, what is the average timeline that your utilities have quoted to provide power to your data center?



Which region are you considering for your next project if you can't get power from your first choice?

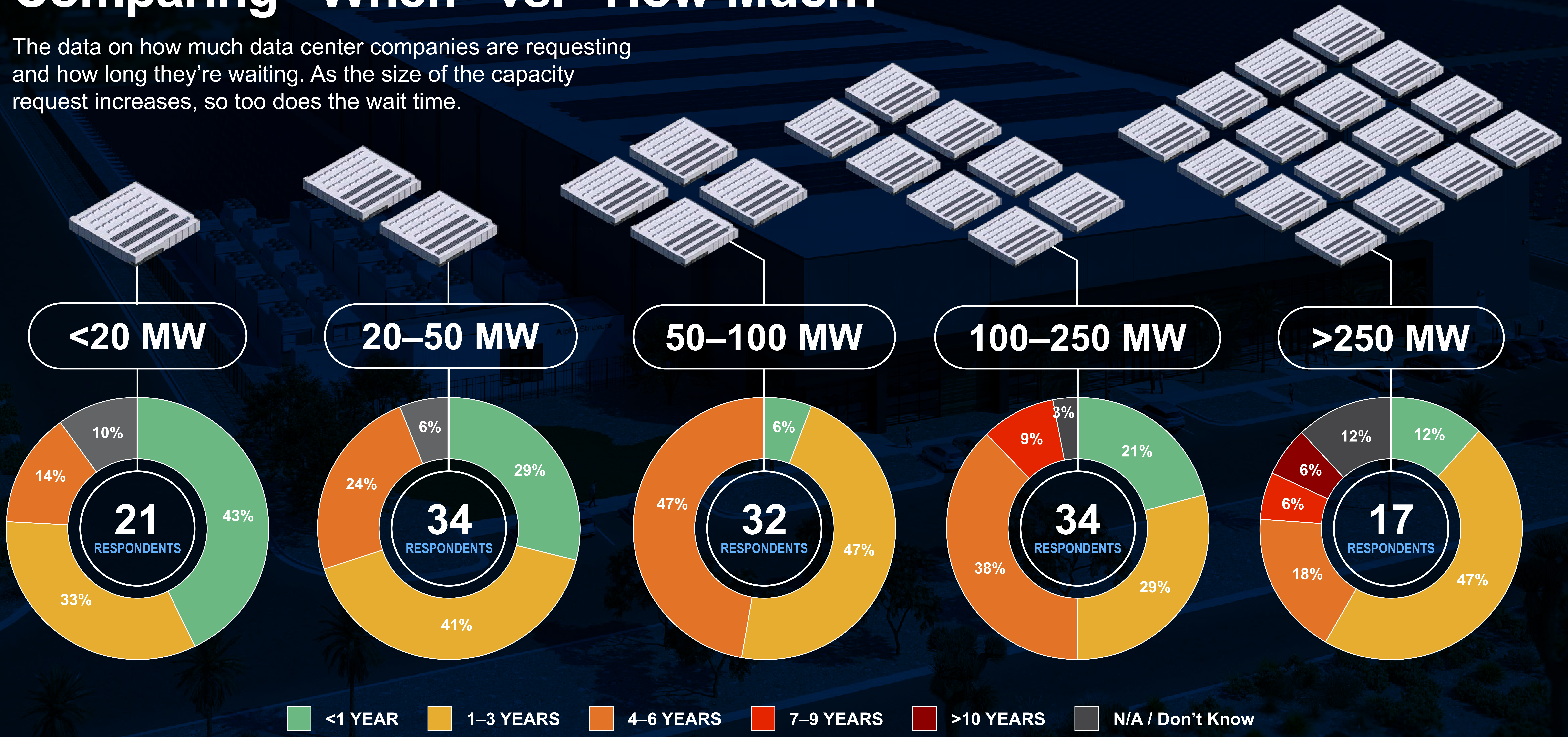


The Midwest is the top "Plan B" option for more power.

Given the regional variations in power availability and wait times, data center professionals are evaluating back-up locations in case their first choice doesn't work out. The Midwest (26%) was the top-ranked region for Plan B power availability.

Comparing “When” vs. “How Much?”

The data on how much data center companies are requesting and how long they’re waiting. As the size of the capacity request increases, so too does the wait time.



Which region has offered the data center industry the fastest time to power?

This chart lays out the industry's first large-scale dataset on regional differences in time to power for U.S. data centers. Of course, this is merely a snapshot in time in a very fast-moving market.

The graph at right displays three questions we asked of participants:

When? How long of a wait time did the utility quote you to deliver capacity?

\+

Where? In which region did you make this request to the utility?

\+

How Much? What was the amount of power, in megawatts, that you requested?

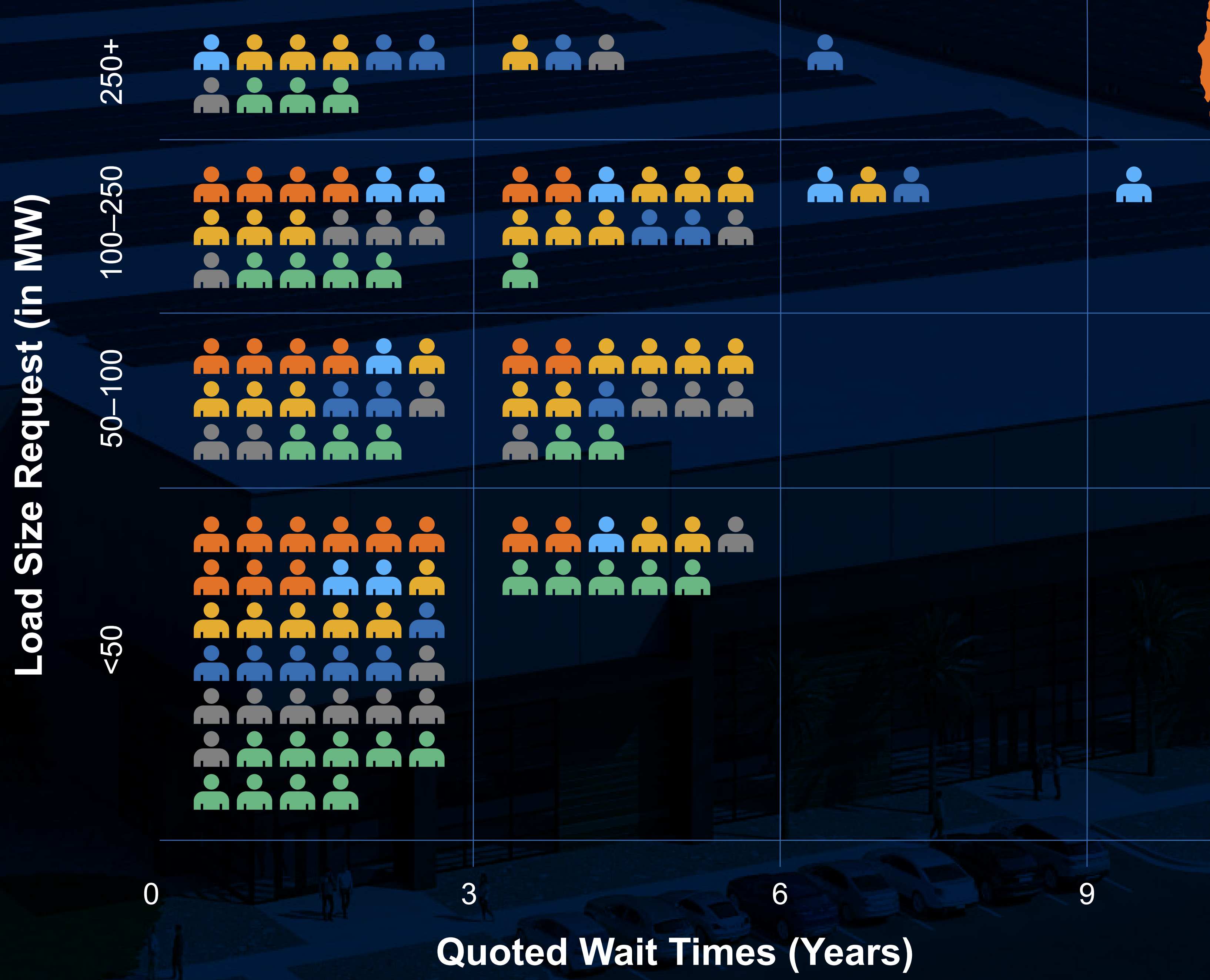
=

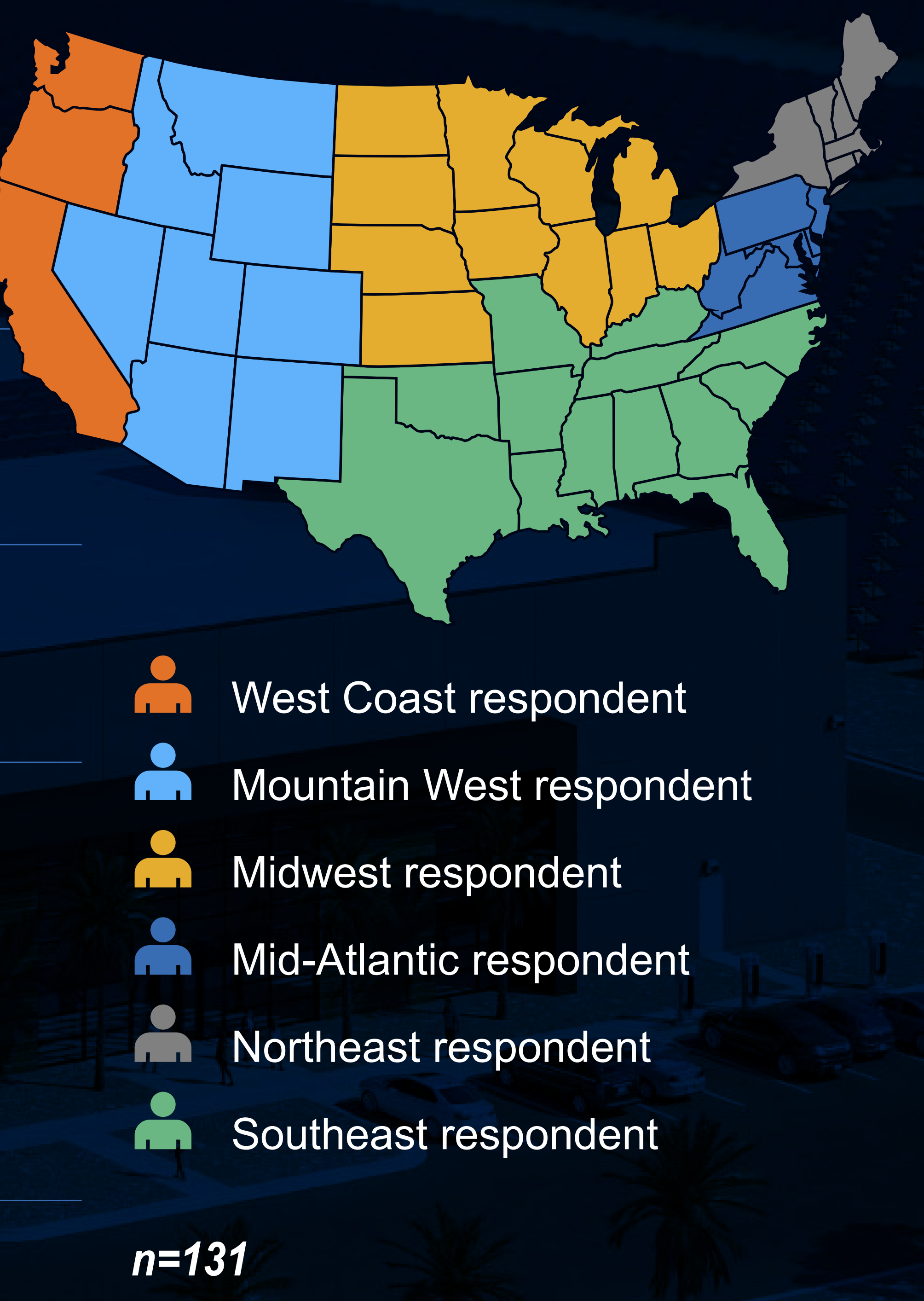
Regional time to power rankings

Key Takeaways

- The fastest time to power in recent years, based on a weighted average, is the **Mountain West**.
- The **Midwest (32)** was home to the most overall recent capacity requests, followed by the Southeast (28).
- Roughly **1 in 3 projects** were quoted a wait time of **4–6 years**.
- Nearly **2 in 3 requests**, regardless of size, were quoted under **3 years**.
- **Five projects** were quoted timelines of **7–9 years**, with one quoted at 10+ years.

The 'When,' 'Where,' and 'How Much' of U.S. Data Center Time-to-Power



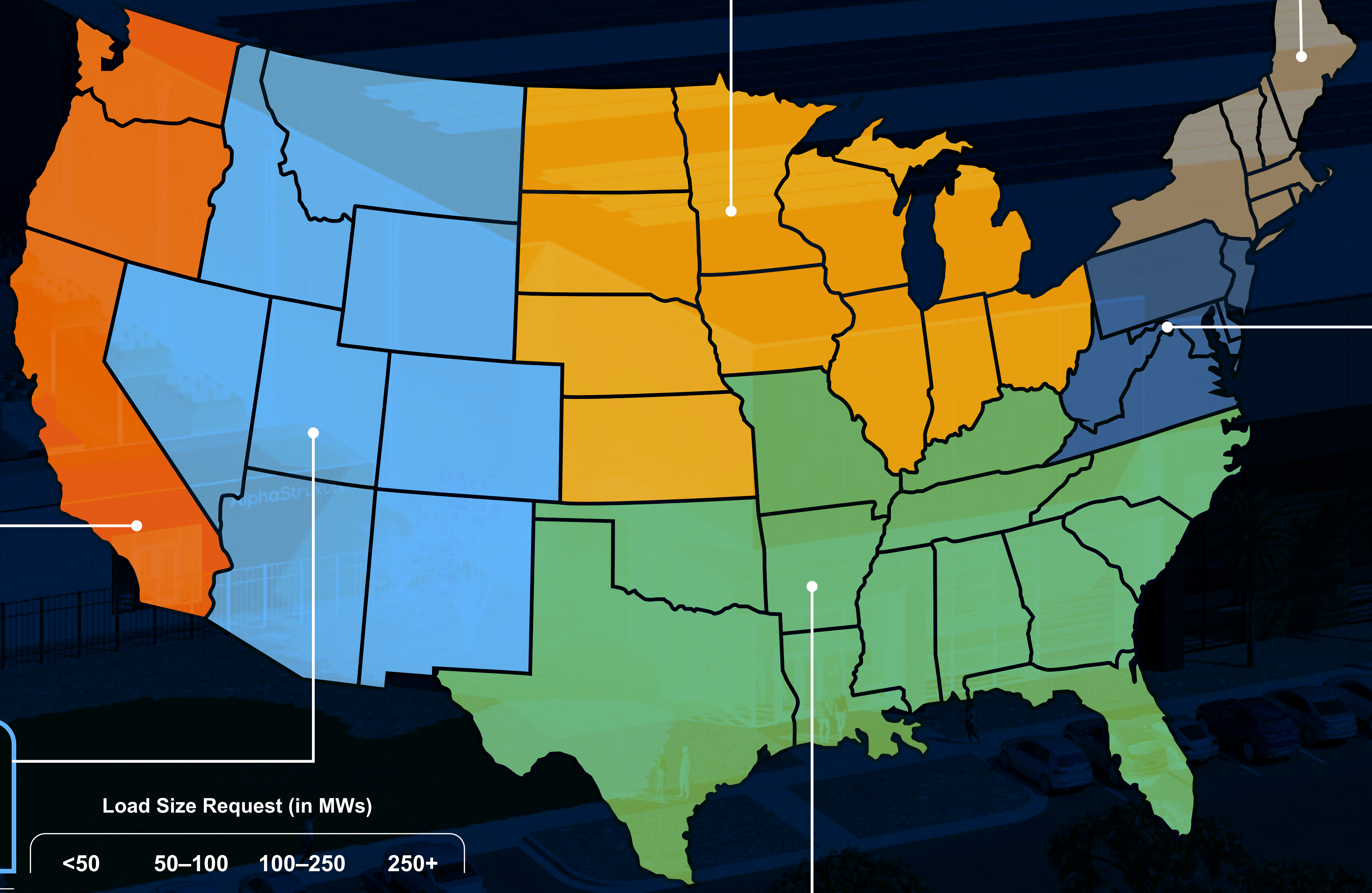


Which region has the fastest time to power?

By creating a weighted average of each region, we were able to compare each region's approximate time to power. These results should be interpreted with a grain of salt because they are based on small sample sizes for each region. Participants reported only their "most recent" capacity request, which could be from several years ago. With those caveats aside, these rankings offer a directional sense of where time to power has been fastest in recent years. Of course, it is likely changing in real time.

① **Mountain West**
② **Mid-Atlantic**
③ **Southeast**
④ **Midwest**
⑤ **West Coast**
⑥ **Northeast**

Regional comparisons of time to power, by the numbers



Midwest

Load Size Request (in MWs)

Quoted Wait Times (years)	<50	50–100	100–250	250+
0–3	19%	13%	9%	9%
4–6	6%	19%	19%	3%
7–9			3%	

Total Requests = **32**

Northeast

Load Size Request (in MWs)

Quoted Wait Times (years)	<50	50–100	100–250	250+
0–3	35%	13%	17%	4%
4–6	4%	17%	4%	4%

Total Requests = **23**

West Coast

Load Size Request (in MWs)

Quoted Wait Times (years)	<50	50–100	100–250
0–3	41%	18%	14%
4–6	9%	9%	9%

Total Requests = **22**

Mid-Atlantic

Load Size Request (in MWs)

Quoted Wait Times (years)	<50	50–100	100–250	250+
0–3	36%	13%		13%
4–6		6%	13%	6%
7–9			6%	6%

Total Requests = **16**

Mountain West

Load Size Request (in MWs)

Quoted Wait Times (years)	<50	50–100	100–250	250+
0–3	20%	10%	20%	10%
4–6	10%		10%	
7–9			10%	
10+				10%

Total Requests = **10**

Southeast

Load Size Request (in MWs)

Quoted Wait Times (years)	<50	50–100	100–250	250+
0–3	32%	11%	18%	11%
4–6	7%	11%	7%	4%

Total Requests = **28**

This page uses the same dataset to present a different view of the situation. These are the 131 responses mapped by the region / load size / wait time matrix.

Theme 1

Analysis

The name of the game in AI is still scale. The basic gameplan is to scale models by training them on ever larger datasets and thereby use ever more compute and power to become ever more intelligent. This massive scaling effort requires building ever more data centers. And the survey data bears this out.

One 100 MW data center is a major undertaking, involving **hundreds of millions** in deployed capital. The typical survey respondent works for a company building at least 10 of these. This is billions of dollars per company. And there are dozens of companies doing this. None of this is a surprise, given what we know from reading the papers these days.

What is more of a surprise is how much longer utility wait times are growing. Today, most respondents are reporting an average wait time over **four years**. And some are reporting that average skewing out toward eight, nine, even ten or more years.

This situation is forcing the industry to make tradeoffs and get creative. And that exciting moment of innovation is where we turn to next.

Theme 2

TRADE-OFFS AND TIMELINES:

On evaluating options and impacts

The energy status quo is no longer tenable.

Data center companies have long been the unquestionable leaders in savvy energy sourcing. They were at the vanguard of widely adopted corporate sustainability practices, such as renewable energy credits, power purchasing agreements, and deep energy efficiency. They led the way on spurring low-cost zero-carbon energy investments, locking in gigawatts of clean electrons into long-term contracts. They built out petabytes of compute power, ushering in the era of smartphones and streaming, all without driving up aggregate electricity demand in the U.S. These massive strides all came before AI.

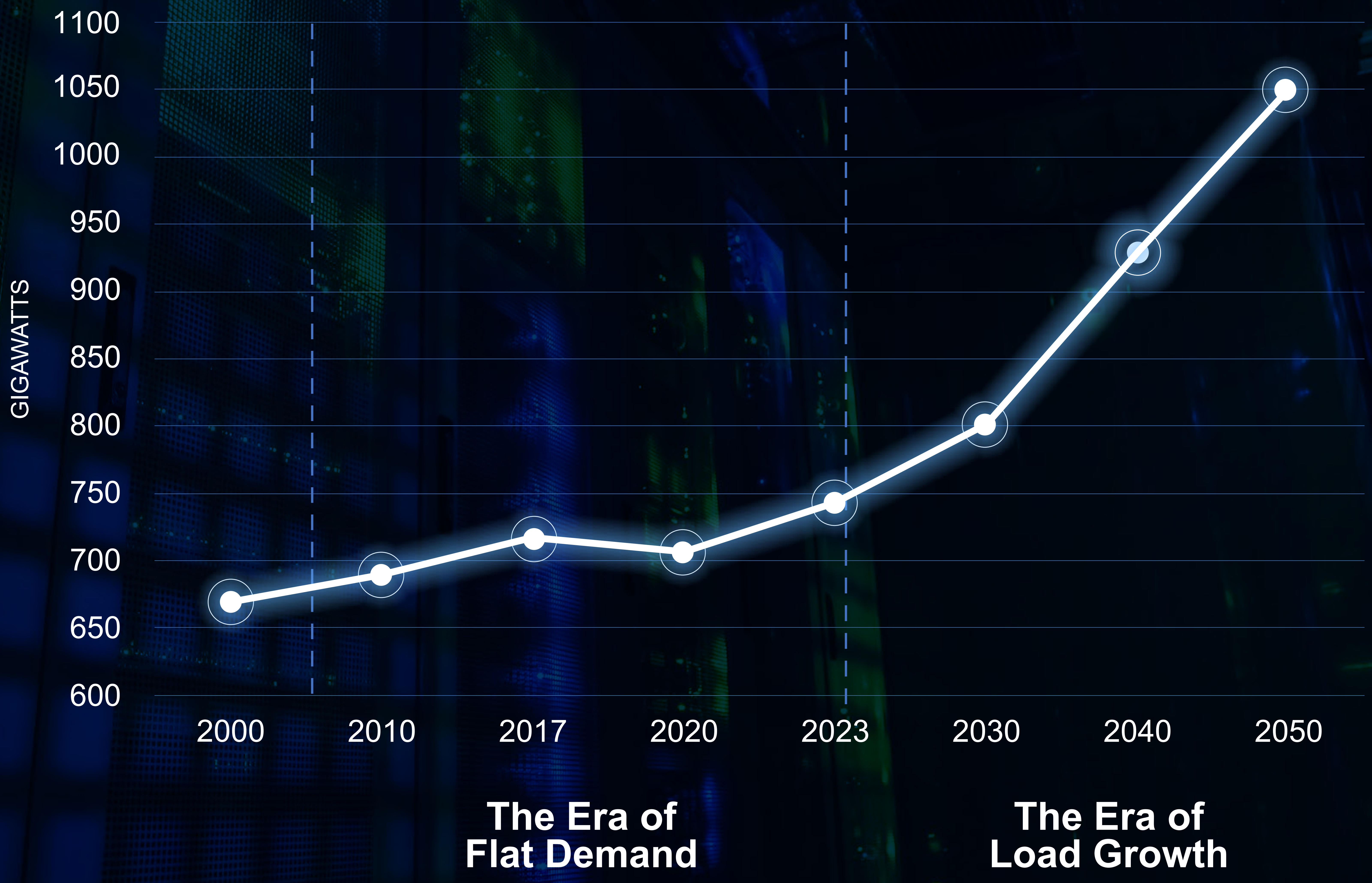
After AI, building and energizing data centers has gotten a lot harder. Prime land with access to fiber, water, and electricity is in short supply. Vacancy rates are at all-time-lows in many of the top markets. After years of impressive progress toward zero-carbon targets, several hyperscalers saw their emissions increase in 2023 and 2024. Aside from growing wait times, other challenges are escalating around costs, chips, and land. This section explores the knock-on effects of the After AI energy crunch: on emissions, energy costs, and workarounds.

Significant load growth was already forecasted before AI.

AI is only amplifying existing growth in the data center sector. And on top of that, the U.S. is already projected to double its grid capacity by 2050, thanks to trends in reindustrialization, electrification, and decarbonization.

Modeling from various sources, including this Department of Energy chart at right, were built without factoring AI-driven demand into the equation. Even still, they show a massive increase in grid capacity.

To put it into perspective, it took the U.S. over a century to build out its existing grid capacity; it will have just 25 years to double it.



Source: U.S. Department of Energy, 2023. Numbers are approximate.

Survey data:

Top barriers slowing the building boom

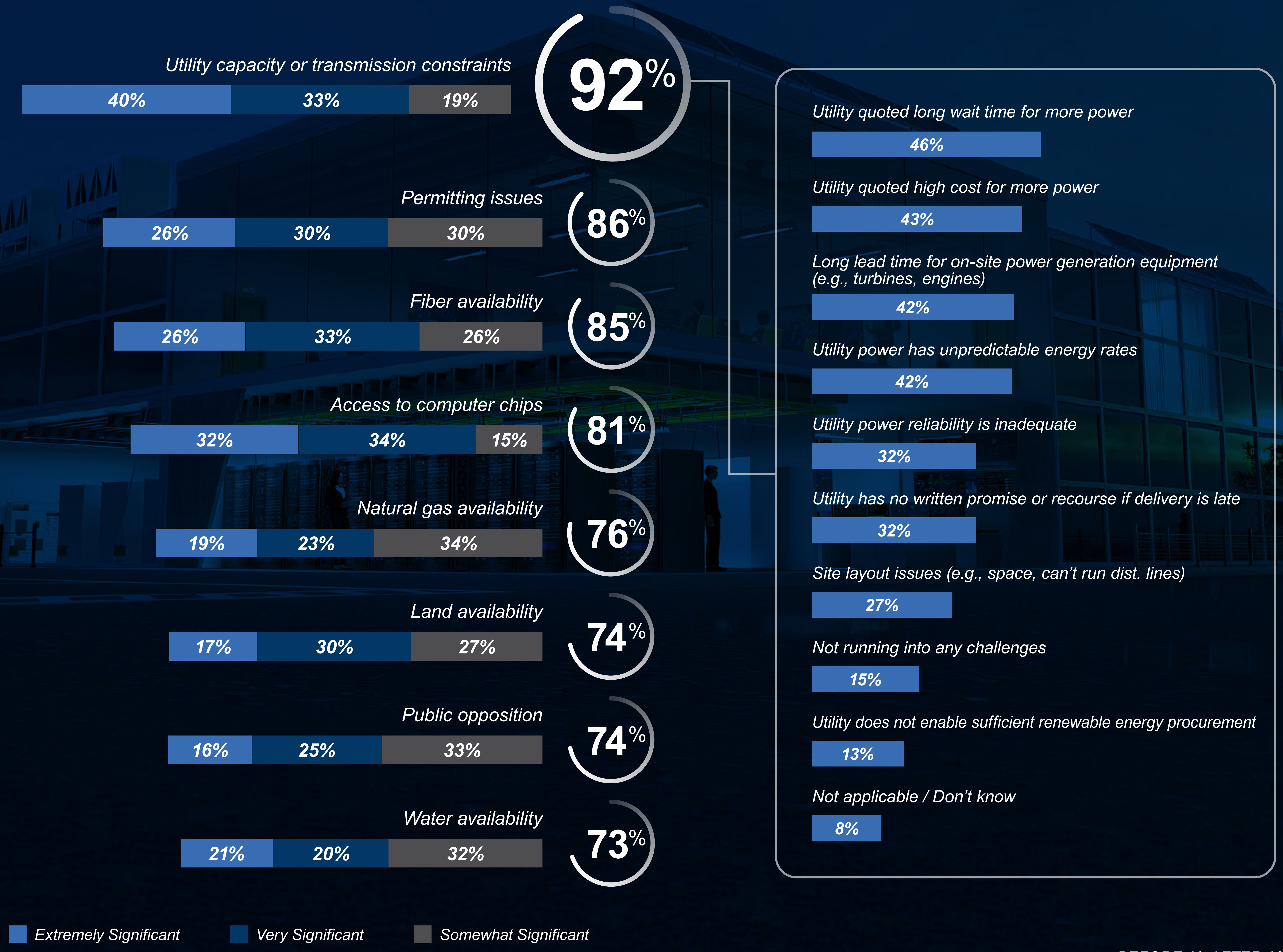
The laws of supply and demand are alive and well. As the industry builds more data centers at a furious pace, it's encountering tight market conditions on many fronts. This section zeroes in on what barriers are holding back growth and just how much this high demand is driving up costs and carbon emissions.

The usual suspects for slowdowns showed up in the data. Most respondents reported at least somewhat significant concerns on land availability (74%), water availability (73%), gas availability (76%), public opposition (74%), fiber availability (85%), computer chip availability (81%), and permitting (86%).

Yet the industry's biggest friction point is the lack of utility generation or transmission capacity. More than nine out of ten, 92%, ranked these capacity constraints as at least somewhat significant, with a whopping four out of ten ranking them as "extremely significant" — far more than any other barrier.

What's slowing down data center projects?

Which obstacles to building more data centers are most significant right now, and what's driving the top overall concern?



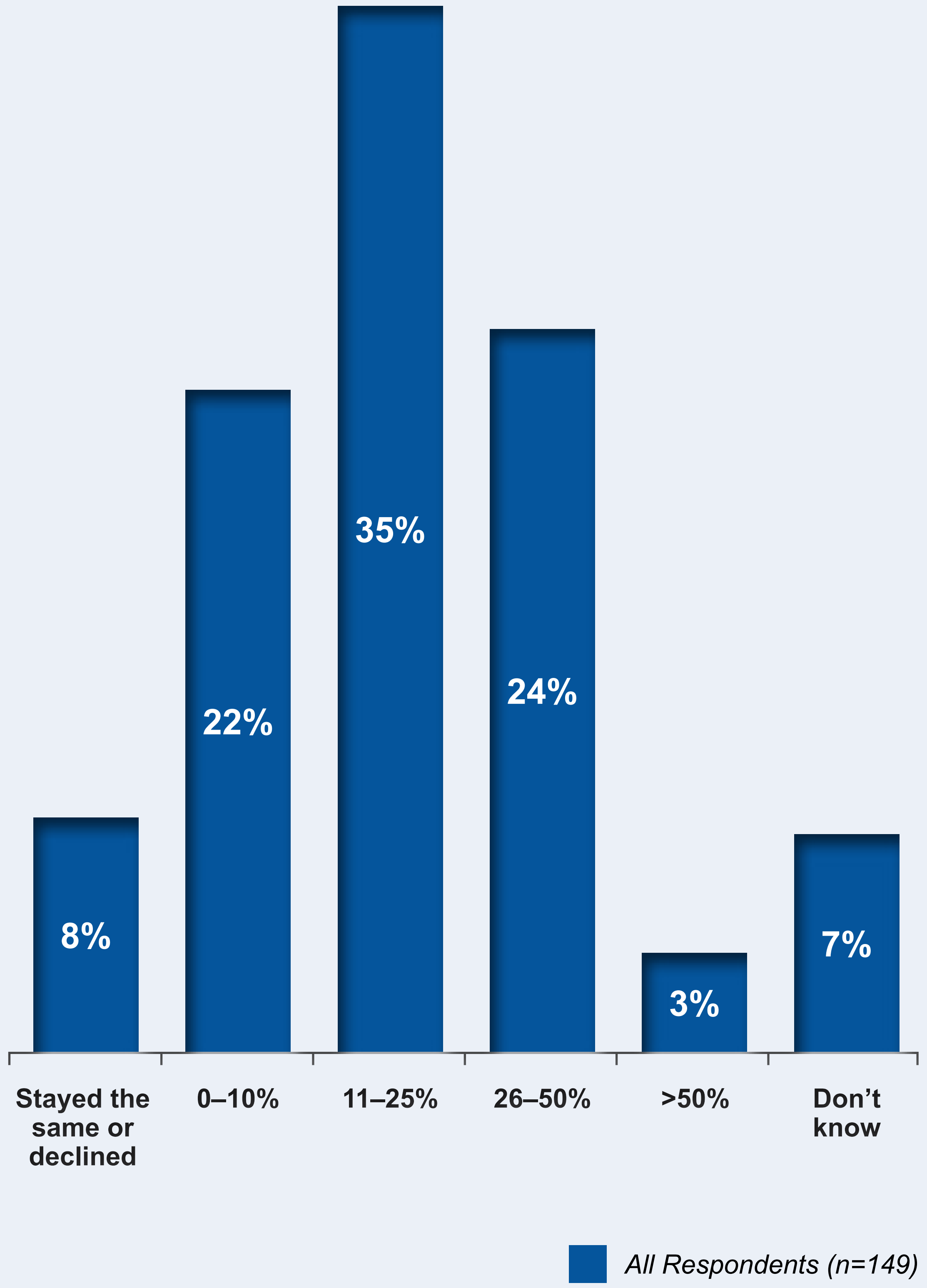
The cost of doing (a lot of) business.

As the AI race continues, there is a growing sense that energy costs are going to rise, as utilities either modify what had been very low costs for power or impose infrastructure investment onto their large-load users.

The industry is, so far, managing energy costs well ...

The overall U.S. average cost for energy rose by about 30% from 2020 to 2024. Six in ten surveyed data center professionals reported their all-in energy costs rose less than 25% during that time. The overall stability here is likely a testament to the industry's savviness in locking in long-term energy sourcing contracts. Still, one in four saw sizable increases.

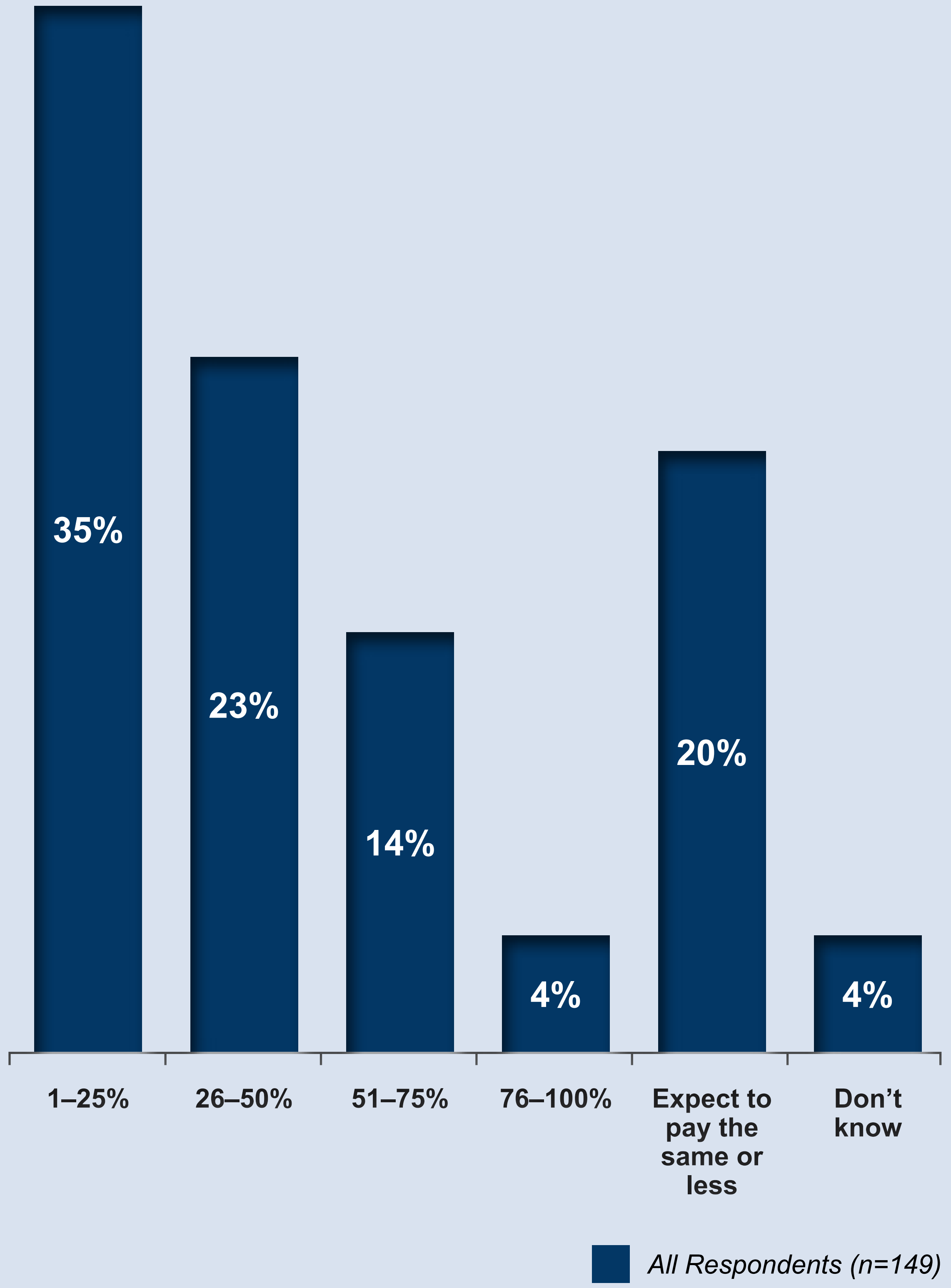
In the past five years, how much have your all-in energy (gas + electricity) costs increased for your company or enterprise?



... Yet, in the future, many expect to pay more.

The respondents' sentiments were mixed around what firms would have to pay to power future data centers. One in five expected to pay the same or less, while one in three indicated their companies were willing to pay up to 25% more. Another 40% were willing to pay significant cost increases, ranging from 26% to as high as twice as much.

Compared to how much your company typically pays for data center power, how much more is your company willing to pay for the power it needs for its new data center projects?



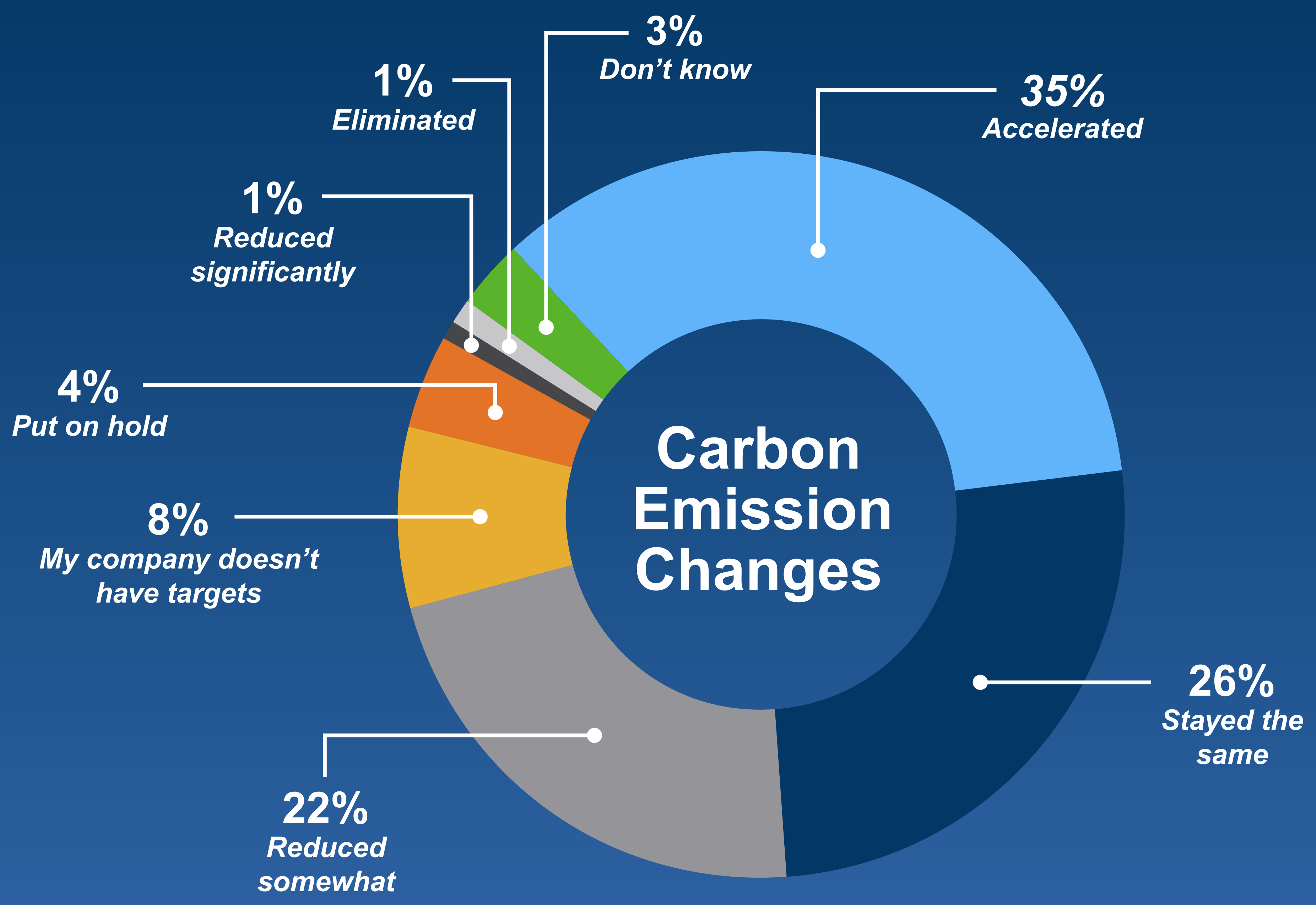
The big carbon question

Aside from cost, the next question is carbon: How much has the post-AI world scrambled the industry's sustainability targets? In 2024, several of the top hyperscalers made headlines by indicating they were recalibrating or pulling away from these targets. What about the rest of the industry? Here is what the survey data says.

The sustainability picture is a mixed bag.

Thirty-five percent saw their emissions accelerate. About one in four saw them remain the same, and a quarter saw them shrink. A handful indicated their targets put on hold or eliminated. It's a cloudy picture, yet it's clear that one cloud in particular — accelerating emissions for a plurality of respondents, is a concern.

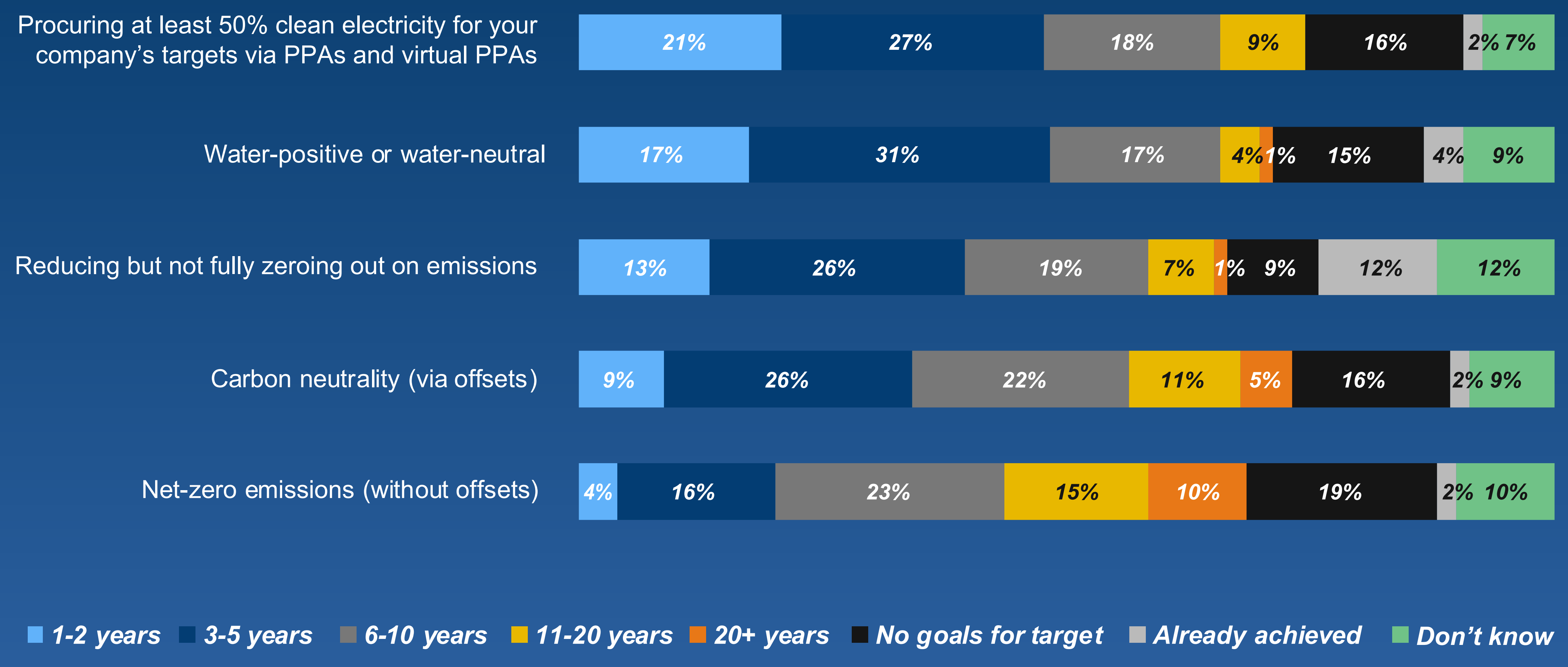
Which of the following best describes how your data center or data center end-users' carbon emissions situation has changed over the last two years, since the first big wave of AI adoption?



Despite the headlines, sustainability targets remain widespread.

As for the state of sustainability targets, the industry continues to demonstrate its commitment. Across the most common sustainability issues, 80 – 90% of respondents reported their companies had targets: procuring clean electricity, achieving carbon neutrality (with offsets), reaching net-zero emissions (without offsets), reducing but not eliminating emissions, and becoming water-positive. Overall, despite the headlines, the data here indicate most targets remain intact. The question now is whether they will be hit.

Which of the following renewable energy and sustainability targets does your data center or data center end-users have commitments or goals to achieve, and in what timeframe?



Theme 2

Analysis

In terms of the data center outlook in North America, everything has changed and nothing has changed. Before AI, the industry was able to secure low-cost, low-volatility, and low-carbon energy via long-term PPA contracts. That remains the case for many in the survey data, with many reporting that when it comes to energy sourcing, they expect neither to pay (much) more nor emit more than they previously thought.

Yet magmatic disruptions are now intruding into that bedrock energy strategy. A huge share of respondents has seen utility capacity become the top hindrance to growth, while a non-insignificant minority have seen their emissions accelerate, are now willing to pay vastly more for their energy, or both. The After AI age is ushering volcanic disruptions across the journey of the electron. Perhaps the largest of such disruptions, the turn away from centralized electricity to decentralized on-site power generation, is where this report heads to next.

Theme 3

ASSESSING THE ALTERNATIVE:

On workarounds and on-site power

The data center industry's legacy of energy innovation is moving into a new era.

The high-performing strategies of the Web 2.0 era are no longer as dependable as before. The grid itself is aging and bogged down in delays for interconnection, permitting, and new capacity, putting it in a tough position to meet all the load growth that has suddenly emerged.
Now the question is, what paradigm comes next?

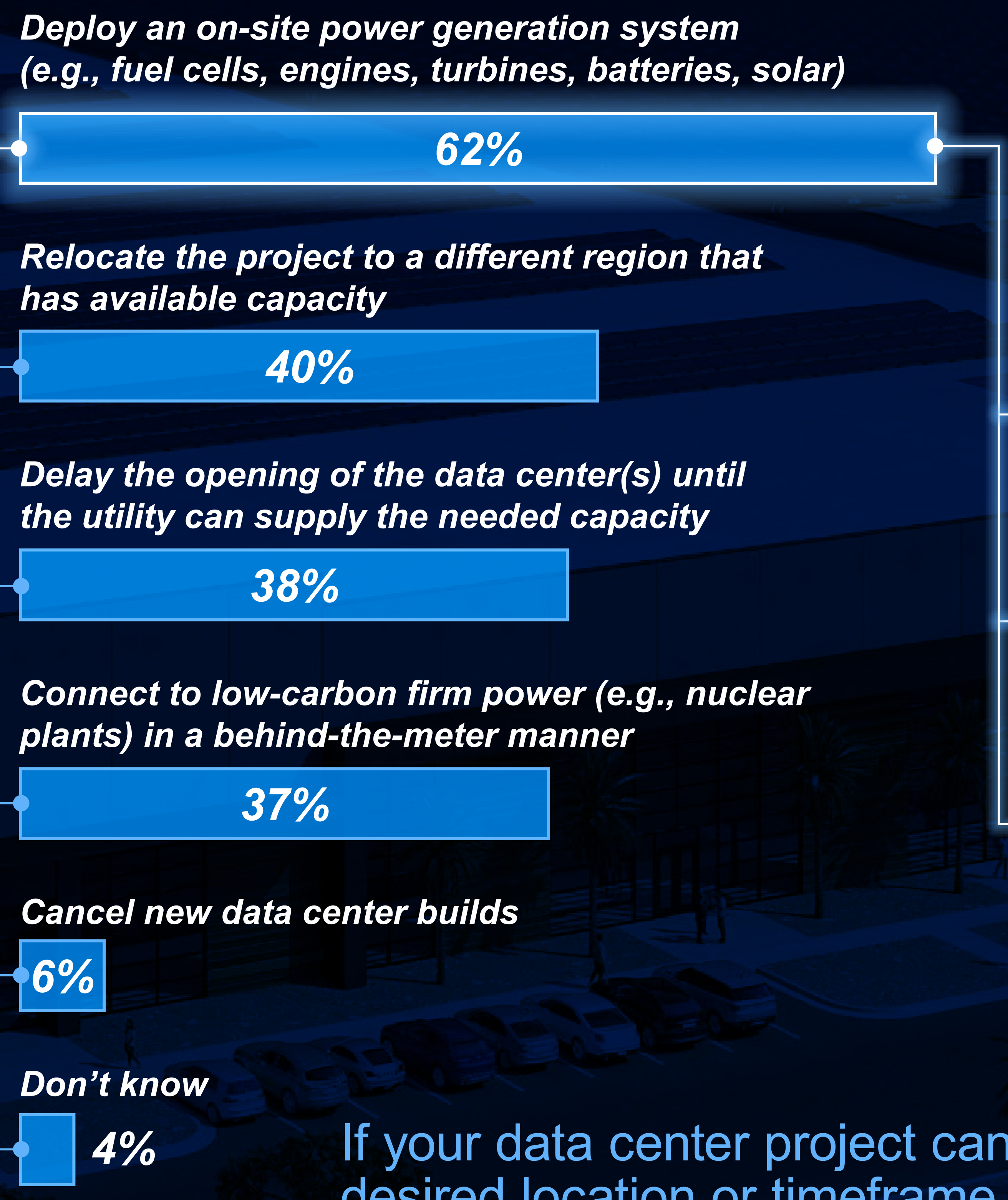
TIMELINE: Some of the data center industry's top energy innovations

2000	The dot-com boom drives up demand for computing, leading savvy data center companies to site their new facilities next to excess generation capacity. This strategy would scale massively years later when crypto mining takes off.
2006	The first server virtualization solution is put into market, ushering in a massive step change in space, cooling, and energy efficiency. The introduction of liquid cooling enables higher utilization and the ensuing heat.
2007	The power usage effectiveness metric (PUE) is introduced. In the early days, PUEs of 3.0+ are common, but as the industry takes the lead on energy efficiency, averages tick downward to 1.4, 1.2, even right around 1.0, the ideal.
2009	Hyperscalers begin adopting power purchasing agreements and renewable energy credits at scale, setting out a replicable roadmap for clean energy procurement that the rest of the business world embraces.
2015	Due to massive growth in streaming and smartphones, the data center industry innovates toward super high-density computing, partly enabled by innovations in cooling technology.
2022	The rise of AI leads to further advances in rack density and cooling, such as immersion cooling and superchips from companies such as Nvidia.
2024	The first off-grid on-site power generation systems are deployed to support large-scale data centers with prime power.

Behind the meter — ahead of the curve?

As the industry searches for more electrons in the early days of the After AI era, it's turning its anxious gaze away from the grid and toward on-site energy systems. The survey data here captures the sentiments of an industry in flux.

What's your **Plan B** for power?



Top 3

Ranked on-site power system deployment options

- #1 **Bridge to power:** when utility arrives, utility becomes ***prime*** power
- #2 **Island power:** the data center never connects to the utility
- #3 **Bridge to power:** when utility arrives, utility becomes ***back-up*** power

If your data center project can't get utility power in your desired location or timeframe, what do you do next?

Respondents were asked what they would do if their desired target location lacked available and timely grid capacity. The most popular choice? Six out of ten said they would deploy an on-site power generation system rather than relocate the project (40%), delay it (38%), or cancel it (6%). Respondents also expressed a desire to site data centers next to excess low-carbon firm power (37%) such as nuclear plants in a behind-the-meter manner. However promising, that option's viability narrowed in late 2024 as regulators rejected bids from two hyperscalers to do just that.

Exploring the option space for on-site power generation

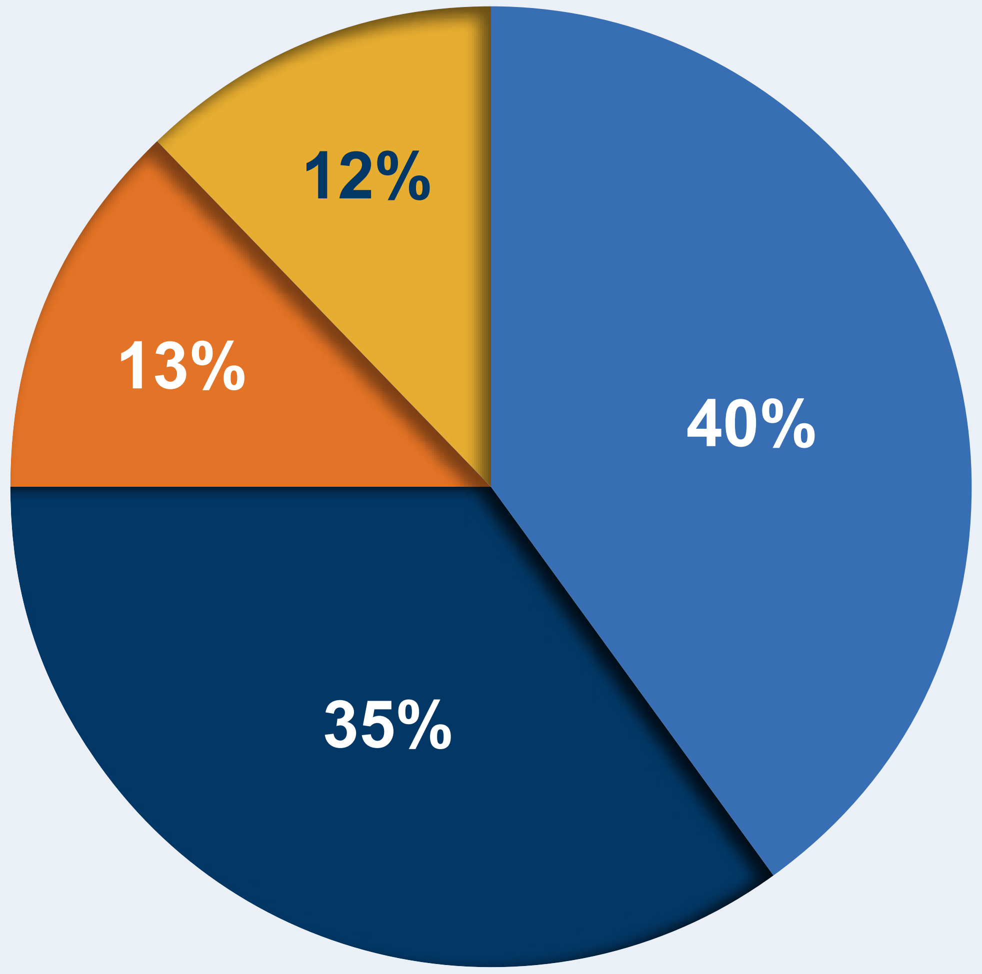
There are several big questions when it comes to deploying an on-site power generation system. How will the system interact, if at all, with the utility grid? Who will operate the system? Which power generation technologies will the system use? And how will costs and project risks be managed? Here is what the survey takers think about each of these questions.

What are the top-ranked models for deploying on-site power?

Unsurprisingly, most survey respondents (53%) expressed their top preference as an on-site system interconnected to the grid. Yet within that group, most expressed preference for using the on-site system as a bridge that converts to a back-up system whenever utility power arrives to the site. The fully off-grid approach was the second most popular, while renting/leasing was the least popular option.

- 🟦 On-site power with utility: When grid power arrives, the on-site system transitions to a back-up solution.
- ■ On-site power without utility: The system never interconnects to the grid.
- 🟧 On-site power with utility: When utility power arrives, the utility is back-up power for the on-site system.
- 🟨 Renting / leasing: When utility power arrives, the on-site system is removed.

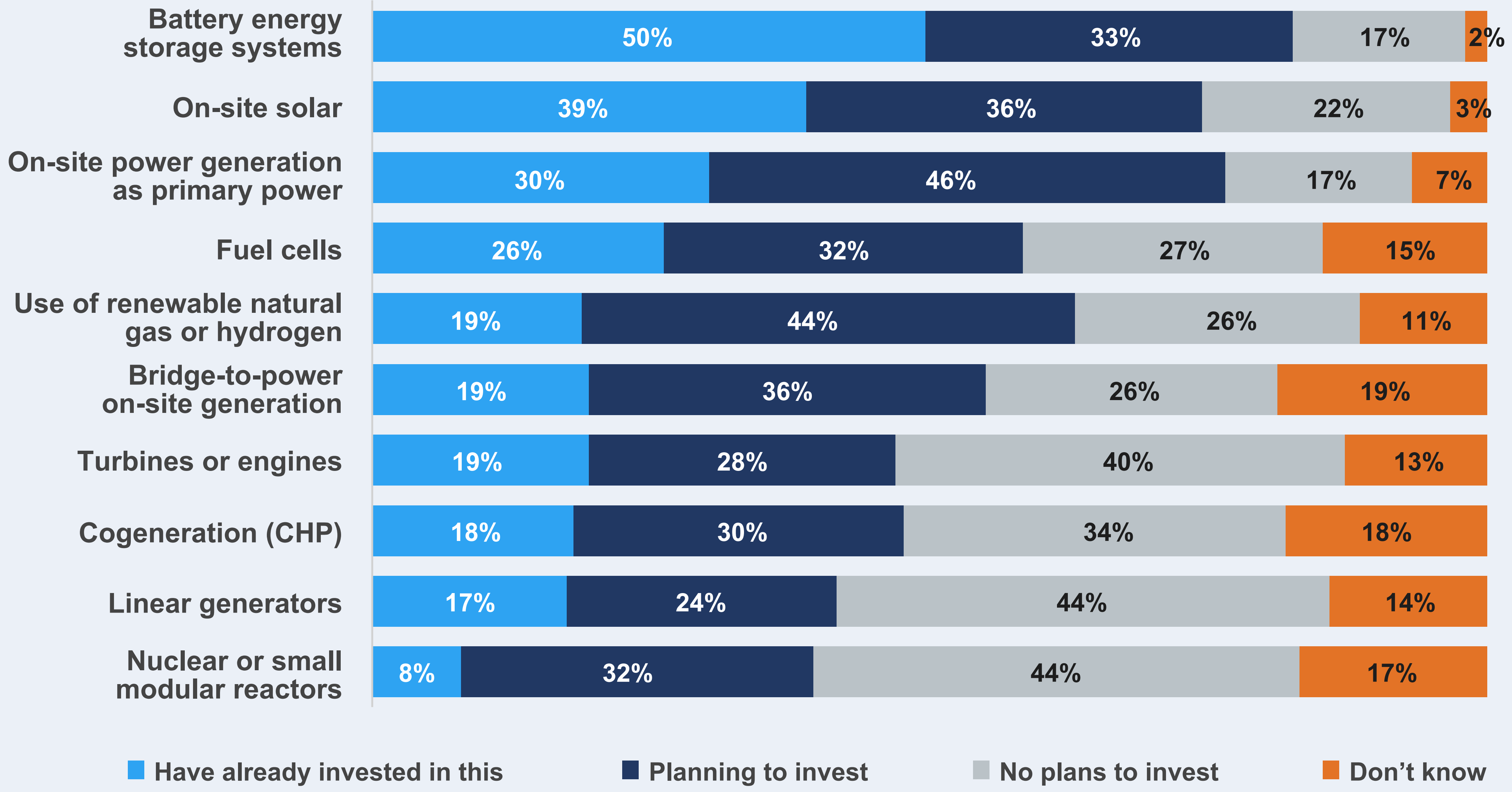
If you're considering on-site power generation for new data center projects, please rank the following options in order of preference.



When it comes to on-site power, batteries lead the charge.

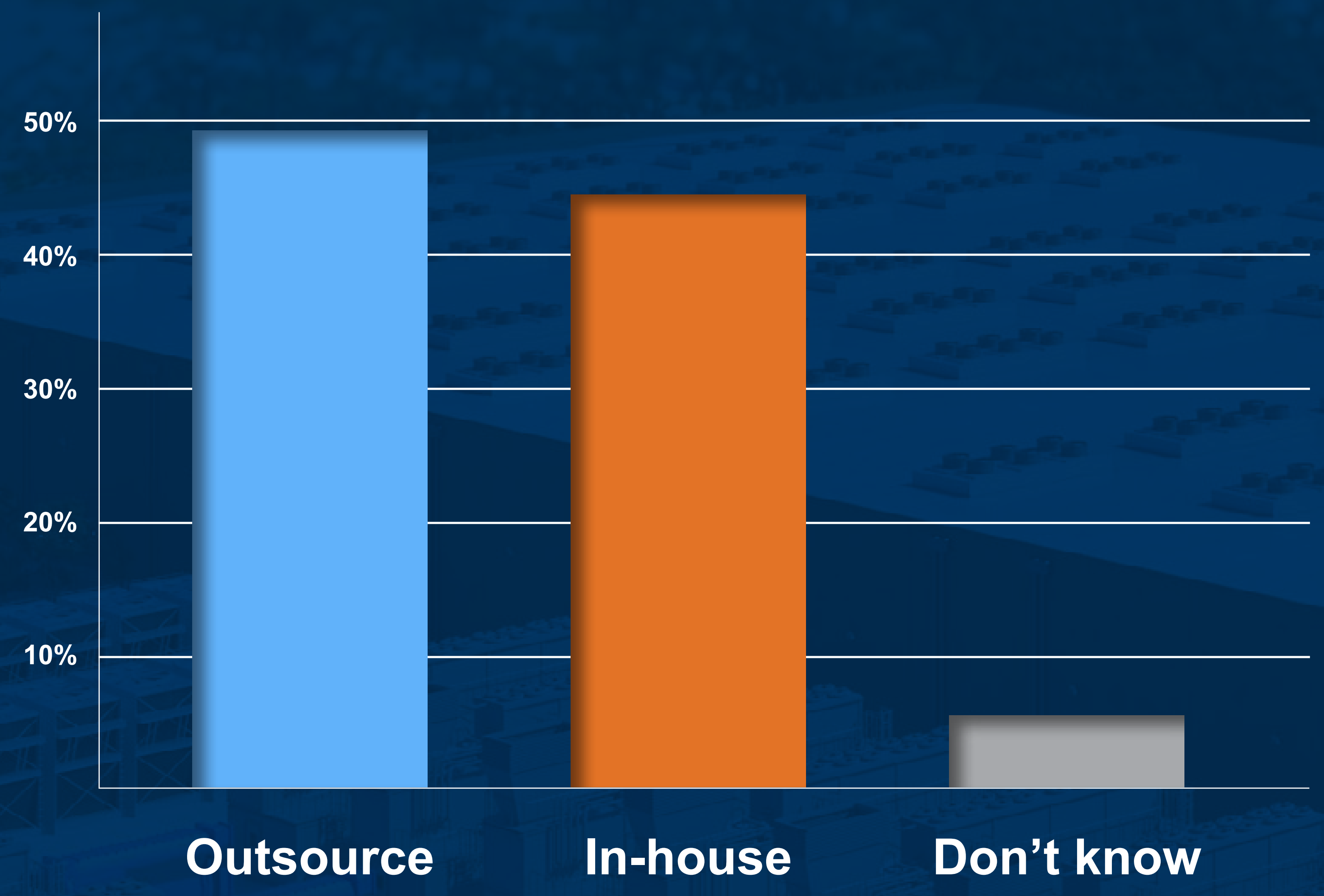
Respondents also shared their investment intentions for distributed energy resources (DERs) to power the on-site system. Battery energy storage systems (50%) and solar (39%) were the leading technologies receiving investment. Surprisingly, on-site power generation as prime power saw third-most investment activity. So far, behind the meter nuclear and small modular reactors (8%) has received the least investment and was rated highest (44%) on the "no plans to invest" ranking.

Which of the following technologies is your company most intent on investing in to meet your future energy needs?



Comparing on-site power generation deployment models

After the decision to deploy on-site power, the next questions are, “Who’s going to take the operational risk to run this large-scale energy system?” and “What’s the best way to fund it?” Here’s what the survey sample had to say on these questions.



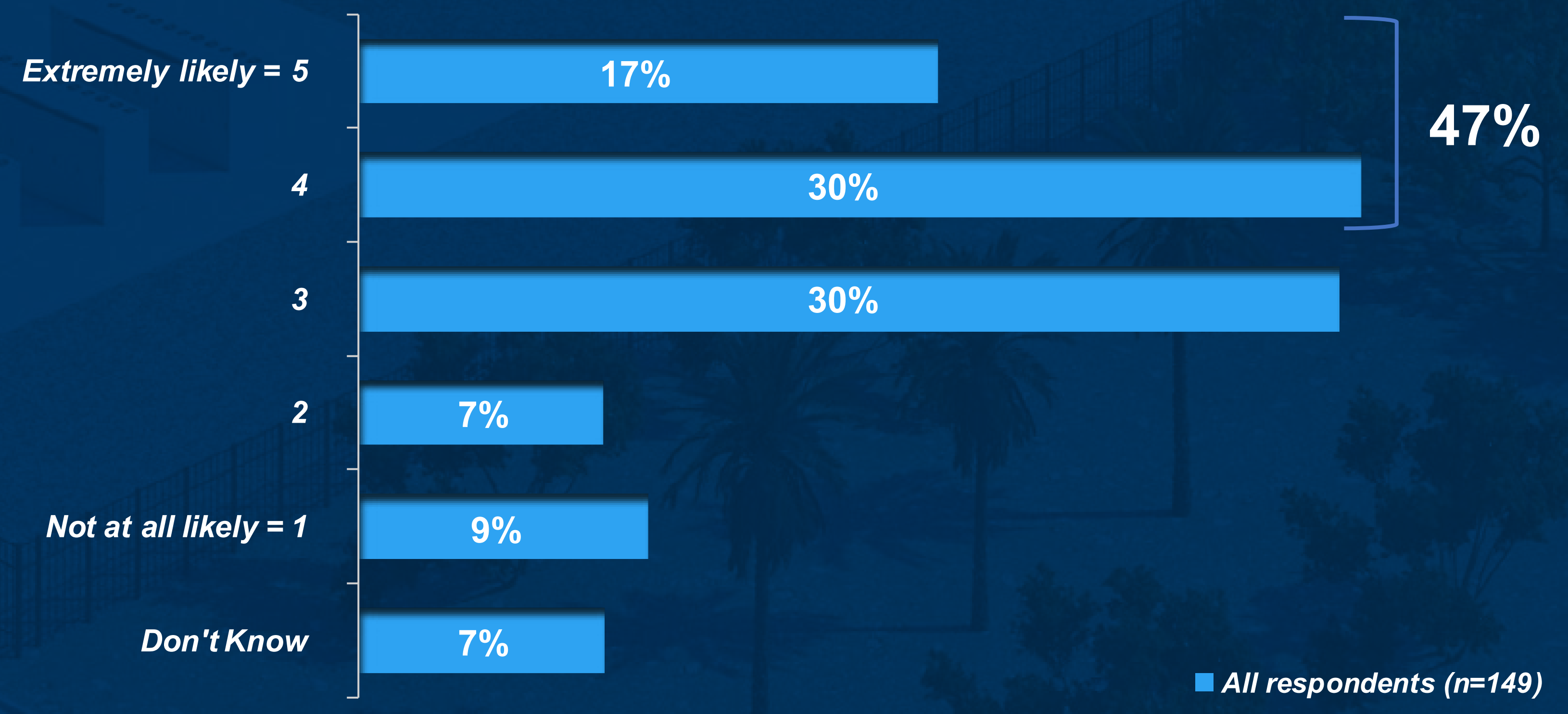
If you’re considering **on-site power generation**, do you intend to operate the system in-house or outsource?

Data center companies are already quite familiar with operating backup generators, but these prime power solutions are far more critical and complex to operate. Overall, there was a slight preference for outsourcing operations to a third party rather than running the system internally.

Evaluating Energy as a Service

The respondents were also asked to evaluate a specific method of outsourcing, Energy as a Service (EaaS). EaaS involves a turnkey, end-to-end service provider that assumes the risks and responsibilities of designing, financing, constructing, operating, and maintaining the energy system. In contrast to other outsourcing approaches, which require a data center company to fund the project internally and manage several vendors across the design-build-operate-maintain lifecycle, EaaS involves a single accountable project partner that covers the capital costs in exchange for ongoing monthly energy and capacity payments. Overall, a third of respondents rated EaaS neutrally while 47% indicated they were either somewhat or extremely likely to consider this model.

Turnkey on-site power generation (also known as Energy as a Service) is a model for deploying and operating energy infrastructure that converts CapEx into fixed OpEx. How likely would your data center or data center end users be to consider this model compared to the traditional “self-perform” or “utility-based” approach?



Theme 3

Analysis

Before AI, on-site power generation systems that delivered prime (not backup) power to data centers were essentially non-existent. That is now changing, as a third of respondents indicated they were already investing in this approach, while six in ten indicated they would do so if their local utility could not provide necessary power. As this sea change unfolds, different deployment models — whether it's utility-connected or off-grid, solar-plus-storage or different types of baseload generation, insourced or outsourced — are still mostly in evaluation and decision mode. And although much focus is on natural gas-powered plants due to their speed, space efficiency, and economics, there remains keen interest, especially among hyperscalers and the colos that support them, to find ways to incorporate large-scale solar and wind assets into the energy mix. Yet in the early days of the After AI age, a clear market consensus has yet to emerge.

This 3D render depicts an AlphaStruxure on-site power generation solution composed of fuel cells, battery energy storage, solar PV, and controls/switchgear. This solution is best-suited to "tens of megawatts," while other solutions using turbines and engines can support hundreds of megawatts.

Conclusion: The future of data center energy

Over the years, the data center industry has navigated changes and disruptions. Back in the Y2K days, fears over widespread server failures led to stockpiling equipment for a catastrophe that never materialized. A decade later, the rise of streaming and smartphones dramatically elevated compute demand, yet the industry managed to minimize load growth on the macro grid by moving toward server virtualization and other efficiency improvements.

The question is how different the After AI age will be from these past inflection points, and how ready the industry is to adapt. There is a widespread sense from analysts that U.S. data center power demand could easily double by 2030. Investors, utilities, and data center companies alike are projecting massive growth. By most accounts, that load is materializing and projects already in the pipeline are moving forward. But the post-2027 outlook is cloudier.

Although no one can predict the future, the survey data here points to several developments that could transform the way data centers source, generate, and use energy.

- **Grid constraints are growing and spreading coast to coast.** Half the survey respondents reported a wait time of at least four years, while 1 of 10 are seeing average wait times balloon out to 7 – 10+ years, an untenable timeline for most.
- **The energy status quo is changing.** Ninety-four percent of participants reported utility capacity constraints as an obstacle to growth, and long wait times were the top-ranked explanation of why. A third of respondents indicated they expect to pay 25 – 75% more for power than before, while one of three saw their emissions accelerate due to the AI race.
- **It’s time for many to think outside the grid.** The strategies that have enabled the industry to procure low-carbon, low-cost, high-reliability power may no longer suffice, and the industry is widely exploring on-site power generation as the primary alternative. Within that group, most want to connect the on-site system to the grid and outsource it to a solution provider.

For many in the industry, it’s time to think outside the box, and, increasingly, think outside the grid. In so doing, the industry perhaps will usher in the next chapter of innovation: once again, leading the rest of the business world toward energy solutions fit for the next generation.

Find out how to achieve up to **4x faster time to power** for your next data center project

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