Infrastructure Masons

State of the Digital Infrastructure Industry

ANNUAL REPORT 2025

Insights and Predictions
from 500+ Industry Leaders

For a Greater Digital Future

Santiago Suinaga

CEO, Infrastructure Masons

Dear Reader,

Infrastructure Masons (iMasons) is a global non-profit organization founded in 2016 to unite the builders of the digital age. We champion the idea that **people** drive **innovation**, and **innovation** drives **efficiency**. I have been in the digital infrastructure industry for more than 20 years, an iMason since 2018, joined the iMasons Advisory Council in 2020 and stepped into the iMasons CEO role in July 2024. The current interest in the digital infrastructure industry is unprecedented. For decades, our industry was the unseen hero that enabled the digital world to function. This changed in recent months. Data centers and AI entered the conversation on the morning news and in the public square, opening a window onto the dynamics and challenges of an industry that is as critical and essential to people as the infrastructure that provides electricity and water.

Today, the power capacity of our industry is on track to triple or even quadruple within the next five to seven years, which will put it in the same power consumption league as the cement, steel and petrochemical industries. More than 6,000 professionals representing more than $1.5 trillion in projects in 130 countries have participated in iMasons programs. We are united on a common goal to ensure this growth is responsible and in economic, social and ecological balance with the communities where digital infrastructure is deployed.

In April 2024, iMasons published the first State of the Digital Infrastructure Industry Annual Report to provide a comprehensive view of the industry and the challenges to responsible and sustainable growth.

It is with great honor that I introduce you to this second volume. More than 500 iMasons, including business leaders from the largest platforms in the industry, contributed insights to ensure a balanced analysis of the industry's current state and future trajectory.

This report comes two and a half years after generative AI debuted to the world and thrust digital infrastructure into the throes of generational change. Descriptions of this moment are full of sports analogies, equating it to the first innings of a baseball game or the opening stages of a golf tournament or the Soccer World Cup. The teams and star players are known. The future is full of uncertainty and opportunity. The pages ahead provide an overview of the field, strategies in motion and insights into the state of play.

I encourage you to learn from the insights and trends outlined in this report and use them to take informed action. The strength of our industry lies in its collective engagement and collaboration. Whether you are a long-time iMasons member, new to the organization, an investor, industry observer, government stakeholder or community member, your involvement is essential. Join discussions, contribute your expertise and help shape the digital future. Thank you for being part of this journey.

Sincerely,

Infrastructure Masons

For a Greater Digital Future

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About The Report

The **iMasons 2025 State of the Digital Infrastructure Industry Annual Report** highlights the trends, challenges and opportunities in the digital infrastructure industry today to inform strategic decisions that will define the industry tomorrow. The report is available to the public and provides an overview of digital infrastructure that grounds the internet, cloud and artificial intelligence in the physical buildings and networks that connect people and communities to each other and the world. iMasons' target audience for the report includes policymakers, economic development officers, investors and industry professionals involved in decision-making for the responsible and sustainable development of digital infrastructure as well as civic leaders and neighbors in the local communities where digital infrastructure is deployed and professionals in search of viable career opportunities.

The report aggregates and synthesizes information shared with and among more than 500 iMasons global members including in one-on-one conversations with people who represent some of the largest digital infrastructure portfolios in the world, member meetings, Advisory Council sessions, and collaboration workshops with strategic partners. In accordance with iMasons' values, all content is anonymous except where noted. This approach enables the presentation of a unique and collective perspective about the state of the digital infrastructure industry. The report surfaces the industry's biggest challenges to responsible and sustainable growth and provides insights to trends and conditions in established and emerging markets around the world. iMasons unites the builders of the digital age with vision of a greater digital future. This report provides a framework for a future where digital infrastructure is in economic, social and ecological balance with the communities where it is deployed.

Special thanks to market intelligence firms **datacenterHawk** and **DC Byte** for sharing data on market size and growth trends with iMasons for preparation of this report and technology researcher and writer **John Roach** for his assistance in creating this report.

Executive Summary

The iMasons 2025 State of the Digital Infrastructure Industry Annual Report is available to the public and intended to guide responsible and sustainable development of the buildings, equipment and networks that enable the internet, cloud computing and artificial intelligence (AI). Over the past three decades, this infrastructure was woven into the fabric of society. Today it is as important to community safety and stability as schools and hospitals, and police stations and fire stations. Recent investor and consumer enthusiasm for AI has triggered the fastest pace of growth in the industry's history and increased public awareness that data centers enable the digital services that people use every day to connect, communicate, work and play. This increased awareness brings increased expectations for the industry to deploy digital infrastructure that is sustainable and a fully integrated part of the communities where it is built.

Continued responsible and sustainable development of digital infrastructure within local communities requires further innovation and collaboration to solve persistent challenges around access to **power**, the public's **perception** of the industry, attracting and retaining skilled **people**, maintaining commitments to the **planet**, and ensuring data **protection**. AI compounds these challenges and raises the urgency to proactively address them. For example, access to power is the top industry challenge. AI amplifies this challenge as data centers used to train next-generation AI models require as much power as a medium-sized city. Proactive steps to address the power challenge include the movement of data centers to power sources instead of moving power to the data center, which was noted as an emerging trend in the iMasons 2024 State of the Digital Infrastructure Industry Annual Report (SOTI 2024). The power challenge has also accelerated the growth of off-grid data centers with on-site power generation, spurred investments in fuel cells, hydrogen supply, advanced nuclear reactor technologies, enhanced geothermal systems, concentrated solar plants and long duration grid-scale energy storage. In addition, the challenge has increased support for natural gas as a bridge between rapid growth and a clean energy future.

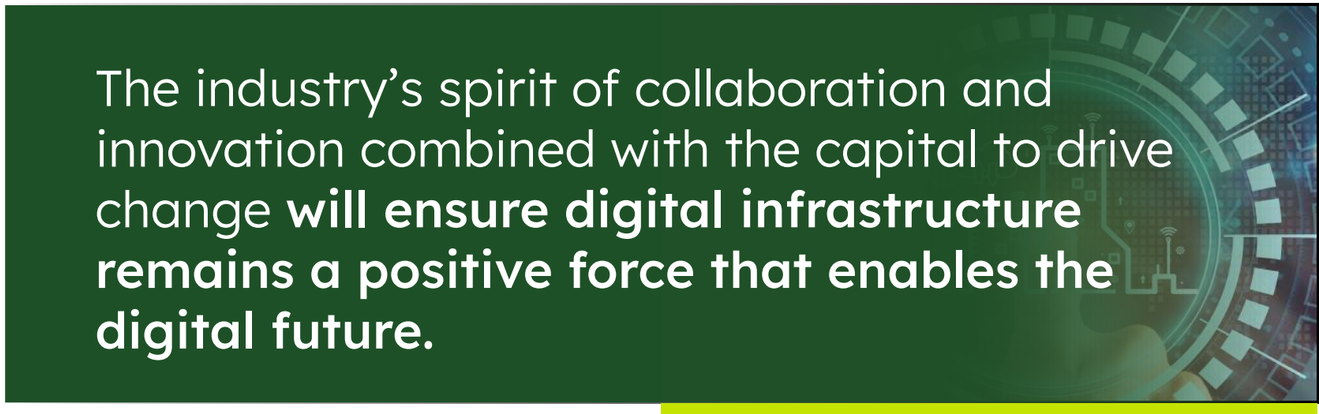
Today, there are **55 GW** of active data center power capacity worldwide, with another **15 GW under construction** and at least **135 GW in the development pipeline** — creating a total aggregate capacity of **205 GW across all categories.**

Data centers used to train next-generation **AI models require as much power as a medium-sized city.**

Today, 90% of power growth is for AI model training. The use of these trained AI models, called inference, is forecast to become 90% of AI workloads by 2030. This will transform how digital infrastructure is used and spur data center development at the near and far edge for lightning-fast interactions with people and machines in every community around the world. Technological breakthroughs that improve the efficiency of AI model training and inference will lower the cost of AI, making it more accessible to more people. These efficiency gains will further accelerate demand and drive deployment of more data centers in more communities. These trends add urgency to efforts underway to change the perception of the digital infrastructure industry by showing that data center owners and operators are good neighbors with good intentions of becoming a welcome part of every community.

Digital infrastructure processes, stores and transmits data that belong to the users of digital infrastructure. The protection of this data is an emerging challenge and opportunity for the distribution of digital infrastructure around the world. Different users of digital infrastructure approach data protection with different priorities. All demand safe and secure control over their data in every global location where the data resides. **Governments** want to protect their data by housing it in digital infrastructure on sovereign soil. **Enterprises** want to keep their private data and intellectual property private, and many are repatriating their data from public clouds to train their own private AI models and run inference for their businesses in isolated environments. **Hyperscalers** need data safe harbors to train next-generation AI models wherever power is abundant and clean without compromising the data used in that training and the inference on those trained models. These data protection challenges currently limit where the industry can grow and could hinder progress toward carbon reduction goals that protect people and the planet.

Today, there is 205 GW of global data center capacity – 55 GW active, 15 GW under construction and at least 135 GW in the development pipeline. Total pipeline capacity has jumped more than 80 GW since the release of SOTI 2024 and effectively doubling the industry in the last two years. Industry analysts expect the global active capacity to triple or even quadruple within the next five to seven years. Hyperscale companies alone are on pace to invest more than $215 billion in new digital infrastructure in 2025. The Americas are home to the strongest market, where around 35 GW of power capacity is active, 10 GW are under construction and 90 GW are in the development pipeline. Asia Pacific (APAC) and Europe, Middle East and Africa (EMEA) each have around 10 GW of active capacity and 2.5 GW under construction. There is an additional 25 GW in the pipeline in APAC and 20 GW in the pipeline in EMEA. The distribution of digital infrastructure will need to transform as the industry races to meet user consumption patterns that require data centers to be a part of every community around the world.



The digital infrastructure industry is poised for continued rapid growth. The trajectory will depend on how the industry navigates the complex and interwoven challenges around **power, perception, people, planet** and data **protection** – the five Ps. The industry's spirit of collaboration and innovation combined with the capital to drive change will ensure digital infrastructure remains a positive force that enables the digital future.

01. Introduction

What is digital infrastructure?

Digital infrastructure provides access to the sum of human knowledge and is the equalizer that allows **anyone, anywhere, to participate in the digital economy.**

Digital infrastructure is the physical backbone of the digital world. It is where generative artificial intelligence (AI) is trained and deployed, what facilitates contactless payments, online brokerages and cryptocurrency exchanges; and enables everything from remote work and online school to telehealth, digital twins and self-driving cars. Digital infrastructure provides access to the sum of human knowledge and is the equalizer that allows anyone, anywhere, to participate in the digital economy.

iMasons defines digital infrastructure as the information technology equipment that transmits, processes and stores data, the facilities that house that equipment and the networks that connect them all. This definition includes data center locations, cell towers and satellite dishes; subsea and terrestrial fiber optic cables; and the hardware and computational resources that deliver electronic services to people and machines. iMasons defines data centers as real estate locations that house information technology equipment to process and store data. This definition recognizes three categories for data center deployments: providers, networks and blockchain.

Provider data centers include cloud, hyperscale, colocation, enterprise, government and edge data centers that host websites and enable electronic services ranging from AI applications and data analytics to data backup and online gaming.

Network data centers include a range of types including internet exchanges where internet service providers and content delivery networks exchange internet traffic as well as cell towers and base stations that transmit data between people, homes, offices and other data centers.

Blockchain data centers include cryptocurrency mining and other peer-to-peer networks exchanging records of transactions.

Data centers are the anchors of the digital infrastructure industry. They support and enable a expanding ecosystem of equipment that exchanges data from one location to another. This ecosystem includes cell towers and fiber optic cables; switches, routers and network cables; racks and servers; and the power and cooling systems required to provide uninterrupted service availability. Digital infrastructure is the constellation of data center locations sprinkled across the landscape and the equipment that controls the flow of data between and among them all.

The digital infrastructure industry originally grew out of sight and out of mind. Early websites were hosted on single servers in office closets and bedroom corners that were reached through dial-up modems. Standalone data centers began to appear in the late 1990s and early 2000s as the dotcom bubble fueled construction of internet exchanges. In the 2010s, businesses, governments and institutions began to shift from on-premises server rooms to leasing space in colocation data centers, building enterprise data centers, and moving their workloads to public hyperscale cloud providers. Then, boom. COVID-19 hit. The pandemic-induced lockdowns forced a shift to remote work and online school, boosted content streaming and online gaming, and spurred e-commerce for everything from food to furniture, all of which accelerated growth of digital infrastructure. Then, just as the digital infrastructure industry started to catch its breath post pandemic, generative AI exited the research lab and turbocharged growth anew. More than anything else, the digital infrastructure industry today is grappling with the impact of this AI-fueled growth.

Digital infrastructure is the constellation of data center locations sprinkled across the landscape and the equipment that controls the flow of data between and among them all.

What is AI?

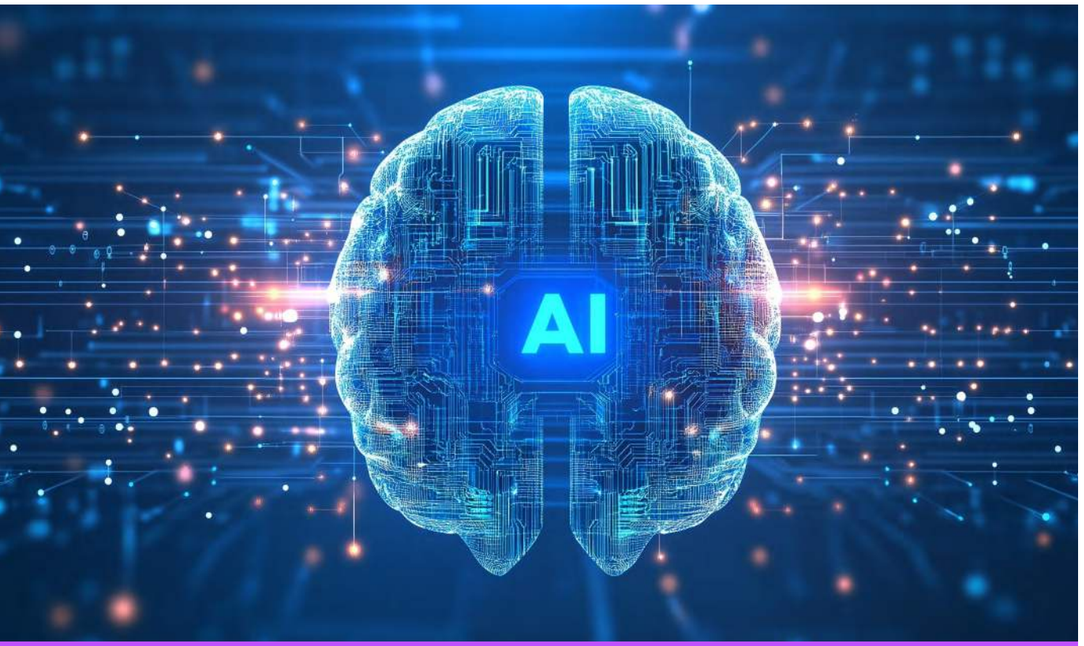
The release of ChatGPT in November 2022 marked a watershed moment **when people around the world recognized the potential of AI.**

AI is a type of computing system that uses math and logic to simulate human reasoning. AI systems are based on machine learning models that are trained to recognize patterns in data and use this information to make predictions or take actions. Research and development of AI systems progressed in fits and starts from the 1950s through the early 2000s, marked by cycles of hope and hype and gloom and despair. The widespread adoption of the internet in the 2000s ushered in the era of big data – the ability to capture and store increasing amounts of digital information, which in turn gave rise to the digital infrastructure industry and surging optimism about the potential of this data to improve the utility of AI systems.

Indeed, machine learning models trained on ever growing datasets through the 2010s, which demonstrated progress in the ability of AI systems to recognize objects and faces in images, translate between languages, engage in dialogue with people, automate manufacturing, predict maintenance needs and glean business insights from stores of enterprise data.

Breakthroughs in these tasks were fueled by the convergence of ever more data, ever more powerful computer chips and ever more sophisticated machine learning architectures and algorithms.

In 2017, a new type of technology called transformer was introduced. Unlike older systems that read words one at a time, transformers can look at an entire sentence, or input, at once. They use a mechanism called attention to figure out which words are most important to each other, similar to highlighting key parts of a sentence to better understand the meaning. This approach allows the system to understand language faster and more accurately, which is why it became the foundation for the large language models (LLMs) powering today's generative AI boom. The release of OpenAI's LLM ChatGPT on November 30, 2022, is considered a watershed moment when people around the world recognized the potential of AI and began to wonder how it would impact their lives and livelihoods.



The pending leap from generative and agentic AI to AGI holds promise **to transform the meaning of productivity and innovation.**

ChatGPT, and other LLMs that followed, excel in working with and understanding text. They help people write everything from computer code to emails, social media posts and law briefs. They can answer questions with fluency and confidence based on knowledge gained during training, translate between languages, summarize documents and solve algebraic equations. Multi-modal models bring similar capabilities to imagery and audio, enabling everything from the generation of animated videos and podcasts to transcriptions and summaries of video conference calls. The next frontier is agentic AI. AI agents are contextually aware systems that can autonomously and proactively perceive, reason, plan and act on a user's behalf. These systems are like a personal assistant with expertise in every domain, and can adapt to whatever the user needs, wherever the user wants it done, whenever the user needs it. For example, the AI agent can plan a business trip or family vacation including booking flights, hotels and restaurants. They can assist customer service and sales teams analyze client behavior, create presentations, write source code, act as virtual caregivers, and serve as research assistants for content creators.

The debut of generative and agentic AI also teases the possibility of artificial general intelligence, or AGI, a type of AI that matches or surpasses human cognitive abilities across a range of tasks and domains. Such capabilities could revolutionize industries and fields from manufacturing and healthcare to legal, finance, marketing, media and entertainment along with the development, operation and maintenance of technologies that control everything from the internet and power grid to national defense systems. The pending leap from generative and agentic AI to AGI holds promise to transform the meaning of productivity and innovation and has spurred widespread optimism about the impact of AI on society. Many digital infrastructure industry members and observers believe that AI will unlock efficiency gains that liberate people from mundane tasks and increase productivity by enabling them to focus on more complex work. This new era of productivity will transform the workplace. iMasons around the world believe AI will ultimately create more jobs than it replaces and are racing to build, operate and maintain the digital infrastructure that enables AI.

AI and Digital Infrastructure

Data centers and associated equipment are the picks and shovels of the AI gold rush that many iMasons and other industry observers see **as a multi-trillion-dollar investment opportunity.**

The integration of AI into the fabric of the modern world is a boon to the digital infrastructure industry. That's because data centers and associated equipment are the picks and shovels of the AI gold rush that many iMasons and other industry observers see as a multi-trillion-dollar investment opportunity. The performance of generative AI systems is inseparable from a class of computer chips that are capable of parallel processing such as graphics processing units, or GPUs, and access to copious amounts of data to train these next generation AI systems. The convergence of needs for GPUs and data has spurred the development of ever larger data centers packed with ever more powerful GPUs as several of the world's largest and deep pocketed companies race to develop the most powerful and dominant AI systems. The developed, or trained, AI systems are then deployed throughout the data center constellation for use, an activity known as inference.

Today's investments in AI infrastructure are focused on the development of data centers that are used to train generative AI models, which is driving a trend of data center campuses with ever greater power capacities. All data centers require power to operate. Data center size is typically measured in power capacity, from kilowatts to megawatts and gigawatts. Through the 2010s, the largest data centers in the world measured in the tens of megawatts of power capacity. Today's largest deals push from the hundreds of megawatts into the gigawatt range. A data center campus with several hundred megawatts to more than a gigawatt of power capacity consumes as much electricity as a U.S. city with a population of several hundred thousand to more than a million people.

Digital infrastructure used to train these next generation AI systems operates and interacts with the power grid in a fundamentally different manner than traditional data centers.

A traditional data center typically serves millions of users engaged in a simultaneous mix of activities, from researching vacation spots and dinner recipes to analyzing financial data, hosting virtual meetings and streaming music and movies. In aggregate, the computer processing for these multiple and varied activities results in a consistent, or flat, load on the power grid. AI training data centers are focused on a single workload spread out across thousands of GPUs networked together for parallel processing. Different phases of training require different amounts of computing power, causing sudden spikes and drops in power consumption in milliseconds, which can destabilize local power grids as well as components inside the data center, forcing developers to rethink designs from the ground up.

Many of the world's biggest technology companies, known as hyperscalers, seek sources of clean energy to power their data centers as part of their sustainability commitments to reduce carbon emissions. This has sent digital infrastructure developers on a worldwide hunt for sites with access to the unprecedented scale of clean power required to train next-generation AI systems. Some hyperscalers have announced deals to source power from nuclear power plants in the United States, others are looking to develop AI data centers with access to hydroelectric power in the Nordics and Brazil. In addition, many digital infrastructure developers are investing in the research and development of alternative energy sources including next-generation solar thermal technology, enhanced geothermal systems, hydrogen fuel cells and nuclear fusion.

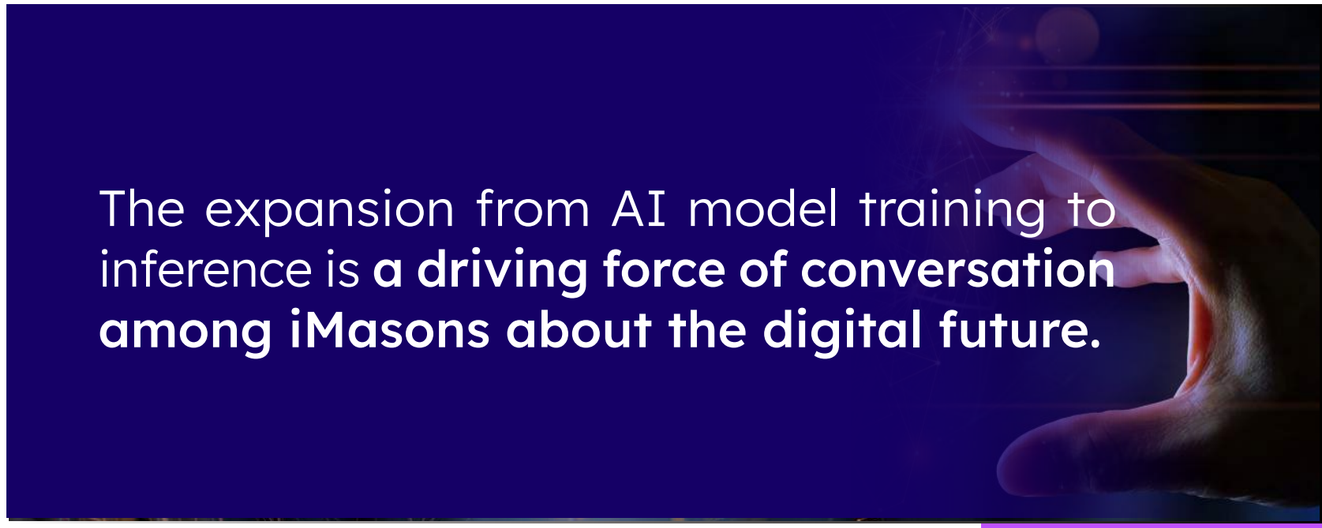
Indeed, meeting the demand for clean energy to power digital infrastructure, including AI workloads, ranks as the top tier challenge for the digital infrastructure industry. The scarcity of reliable, baseload sources of clean energy available to data center developers today may prolong the use of fossil fuels as digital infrastructure industry participants strive to balance meeting demand for data center capacity to train the next-generation AI systems and their commitments to protect the planet. Other observers are optimistic that the demand for digital infrastructure to train AI, and AI systems themselves, will unlock the innovation necessary to achieve net-zero or negative carbon emissions in the long term. For the moment, many industry participants have reverted to natural gas fired power generation as the bridge to a clean energy future as they keep an eye on trends that may break the paradigm that equates improved AI performance with more data, more GPUs and more power. Already, reports of a next-generation AI model trained in China with a fraction of the GPU capacity used to train other LLMs have disrupted global financial markets and unleashed speculation about the digital infrastructure industry's future power demand.

Meeting the demand for clean energy to power digital infrastructure, including AI workloads, **ranks as the top tier challenge for the digital infrastructure industry.**

From AI Training to Inference

Data centers used to train AI workloads are typically location agnostic – they can be located anywhere a developer has access to land and power along with fiber optic cable capacity. The potential of next-generation AI systems to transform society with increased productivity and innovation – and the return on investment in AI infrastructure – is expected through inference, or the use of trained AI models. Most inference is latency sensitive – the closer a data center is located to users the faster data can travel from a user to a data center to be processed and sent back to the user. Once trained AI systems are deployed for inference, latency gains importance as a weight in digital infrastructure development decisions. Today, LLM training represents 90% of global AI workloads, which is concentrated in AI data centers with hundreds of megawatts to more than a gigawatt of power capacity. Within the next five years, the ratio is predicted to flip – 90% of AI consumption will be for inference. That's why the expansion from AI model training to inference is a driving force of conversation among iMasons about the digital future.

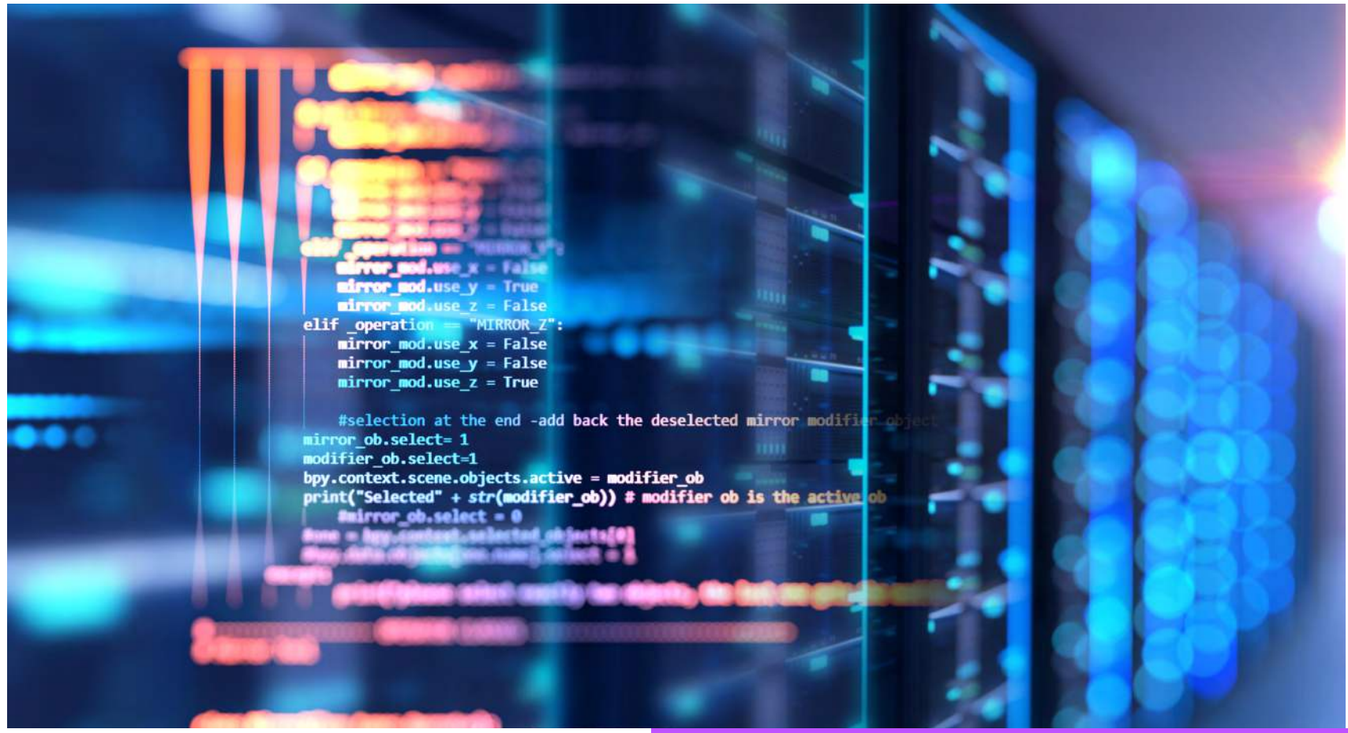
Consensus in the industry on the form of digital infrastructure required for inference is, for now, elusive. Some iMasons speculate that many inference workloads are less latency sensitive than the market anticipates. If true, then the data centers used today to train AI systems in geographic locations isolated from dense population centers will also be used for inference. Other iMasons view inference as the long-awaited killer application for the edge. In this scenario, small language models (SLMs), which have lower computational requirements for training and inference than LLMs, will ignite an explosion of kilowatt- to multi-megawatt size data centers in areas of population density and economic activity around the world. Inference will generate more data to continuously train and enhance these SLMs. Another popular perspective among iMasons holds that AI training and inference will become integrated with every digital service, requiring retrofits and



new designs for conventional cloud and colocation data center facilities to accommodate the higher power density and cooling demands of AI infrastructure.

Today, uncertainty about the future of AI infrastructure needs requires developers to incorporate flexibility into their data center designs. For example, a data center client may need space for traditional CPU servers with 10 kW rack densities for traditional workloads such as cloud computing, which is similar to the power consumption needs of four to five average homes in the United States, and GPU servers exceeding 600 kW rack densities for AI training workloads, which is similar to the power needs of more than 300 homes. This mix of computer hardware will also require a mix of cooling systems ranging from air cooled to direct-to-chip and immersion liquid cooling, which also bring a mix of power requirements. Several iMasons noted the challenge of planning for this mix is a challenge itself.

Another question percolating among iMasons is estimates on the size of the demand for inference. Many predict it will be several multiples of the demand for training, which has profound implications for the development of digital infrastructure. Are utilities prepared to provide the power required for AI inference workloads? Are people available to build, retrofit and operate data centers equipped for AI? Are digital infrastructure developers ready to engage with the local communities to earn the positive perception the industry needs to facilitate growth? Will digital infrastructure industry participants maintain their commitments to the planet? What safeguards exist to protect the data that digital infrastructure processes, stores and transmits? The answers to these questions will determine whether and how quickly the digital infrastructure industry can monetize the investment in AI, if the investment in AI yields the use cases that generate the anticipated demand.



Many iMasons predict demand for inference will be several multiples of the demand for training, which has profound implications for the development of digital infrastructure.

Investment in AI Infrastructure

Optimism that AI will yield returns is fueling investment in digital infrastructure that will reach $1 trillion in the coming years, according to a report from Goldman Sachs, an investment bank. Capital spending by hyperscale companies alone is expected to reach $200 billion to $215 billion in 2025, according to media reports, with most of this outlay dedicated to expanding infrastructure for generative AI. Over the long term, many iMasons see digital infrastructure for AI as a several-trillion-dollar investment opportunity. For context, a 1 GW data center campus loaded with GPU hardware designed to train the current generation of AI systems carries a price tag of $50 to $60 billion, according to industry estimates. Future models may require a tenfold increase in computational resources and power requirements, suggesting multi-trillion-dollar investments in digital infrastructure for AI model training. Digital infrastructure for inference, some analysts expect, will require multiples of this capital expenditure.

Even if breakthroughs in next-generation AI model training yield energy efficiency gains that reduce the short-term demand for data center and power capacity, many industry observers expect the long-term demand for digital infrastructure to soar in accordance with Jevons paradox. The paradox is named after William Stanley Jevons, who described in his 1865 book, “The Coal Question,” the phenomenon of how increases in energy efficiency drive increased consumption over the long term, not less. Jevons argued by way of example that if an innovation allowed blast furnaces to produce more iron with less coal, it would spur investment in blast furnaces, which would drive up consumption of iron, and hence coal. Other economists point to the paradox to explain why improved efficiency of refrigeration led to an explosion of refrigerators and fuel efficiency gains in cars led people to drive more and buy bigger cars. For the digital infrastructure industry, the paradox means falling costs to train and use AI models could drive increased adoption of AI, requiring more digital infrastructure.

The risk, some iMasons observe, is that investor appetite will wane if generative AI systems are unable to produce investment returns. One industry analyst put the returns required for today’s AI systems at $600 billion in incremental revenue, a level of return that current use cases of generative AI to write first drafts of emails and documents, summarize meetings and translate between languages is unlikely to fetch. Several iMasons noted that hyperscale companies have begun to bundle these AI features with the software packages available on their cloud and software as a service platforms and increased prices for the software licenses, which begins to generate a return on investment whether or not customers use the AI features. Other analysts expect AI use cases that justify the investment to emerge as the technology continues to improve, spurring increases in productivity and innovation that yield as-yet-imagined breakthroughs. History supports this argument. The adoption of personal computers laid the groundwork for the internet, which transformed how people interact and conduct business. The smartphone put internet-connected devices in every pocket, which accelerated social media and unleashed waves of business innovation. For now, the investor appetite for opportunities to participate in the digital infrastructure industry is insatiable and most observers expect it to stay that way for at least the next several years.

Capital spending by hyperscale companies alone is expected to reach **$200 billion to $215 billion in 2025.**

State of the Digital Infrastructure Industry

The iMasons 2025 State of the Digital Infrastructure Industry Annual Report (SOTI 2025) marks the year media attention on AI and the rapid growth of data centers pushed the digital infrastructure industry into the public eye. The increased attention revealed an industry that is woven into the fabric of modern society to enable digital services that people and machines use every day to connect, communicate, work and play. Investors bet that AI will transform these services and unlock new ones. Their bets are backed with hundreds of billions of dollars to fund the construction, operation and maintenance of new digital infrastructure. The build-out of this infrastructure could more than triple the size of the digital infrastructure industry within the next decade.

More than 80 GW of new data center capacity was added to the development pipeline in the 12 months since the iMasons 2024 State of the Digital Infrastructure Industry Annual Report (SOTI 2024) was published on April 17, 2024, according to industry partners who shared market intelligence data with iMasons. One gigawatt is enough power to meet the needs of about 750,000 average U.S. homes. That's the number of homes in a metropolitan area large enough to support a professional sports team such as the National Football League's Denver Broncos in Colorado. Today, reports of multi-billion-dollar deals to build new data center campuses measured in the hundreds of megawatts to more than a gigawatt of power capacity spiral across cyberspace like confetti in a ticker-tape parade. Much of this infrastructure is slated for development in rural areas of the United States with access to adequate land and power resources. Other regions with access to power and attractive economic development incentives are primed to pop, including Brazil, Malaysia, the Nordics and Middle East.

More than 80 GW of new data center capacity was added to the development pipeline in the 12 months since the iMasons 2024 State of the Digital Infrastructure Industry Annual Report was published.

Total power consumption by data centers could double by 2026 to more than 1,000 TWh, according to forecasts from the International Energy Agency. In the United States, total data center power usage will be between roughly 325 and 580 TWh in 2028, representing 6.7% to 12% of total U.S. electricity consumption, according to the 2024 United States Data Center Energy Usage Report that the Lawrence Berkely National Laboratory prepared for the U.S. Department of Energy.

Drivers of digital infrastructure growth include continued migration to the cloud, the rollout of 5G networks, the rise of edge computing and increasing data demands from AI. While much of the industry conversation is focused on AI, growth of cloud computing remains robust, according to iMasons members. Yet how the customers use the cloud is changing. For example, several observers noted the repatriation of certain workloads to on-premises data centers from the public cloud. Enterprises are driving this trend as they replace “cloud first” strategies with “cloud appropriate” strategies that result in a combination of on-premises, cloud and colocation provisioning based on specific workload requirements, according to the Uptime Institute Global Data Center Survey Results 2024.

Nearly two thirds of colocation providers host hyperscale tenants, noted Uptime Institute. Some iMasons cater exclusively to hyperscale clients, others see an opportunity to focus on small and medium sized clients who require data center capacity isolated from the public cloud. Demand for data center capacity anywhere is pushing vacancy rates to record lows and rents to record highs across global markets, according to industry reports. In the primary markets of North America, for example, vacancy rates fell to a record low of 1.9% in 2024 and rent rates for a 250 to 500 kilowatt requirement increased 12.6% to $184.06 per kW/month, according to CBRE, a commercial real estate and investment firm. New data centers under construction are often fully leased with contracts of 10 to 15 years in duration.

The market enthusiasm for digital infrastructure is tempered by concerns of an investment bubble. Several iMasons note that AI must demonstrate it can generate a return on investment in 2025 or else the flow of capital into the industry will slow down. Many iMasons anticipate disruptive market churn and consolidation as leaders and laggards in the AI race emerge. As one iMasons noted, nobody can stop growth like disappointed investors. For now, iMasons see continued demand for digital infrastructure. Meeting that demand will require deft navigation of persistent industry challenges around power, people, perception, planet and data protection as well as a host of new and emerging challenges associated with the pace of demand to develop and deploy infrastructure for the digital future.

Demand for data center capacity anywhere is **pushing vacancy rates to record lows and rents to record highs across global markets.**

02. Member Insights

2025 Industry Challenges

Power | Perception | People | Planet | Protection

Introduction to the Five Ps

SOTI 2024 focused on four persistent challenges to continued responsible and sustainable growth of the digital infrastructure industry around **power, people, perception** and the **planet**, the four Ps. SOTI 2025 examines the impact of the AI boom on these challenges and introduces a fifth around the **protection** of data that digital infrastructure processes, stores and transmits.

Power: Access to increased electric power to meet the accelerating demand for digital services remains the top-of-mind challenge for continued growth of the digital infrastructure industry. SOTI 2025 explores how the AI boom both exacerbates the power challenge and drives efficiency and innovation. Potential long-term, medium-term and immediate solutions are also discussed.

Perception: The need to earn a positive public perception of the digital infrastructure industry in communities where digital infrastructure is located accelerated up the list as a top priority for the digital infrastructure industry. The AI boom has increased public awareness of the digital infrastructure industry, which brings increased scrutiny and pushback that threaten to throttle growth. SOTI 2025 discusses initiatives to earn a positive perception for the industry.

People: The shortage of skilled people to build, operate and maintain digital infrastructure remains a challenge as industry growth continues to outpace the industry's ability to recruit, train and retain people. SOTI 2025 focuses on replicable success stories to build a workforce for the digital future.

Access to increased electric power to meet the accelerating demand for digital services remains **the top-of-mind challenge for continued growth of the digital infrastructure industry.**

Planet: As noted in SOTI 2024, without a deliberate focus on decarbonization in development decisions, the industry's carbon footprint will balloon and make net-zero commitments unachievable. iMasons continue to view growth-at-all-costs as unacceptable and kept protecting the planet as a top priority in SOTI 2025.

Protection: The protection of data that digital infrastructure processes, stores and transmits emerged as a challenge and opportunity for the distribution of digital infrastructure around the world. SOTI 2025 explores how the push and pull of data protection trends impact the growth of the digital infrastructure industry, including where data centers are located to train AI models.

Macro Trends

Discussions among iMasons about the impact of AI and the five Ps – power, perception, people, planet and protection – bubbled up three macro trends in the digital infrastructure industry that warrant additional attention: the need for data center deployments in data safe harbors and data embassies, the shift in AI workloads from training to inference, and the need for members of the digital infrastructure industry to proactively engage with community members to earn a social license to operate.

Data Safe Harbors and Data Embassies

The development of data safe harbors and data embassies could **open the door for the deployment of digital infrastructure in regions with abundant and cost-competitive clean energy.**

Protection, the fifth P, emerged from discussions about Clean Energy Zones that were introduced in SOTI 2024 as master planned towns or city-size areas developed around concentrated sources of clean energy to serve multiple industries, including multi-tenant data center complexes. Representatives of companies that train LLMs in data centers that are pushing into the gigawatt range of power capacity explained that they would require rules and regulations to protect the data used to train the LLMs, especially in data centers located on foreign soil. The discussion evolved to include a multifaceted conversation about the protection of public sector and private sector data. A solution emerged that could help spur the development of Clean Energy Zones: data safe harbors and data embassies.

Data safe harbors and data embassies are carve-out zones within a country or jurisdiction that guarantee protection of the data that's processed, stored and transmitted through digital infrastructure that is located in the carve-out zone. Data safe harbors are similar to special economic zones with clear regulatory frameworks and protections for data. Data embassies are analogous to an embassy – an area on foreign soil where a country's sovereign rules and regulations apply. A data embassy is an embassy for public sector data on foreign soil. The development of data safe harbors and data embassies could open the door for the deployment of digital infrastructure in regions with abundant and cost-competitive clean energy and in markets clamoring to participate in the digital infrastructure industry that are avoided today because of concerns about data protection.

AI Workload Shift

Today, LLM training represents 90% of global AI workloads, which is concentrated in AI data centers with hundreds of megawatts to more than a gigawatt of power capacity. Within the next five years, the ratio is predicted to flip – 90% of AI consumption will be for inference and 10% will be for training. Gigawatt-scale AI data center campuses will continue to exist for AI model training and inference, but the trend of AI workload growth is shifting to support inference of generative and agentic AI models at the edge. Industry observers expect this shift to require hundreds of thousands to millions of data centers in the tens of kilowatts to tens of megawatts range located in cities for low-latency interaction with people and machines.

The AI workload shift corresponds with an expansion of digital infrastructure consumers. Today's biggest consumers of digital infrastructure are hyperscalers who train and deploy AI models for inference on their platforms in massive AI data centers. Tomorrow, hyperscalers as well as enterprises, small businesses and individuals will run AI inference workloads including at the edge. Enterprises and other consumers concerned about exposure of proprietary data through public LLMs are shifting their inference workloads to private AI models. Some of these models are housed in neoclouds located in on-premises data centers, private data centers and colocation data centers. Other private AI models are part of isolated cloud services that hyperscalers offer to clients in dedicated cloud regions. One consequence of the AI workload shift to inference is the deployment of more data centers in more communities around the world. This adds urgency to efforts underway to show that data center owners and operators are good neighbors with good intentions of becoming a welcome part of every community.

Community Engagement

Digital infrastructure enables digital services that people and machines use every day to connect, communicate, work and play. To meet the demand for digital services that digital infrastructure enables will require the deployment of more data centers and associated infrastructure including fiber optic cables, power plants and transmission lines in more communities around the world. With digital infrastructure going mainstream, community support has become increasingly important to further enable the industry's expansion.

Conversations among iMasons highlighted the need for the industry to integrate with the communities where digital infrastructure is deployed. An industry workgroup called the iMasons Social Accord has developed a social framework and is actively developing a community engagement guidebook and agreement that commits the digital infrastructure industry to achieve economic, social and ecological balance with the communities where data centers are built and operated.

POWER

The digital infrastructure industry's demand for power is compounded by the electrification of everything including cars and cookstoves as well as the reshoring of manufacturing.

The growth of the digital infrastructure industry is measured in units of power – from kilowatts to megawatts and gigawatts. Digital infrastructure uses electric power to process, store and transmit data. Without power, there are no digital services that digital infrastructure enables. Today, new deals for hyperscale data center campuses slated for AI training and cloud computing measure in the hundreds of megawatts to more than a gigawatt of power capacity. Several iMasons predict AI inference applications will require hundreds of thousands of data centers with hundreds of kilowatts to a few megawatts of power capacity deployed at the near and far edge – areas where people and machines are located – for lightning fast, low-latency interactions.

Forecasts from industry insiders and market observers suggest digital infrastructure will consume in aggregate around 3-4% of all power generated in the world by 2030, which is comparable to the amount of power the pulp and paper industry consumes today. According to the U.S. Department of Energy, the digital infrastructure industry could consume between 6.7% and 12% of the power in the United States by 2028, which would put data centers in the same power consumption league as entrenched heavy industries including steel, cement and petrochemicals.

The digital infrastructure industry's demand for power is compounded by the electrification of everything including cars and cookstoves as well as the reshoring of manufacturing, which puts the digital infrastructure industry in competition for available power capacity as well as any new sources of power added to the electric power grid.

AI amplifies the digital infrastructure industry's power challenge. For example, AI training data centers consume exponentially more power than traditional data center workloads. A query on the popular generative AI service ChatGPT requires nearly 10 times more electricity than a traditional search on Google, according to research by Goldman Sachs. The same research estimates that global data center power demand will increase 160% by 2030.

Recent breakthroughs in generative AI model training such as the announcement that AI startup DeepSeek was able to develop a model with similar performance to OpenAI's ChatGPT using fewer and less powerful GPUs may alter these power demand growth forecasts, at least in the short term, according to industry observers. Other industry analysts and participants believe any energy efficiency gains in AI model training will increase access to AI, allowing the use of AI systems to proliferate and in turn accelerate the demand for digital infrastructure and power.

Today, the demand for power shapes where and when digital infrastructure is built and is spurring innovation and partnerships throughout the electric power and digital infrastructure industries. Legacy and new energy development firms have started practices that are dedicated to helping data center developers find and secure access to power for their facilities. Meanwhile, owners and anchor tenants of hyperscale data centers are often principal investors in companies at the forefront of new and emerging energy technologies, including advanced nuclear reactors, concentrating solar power plants and hydrogen fuel cells.

Top of mind for many iMasons today is how to navigate persistent power constraints in established digital infrastructure markets such as Northern Virginia in the United States, Singapore in Asia, and Frankfurt, London, Amsterdam, Paris and Dublin in Europe. In some cases, developers looking to bring new capacity online in established markets are deploying behind-the-meter solutions such as microgrids powered by hydrogen fuel cells or natural gas generators. These behind-the-meter solutions can bridge three-to- seven-year waits for the construction of new transmission lines and substations that enable connections to regional power grids. Other developers aim to maintain their independence from the grid to increase their control over service availability and reduce the impact of their operations on local communities.

The power constraints in established markets are also forcing developers to expand into regions with available power capacity.

Today, the demand for power **shapes where and when digital infrastructure is built.**

The movement of data center development to regions with power was noted as an emerging trend in SOTI 2024. Today, the trend is manifest with new mega projects announced in unconventional markets including West Texas, North Dakota, Indiana, Ohio, Pennsylvania, Tennessee, and Mississippi in the United States, Johor in Malaysia, Brazil in South America and several regions in the Middle East.

In another trend, digital infrastructure companies are purchasing existing power plants outright or signing multi-year off-take agreements with them. Other digital infrastructure developers see an opportunity to leverage available power capacity in regions with out-of-favor heavy industries such as aluminum, cement and steel plants. Office space left empty in the wake of the shift to remote work with hundreds of kilowatts to a few megawatts of available power capacity are seen as an opportunity for developers of edge data centers.

Ensuring power is available to support durable digital infrastructure industry growth will require **new partnerships and collaboration.**

Longer term, concerns are rising throughout the digital infrastructure industry that all markets will run out of power unless new generation sources are brought online, and electric power grids are expanded and upgraded. Ensuring power is available to support durable digital infrastructure industry growth will require new partnerships and collaboration between and among the digital infrastructure industry, electric utilities and regional and national governments. This need has been noted by government officials eager to maintain and attract digital infrastructure development within their borders. For example, the U.S. Department of Commerce's National Telecommunications and Information Administration issued a request for comments in September 2024 to understand how the U.S. government can support the growth of the digital infrastructure industry. The government outreach generated input from iMasons and several other members of the digital infrastructure industry that included calls for power grid enhancements.

Other signs of partnerships include the development of new business models at legacy and startup energy infrastructure developers around sourcing power for the digital infrastructure industry. These models include support to secure traditional power purchase agreements with developers of solar and wind farms as well as the development of master-planned multi-tenant industrial complexes around sources of clean energy, which resonates with the concept of Clean Energy Zones discussed in SOTI 2024.

As these deals for new power infrastructure and grid expansions are negotiated, the parties involved are reassessing their risk profiles. For example, iMasons members report that utilities are increasingly requiring multi-million-dollar deposits and take or pay agreements from data center developers to finance power grid expansions needed to supply the digital infrastructure industry. Data center developers are also primary investors in companies developing and scaling technologies such as small modular reactors, enhanced geothermal systems, and proven energy storage systems, which are considered necessary to support the growth of the digital infrastructure industry and reduce carbon emissions.

Nuclear

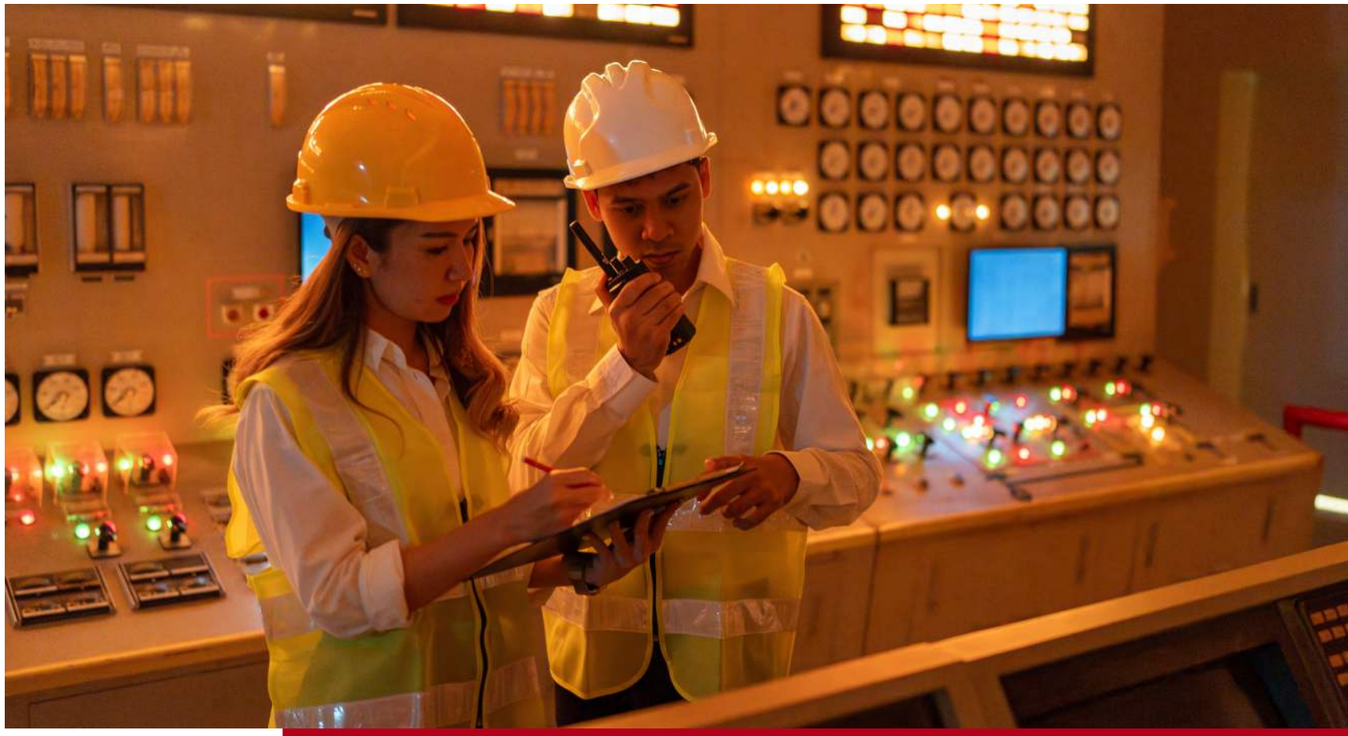
Nuclear energy is in the spotlight as a potential long-term solution to the digital infrastructure industry's power challenge.

Nuclear energy is in the spotlight as a potential long-term solution to the digital infrastructure industry's power challenge. Nuclear power plants are a source of clean, reliable, dispatchable power. That's what data centers need to operate 24 hours a day, 7 days a week and meet commitments to achieve net zero carbon emissions. Private conversations about nuclear as a source of reliable, baseload clean power for data centers started in earnest about three years ago inside hyperscale companies, according to an iMason. Major public announcements have been made over the past 12 months. In the United States, one deal disclosed a hyperscaler's plans to draw power from a nuclear power plant for a data center campus on a parcel of land adjacent to the plant. Another announcement disclosed a power purchase agreement for all the electricity generated at a mothballed nuclear power plant that will be restarted to support the digital infrastructure industry. These deals are subject to regulatory approval, which is uncertain, though most iMasons expect the approvals will be obtained. The process in the United States is being watched as a potential blueprint for replication in the power-constrained markets of Europe, noted an iMason.

Longer term, many members of the digital infrastructure industry have their eyes on small modular reactor technology, known as SMRs. As the name implies, these next-generation nuclear power plants are smaller than conventional nuclear power plants and harbor designs that may help alleviate the safety and radioactive waste concerns associated with the nuclear industry. For example, one company's design is for 75 MW deployments that cover three acres of land using a technology developed and proven at a U.S. national laboratory. The 75 MW unit offers modular scalability to achieve installations from hundreds of megawatts to several gigawatts at a single location. In case of a natural disaster such as a flood or hurricane, the reactor will shut down automatically through natural forces – no pumps, motors, backup power or humans are required.

The design also allows use of recycled spent fuel, which over the long term could shrink by 95% the United States' current 90,000 metric ton stockpile of spent fuel. The first commercial reactors based on this design are expected to begin serving customers in 2028 and scale into a viable solution for the digital infrastructure industry in the 2030s. To shorten the timeline for power access, SMR developers are forming partnerships with providers of natural-gas powered generators, who can deploy behind-the-meter solutions within 24 months that serve as a bridge until the SMRs are brought online. Once the SMRs are activated, the natural-gas generators are available for peak power production and backup generation.

For now, many iMasons are taking a wait-and-see attitude toward nuclear energy. They want to see the market viability of SMR technology proven, including whether it can scale sufficiently to serve the digital infrastructure industry. Questions also remain about the cost of conventional nuclear and SMRs relative to other sources of electric power. Another challenge, at least for the short term, is a worldwide shortage of uranium fuel, several iMasons noted. The nuclear industry also continues to seek a long-term plan to dispose of spent nuclear fuel. Even if these challenges are solved, many iMasons expect community resistance to the deployment of SMRs in their backyards. Community engagement and education programs to address this challenge are in the works. In the short term, community resistance may force SMR deployment to rural areas, potentially limiting the utility of SMRs to AI training and other non-latency sensitive workloads.



Many iMasons are taking a wait-and-see attitude toward **nuclear energy.**

Renewables Plus Storage

The digital infrastructure industry's knock against solar and wind power is their inherent variability. As the saying goes, the sun does not always shine, and the wind does not always blow. This variability is a problem for data centers that need reliable access to power 24 hours a day, 7 days a week. Many companies in the digital infrastructure industry use power purchase agreements with solar photovoltaic (solar PV) and wind farm developers as part of their carbon reduction initiatives but few rely directly on these developments for data center operations. Rather, the digital infrastructure companies take credit for financing the addition of renewable power capacity to the electric power grid and use the full mix of electrons on the grid to power their data center operations. A potential exception to this status quo lies in projects that combine renewable energy production with energy storage systems, enabling around-the-clock clean energy.

Today, concentrating solar power, known as CSP, is emerging as a tool in the toolkit for the digital infrastructure industry to address the power challenge with variable renewables. The technology consists of an array of mirrors arranged to reflect and focus sunlight onto a tower, or receiver. There, the sun's heat is absorbed and stored in a medium such as molten salt, which is then used to generate steam to turn a turbine and generate electric power on demand. By contrast, solar PV technology converts the sun's energy into electric energy that is either put directly onto the electric power grid or stored in batteries.

CSP technology first gained a foothold in the U.S. market about a decade ago but ran into a host of environmental permitting and technical execution challenges. Meanwhile, costs for solar PV energy plummeted. CSP lost ground to solar PV in the United States but gained traction in other regions that also have ample direct sunlight including the Middle East, South Africa, Chile and China, according to an iMason. These developments have allowed the global CSP industry to identify and solve technical challenges and mature, attracting interest from data center developers in search of reliable clean power capacity.

Going forward, energy developers view the combination of solar PV and CSP as a potential cost-efficient pathway to achieve reliable, round-the-clock energy for data centers. During daylight hours, solar PV is ideal for low-cost direct electricity generation while the CSP plant charges up the thermal energy storage for power generation during the overnight hours. One technology provider is using image processing and closed loop control algorithms to optimize the pointing accuracy of the mirrors, eking out a few extra percent of efficiency, and taking a modular approach to CSP towers to increase the reliability of the overall system. The company is currently in talks with data center developers to provide behind-the-meter power generation at facilities in the southwestern United States.

Energy and digital infrastructure firms are also exploring potential partnerships for utility scale solar PV and CSP projects to generate several gigawatts of power capacity for data centers in the Middle East, according to an iMason. These projects align with the concept of Clean Energy Zones discussed in SOTI 2024 of master-planned, multi-tenant industrial complexes around sources of clean energy. One of the solar projects under construction generates power at less than 1.5 cents a kilowatt hour. Governments in the Middle East are making investments in these partnerships in a bid to become an AI hub for the world.

The combination of solar PV and CSP is a potential cost-efficient pathway to achieve reliable, round-the-clock energy for data centers.

Fuel Cells

Fuel cells are proving to be the market ready, efficient and scalable clean power technology to address the power challenge today.

Next-generation energy technologies such as SMRs, enhanced geothermal systems and nuclear fusion may be meaningful solutions to the digital infrastructure industry's power challenge in the 2030s or beyond, according to industry observers and iMasons. Fuel cells are proving to be the market ready, efficient and scalable clean power technology to address the challenge today.

Fuel cells convert chemical energy into electrical energy through an electrochemical reaction between hydrogen, or other fuel source, and oxygen. Pure water is the byproduct. The fuel source determines the technology's carbon footprint, with green hydrogen the cleanest accessible option. Fuel cell types are proton exchange membrane, known as PEM fuel cells, and solid oxide fuel cells, known as SOFCs. The key differences between the types lie in operational mechanics and fuel sources, with PEMs restricted to hydrogen and SOFCs able to accommodate natural gas as well as hydrogen. Traditionally, PEMS are favored for compact and lightweight applications such as transportation whereas SOFCs have a foothold in the utility-scale stationary power market. Today, both fuel cell technologies provide primary power to data centers.

Fuel cells are typically deployed as behind-the-meter or off-grid solutions in micro-grid or modular configurations. They can alleviate the need for battery energy storage systems to manage the dynamic loads of AI data centers. Some data center developers turn to fuel cell micro-grids to accelerate projects that are otherwise in years long holding patterns waiting for substations and tie-ins to the electric power grid. Other developers turn to fuel cells for complete independence from the electric power grid, allowing streamlined projects that take 12 months from order to completion rather than the typical 24- to 36-month timeline.

The complication for PEM fuel cells is access to hydrogen. Today, hydrogen pipelines are found near oil refineries, which use hydrogen to improve the quality of fuels and remove impurities. Access to these hydrogen pipelines is why one developer of hydrogen powered data centers selected a site on the U.S. Gulf Coast to build an off-grid 1 GW campus. Bi-monthly fuel truck delivery of hydrogen could unlock the development of hydrogen-fueled inference data centers in the 5 MW to 15 MW range, an iMason said. Another option is for fuel cells to be a part of the energy mix at AI training campuses co-located with a solar or wind farm. In this scenario, electricity generated by solar PV panels and wind turbines could both power the data center directly and generate green hydrogen through electrolysis to power the fuel cells at night or when the wind slackens or clouds blot the sun.

The fuel flexibility of SOFCs allows rapid deployment across a wide geography. Use of SOFCs in micro-grids enables developers to accelerate projects in power constrained markets and to maintain operational flexibility once grid connections are established. A utility in the Midwest, for example, recently signed a contract for up to 1 GW of SOFCs to enable data centers to come online years before planned transmission infrastructure upgrades are completed.

Natural Gas

Today, industry observers note that the idea of around the clock clean energy remains aspirational in many markets due to the variability of wind and solar, cost of energy storage, lack of access to hydroelectric power and green hydrogen, and the immaturity of next-generation solutions. In the meantime, sources of thermal power are necessary for the digital infrastructure industry to keep up with the demand for digital services. One industry analyst put the short-term mix required at 40% renewable and 60% thermal.

Natural gas is widely viewed as the short-term fuel of choice for thermal power generation. For example, recent announcements of gigawatt scale AI training data centers in the United States include plans for construction of behind-the-meter natural gas plants to provide electric power. These behind the meter natural gas power plants can accelerate timelines to bring new data center capacity online. Once grid connections are established, recent research conducted at Duke University suggests these plants can help provide grid flexibility through demand response programs. During peak demand, the generators would fire up and supply partial or all the data center's power, relieving strain on the local power grid. Such flexible load management across the data center industry could allow the United States to integrate up to 126 GW of new load onto the grid, the study found. What's more, the flexibility to guarantee baseload power to the data center would enable greater integration of renewable power from variable wind and solar onto the grid, accelerating the transition to a clean energy future.

Over time, one iMasons observed, there's also an opportunity to convert the natural gas feedstock for these natural gas power plants to biomethane or green hydrogen. Other iMasons noted new natural gas generation will lock the industry into fossil fuel power for decades. Solutions to the continued use of fossil fuels for firm, dispatchable power include digital infrastructure industry support for the development of carbon removal techniques ranging from planting trees to increasing the alkalinity of the ocean and the deployment of machines that suck carbon out of the air.

Natural gas is widely viewed as the short-term fuel of choice for thermal power generation.

PERCEPTION

In this era of increased scrutiny, the digital infrastructure industry **must earn a social license to operate. iMasons know there is work to do.**

The power challenge pushed the digital infrastructure industry into the public eye. The increased visibility brings increased scrutiny. What that scrutiny reveals – the public's perception of the digital infrastructure industry – is fast rising to the top concern of iMasons around the world. To meet the demand for digital services, the industry needs to win in the court of public opinion, to earn the trust of the community as a desired, coveted and supported member of the communities where digital infrastructure is deployed. In this era of increased scrutiny, the digital infrastructure industry must earn a social license to operate. iMasons know there is work to do.

Earning a social license to operate averts public opposition to digital infrastructure development, which can delay projects, make investors skittish, and lead to rules and regulations that limit growth in certain regions. The voices of opposition often focus on concerns about the industry's impact on the power grid and water resources, as well as noise pollution, air quality and visual aesthetics. Other voices question the tax incentives used to lure digital infrastructure development into a community, and the number of jobs and economic activity the deployments create.

Today, a prevailing counter narrative within the digital infrastructure industry holds that the digital services that digital infrastructure enables are essential to modern society and the global economy. For some industry members, the societal and economic importance of digital infrastructure brings a responsibility to operate in a manner that benefits society. Others treat the industry's economic importance and tax revenue creation as more than enough to justify a presence in any community – an attitude that industry observers and advisors fear will strengthen public opposition and fray community relations at a time when the opposite is necessary.

Favorable winds for the digital infrastructure industry are sweeping in from national and local governments that recognize the economic and national security significance of digital infrastructure and are eager to enact policies and mandates that support and spur development within their jurisdictions.

An emerging trend around the protection of user data buttresses these winds, as does the embrace of the industry by communities that see their schools, health and emergency services, and power, water, fiber and road networks improve on the back of the digital infrastructure industry's investments.

The headwinds are stronger, especially in and near established markets where data center deployments are clustered, the industry's tax benefits are taken for granted, power supplies are constrained, and the noise and visual impacts of digital infrastructure development are abundant. In these areas, iMasons observe that NIMBYism, which is the shorthand term for the phrase "not in my backyard," is an increasing challenge. They report that government agencies in these communities are responding to public pressure to deny expansion permits for projects that just a few years ago would have been allowed to advance unimpeded.

The perception challenge has brought an end to the days when developers could enter a community, buy land, negotiate a power contract with the local utility, receive tax incentives from city and state governments, and build whatever they want. Today, engagement with the community is critical at every step of the process. Key to this engagement is to meet with government officials, community activists, business leaders, school boards and concerned citizens. That's the only way to know what matters to the local community, and every community is different, note several iMasons. The knowledge gained through community engagement informs actions to address concerns through design decisions, contributions and community involvement.

Several individual companies in the digital infrastructure industry maintain community engagement initiatives as part of their ongoing strategies to earn a social license to operate. These initiatives include education programs intended to demystify the data center development, partnerships and support for science, technology, education and math courses at schools and workforce development courses at community colleges. Some companies emphasize their investments in renewable energy to strengthen the local power grid and landscaping enhancements that increase biodiversity, clean the air and mitigate acoustic and visual impacts of digital infrastructure development. These individual initiatives are a positive step, note industry observers and advisors.

iMasons is working on a coordinated industry-wide initiative, the iMasons Social Accord, to create a guidebook and verification framework for the construction and operation of digital infrastructure that's in economic, social and ecological balance with the communities where it is deployed.

iMasons is working on a coordinated industry-wide initiative, the iMasons Social Accord, ... **for the construction and operation of digital infrastructure that's in economic, social and ecological balance with the communities where it is deployed.**

The accord is intended to move the digital infrastructure industry beyond building and operating data centers that are “in the community” to being “of the community.” Digital infrastructure industry members that are “of the community” share the community’s values, participate in local events and invest in the well-being and development of the community.

“Of the community” data centers are economic investments in the community that generate tax revenues, create jobs and develop and sustain a workforce to build, operate and maintain digital infrastructure. “Of the community” data centers are virtual and physical social hubs that support access to education and healthcare, raise digital literacy, provide food and housing security, stabilize water and power supplies, and enhance emergency response systems. “Of the community” data centers leverage sustainability innovations to align with the ecological performance of the natural landscape where they are deployed.

Conversation with iMasons for SOTI 2024 helped shape the formation of the Social Accord, which has gained momentum over the past year through collaborations across the digital infrastructure industry. To learn more and get involved, please visit socialaccord.org.

Digital infrastructure industry members that are “of the community” **share the community’s values, participate in local events and invest in the well-being and development of the community.**

PEOPLE

Today, construction workers and electricians are in high demand to build, wire and retrofit data centers for modern AI workloads.

Hiring and retaining people to work in the digital infrastructure industry remains a persistent challenge as the industry rapidly expands to meet the demand for cloud computing and AI services. Jobs in the digital infrastructure industry run the gamut from sales and marketing to operations and management, with the greatest need for people with the skills to build, operate and maintain the technical networks and systems that enable digital services. Only 15% of applicants for these jobs have the required skills, according to research published by the commercial real estate firm JLL. These jobs can take more than 60 days to fill and 10% are never filled, which is twice the average in the United States, according to the firm. On the bright side for the industry, the skills shortage appears to have stabilized even as the industry's growth continues, which suggests some success in hiring and retention efforts, the Uptime Institute reported.

The worker retention challenge is most acute for people early and late in their careers. Only 18% of first year workers stay in the industry, according to the JLL report. The workers' reasons for leaving center on three concerns: pay, burnout and career development opportunities. Competition among industry companies for skilled people is fierce, with poaching accounting for as much as 40% of employee churn. Reports are common of employees leaving a job at one company for a similar role at another company across the street for a $2 to $5 increase in hourly wages. One in five data center operators report losing staff to other operators, according to Uptime Institute. On the other end of the career spectrum, iMasons warn of a "silver tsunami." An estimated 47% of the workforce will be retirement age within 5 years, and 30% of the workforce has been in the industry for 10 to 25 years. As these aging workers gray out of the industry, will the next generation be prepared to fill the void?

Today, construction workers and electricians are in high demand to build, wire and retrofit data centers for modern AI workloads. The shortage of these skilled workers is particularly acute in rural areas where digital infrastructure developers are expanding for access to power.

Targeted workforce recruitment and training programs have proliferated in recent years as members of the digital infrastructure industry race to bring more capacity online.

Jobs at these sites can last multiple years, as hyperscale data center campuses are typically built in stages. The tendency of companies to cluster in certain geographic areas adds to job security for construction workers who specialize in the needs of the digital infrastructure industry. Electricians trained to outfit data centers for AI workloads are particularly coveted in today's market, noted several iMasons. Next-generation power systems will also require a skilled workforce. The people most likely to fill those jobs are today in elementary school.

Targeted workforce recruitment and training programs have proliferated in recent years as members of the digital infrastructure industry race to bring more capacity online. Most hyperscale companies sponsor workforce training programs in the regions where they deploy data centers to secure a direct pipeline of talent and strengthen relationships with community members. Some also have recruitment efforts that target specific demographics, such as military veterans, a cohort of resilient, mission-critical focused and systems-oriented people primed to succeed in the digital infrastructure industry. Industry-wide initiatives led by organizations such as iMasons and its partners complement and amplify these efforts, building a pipeline of talent that lifts all boats.

Industry-wide efforts also include the development of scalable curricula and programs that can be implemented at high schools and colleges and universities around the world. For example, iMasons and its partner organizations collaborate with select colleges and universities on a senior capstone project that pairs iMasons member mentors with students to design a nationwide digital infrastructure architecture plan to support the latency and bandwidth requirements and projected growth of a mobile phone app. The project requires students to work collaboratively with team members as they apply skills and knowledge specific to the digital infrastructure industry. Many alumni of the program are now employed at sponsoring organizations in the industry. iMasons is looking to expand the program in alignment with the association's goals to attract a workforce that reflects the mix of people in the world that digital infrastructure serves.

Other programs include the Building a Greater Digital Future curriculum modules for junior high and high school students that iMasons and partners developed in partnership with Jason Learning. Digital Infrastructure companies can sponsor the adoption of the modules at schools in the communities where they operate, building bridges and strengthening relationships with members of the local community while growing a local workforce. iMasons members are also collaborating on curricula for K-12 schools to increase early awareness of the industry, as well as for community colleges and post-graduate certificate programs.

These efforts are an optimistic sign of proactive action to address the people shortage, according to an iMason. Another iMason noted that these efforts must focus on the long term, establishing a workforce to build the digital future.

Automation and AI are also eyed by iMasons as part of the solution to the people challenge. Robots and generative AI are seen as tools to augment the workforce, for example, and AI algorithms can facilitate recruitment efforts. A recently launched job-matching platform that iMasons developed in partnership with Oplign uses AI to translate and match skills that armed forces veterans learn in military jobs with skills needed in the data center industry. iMasons has extended the job-matching platform to cover professionals, students and any other applicants in the market looking for a career path in the digital infrastructure industry.

PLANET

Some of the industry's most prominent leaders note that **sustainability remains core to their economic development and leadership principles.**

The digital infrastructure industry possesses the money, willpower and innovative spirit to lead the world in responsible, economic and sustainable growth that balances initiatives to protect the environment and our planet, according to several iMasons. Today, the pace of the global race to develop dominant AI systems that win market share and produce returns for investors has pushed protections for the planet to the backburner, at least temporarily, many iMasons observe. Hope for the planet rests with the implementation and enforcement of rules and regulations that require digital infrastructure companies to disclose the environmental impact of their operations, which could compel the industry to realize its leadership potential and innovate solutions.

The pullback in protections for the planet is most stark in the predictions and acknowledgements that companies in the digital infrastructure industry will miss the targets they set for themselves to achieve net-zero carbon emissions between 2030 and 2050. Members of the digital infrastructure industry made these commitments in the late 2010s, prior to the COVID-19 pandemic and subsequent emergence of generative AI that accelerated demand for digital infrastructure. The industry today lacks the ability to cost efficiently build and operate digital infrastructure at the scale and pace the market demands and meet the net-zero targets, according to industry members and analysts. Instead of trending down, carbon emissions from the digital infrastructure industry are expected to more than double relative to 2022, according to Goldman Sachs. Some members of the industry acknowledge their inability to meet the targets, others insist the targets will be achieved. Either way, observers anticipate increased scrutiny of progress and a push for transparency.

The language that members of the digital infrastructure industry use to discuss initiatives that were traditionally housed under the umbrella of sustainability has also shifted, according to several iMasons. Terms such as "net-zero" and "ESG" are out of favor. Instead, companies talk about "energy efficiency" and efforts to "increase grid capacity". The language shift reflects the current market and geopolitical climate, and masks continued long-term commitments to protect the planet, several iMasons observed. Some of the industry's most prominent leaders note that sustainability remains core to their economic development and leadership principles and that its removal from the spotlight is a temporary necessity to meet market expectations. One iMason noted that the planet is caught between a moral obligation to future generations and the market reality of today.

Regulations such as the U.S. Security and Exchange Commission's climate disclosure rule and the European Union's Corporate Sustainability Reporting Directive, or CSRD, and the Corporate Sustainability Due Diligence Directive, or CSDDD, are expected to compel many members of the digital infrastructure industry to keep the planet a top priority as they continue to grow the economy.

These regulations are designed to promote sustainability within companies. The CSRD requires companies to disclose information about their environmental impacts such as carbon emissions and the CSDDD requires companies to identify, prevent, mitigate and account for potential human rights and environmental risks throughout their operations. Companies with operations in the EU must comply with these regulations, with the largest companies such as hyperscalers due to begin reporting in 2026. Hyperscalers have indicated they will bring their operations and reporting around the world into compliance with the EU standard, several iMasons noted.

Compliance with the EU regulations will require companies to measure and report the environmental impact of their operations. Most companies in the digital infrastructure industry currently lack the data they need for reporting environmental impact such as greenhouse gas emissions, according to the Uptime Institute. Today, industry companies typically report power consumption and power use efficiency, or PUE, but those are insufficient in and of themselves to track progress toward sustainability, the institute's report noted. The ability to measure impact, as noted in SOTI 2024, brings the ability to monitor and validate progress. While a predicted increase in reporting has yet to materialize, observers expect legislation and public pressure to force compliance.

Optimism about the digital infrastructure industry's ability to protect the planet rests in the industry's spirit of innovation, several iMasons observed. Today, many companies and members of the industry are invested in the research and development of clean energy technologies such as SMRs, fuel cells, enhanced geothermal systems, CSP and nuclear fusion. In time, these technologies will mature and scale to meet the industry's demand for clean energy. So too will investments in low-carbon concrete, steel and wood used to build next generation data centers. Carbon capture and carbon removal technologies are positioned to bridge the gap between today and tomorrow and eventually account for legacy emissions.

Industry initiatives such as the iMasons Climate Accord (iCA), which has united the largest portfolio owners in the digital infrastructure industry representing more than $8 trillion in combined market capitalization on a common goal of carbon reduction, continue to gain traction. This year, the iCA launched a maturity model, or framework, that enables members to measure progress in carbon reduction across materials, equipment and power and share best practices with industry peers.

Optimism about the digital infrastructure industry's ability to protect the planet rests in the **industry's spirit of innovation.**

PROTECTION

Digital infrastructure processes, stores and transmits data. **The protection of this data is an emerging challenge and opportunity for the distribution of digital infrastructure.**

Digital infrastructure processes, stores and transmits data. The protection of this data is an emerging challenge and opportunity for the distribution of digital infrastructure around the world. Governments want digital infrastructure within their jurisdictions to protect their sovereign data for reasons of national security and economic competitiveness. Hyperscalers require digital infrastructure located within data safe harbors wherever cost-competitive, scalable and abundant clean power is available to train next-generation AI models. Enterprises, research organizations and citizens want to fine tune and use AI models with their data in digital infrastructure that offers data protection and isolation from the public cloud. The push and pull of these data protection trends are an accelerant to the growth of the digital infrastructure industry, according to iMasons around the world.

Governments see sovereign digital infrastructure as critical to their national security and economic competitiveness and are developing and enacting policies to attract and encourage the deployment of digital infrastructure within their borders. For example, the U.S. National Telecommunications and Information Administration issued a request for “comments on the challenges surrounding data center growth, resilience and security in the United States amidst a surge of computing power demand due to the development of critical and emerging technologies.” iMasons and several other members of the digital infrastructure industry submitted comments. In January, the U.S. government issued executive orders to support and accelerate the development of digital infrastructure, including opening federal lands to gigawatt-scale data centers.

The United Kingdom has released proclamations on the importance of digital infrastructure to economic competitiveness and designated data centers as Critical National Infrastructure, which gives data centers the same priority and support as energy, water and healthcare facilities. The designation enhances government support and boosts investor confidence, according to several iMasons.

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Enterprises are driving repatriation from the public cloud to on-premises and colocation data centers that offer **protection for their data.**

It also requires increased disclosure of operations requirements, which is becoming a source of new tension with data center tenants who want their operations kept private, an iMason noted. Industry observers anticipate similar proclamations and designations about the national importance of digital infrastructure throughout the European Union. Similar trends are seen elsewhere around the world, from Canada to Thailand.

The geopolitical currents pushing digital infrastructure deployments into more countries are also shaping a trend within the digital infrastructure industry and throughout the digital economy for the development of safe harbors for the data processed, stored and transmitted in these deployments. Some iMasons see these data safe harbors as analogous to an embassy – an area on foreign soil where a country's sovereign rules and regulations apply, in other words a data embassy for public sector data on foreign soil. Other iMasons see the safe harbors as analogous to a special economic zone with clear regulatory frameworks and protections for user data, in other words a data safe harbor for private sector data on foreign soil.

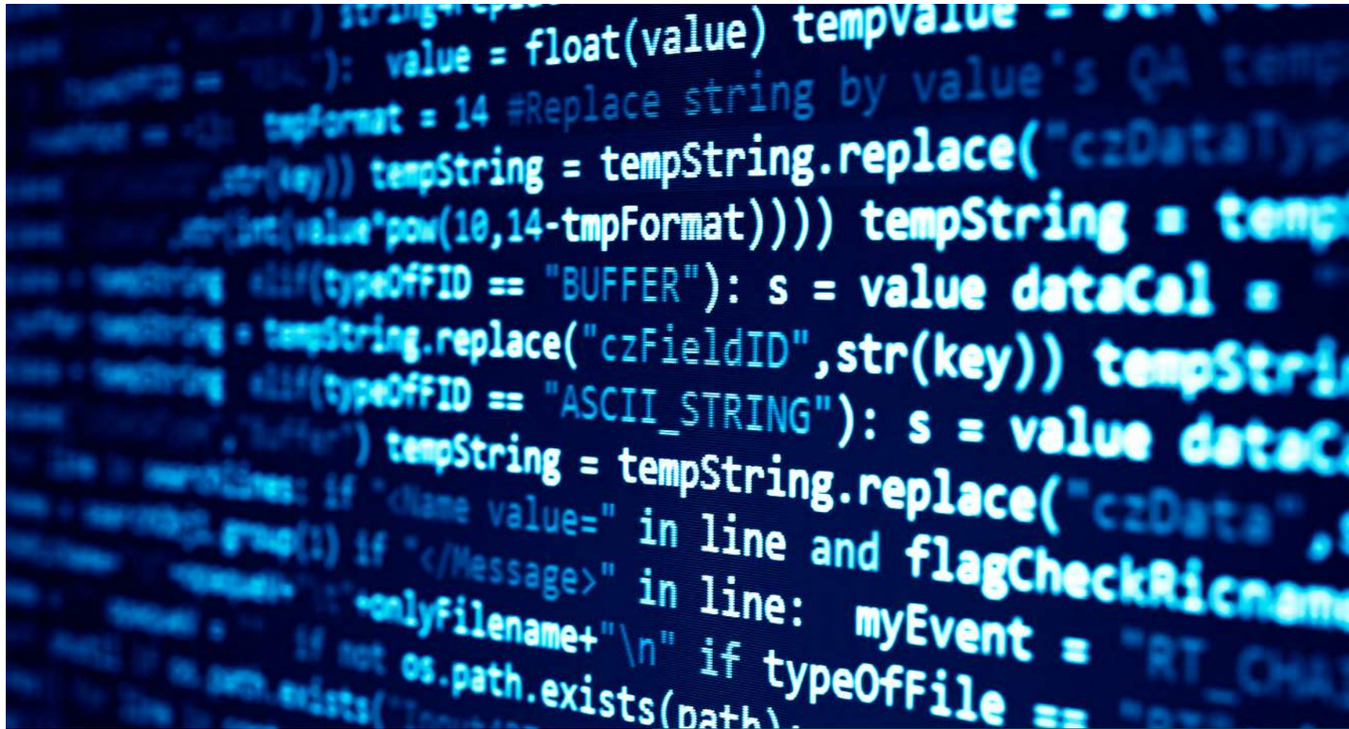
The data safe harbor concept would allow companies such as hyperscalers to train the largest next-generation AI models in digital infrastructure deployed in a country that's geographically favorable to the generation of abundant clean energy at attractive rates while keeping user data and intellectual property isolated and protected from the rules and regulations of the host country. The frameworks, structures and hundreds of billions of dollars in investment needed to enable these types of data safe harbors are taking shape across the Middle East, the Nordics and South America, according to market analysts, observers and iMasons.

Enterprises such as financial institutions, law firms and insurance, media, entertainment and healthcare companies with sensitive proprietary data are driving repatriation from the public cloud to on-premises and colocation data centers that offer protection for their data.

This data protection has expanded from traditional sensitive data categories including personally identifiable information (PII), payment card industry (PCI) data, Health Insurance Portability and Accountability Act (HIPAA) data, and information protected under the European Union's General Data Protection Regulation (GDPR) to the data that all companies and people generate and use as part of their day-to-day functions. For example, customer use data, product design documents, source code, contracts, and other company specific trade secrets are used to train custom AI models that are exclusive to these enterprises for the operation of their businesses. Exposure of this private company data through a commercial LLM has become a significant concern to enterprises around the world. This data protection trend is breathing new life into the retail data center market, an iMason said.

New business models that address data protection concerns are emerging. For example, cloud competitors called neoclouds offer dedicated platforms in private data centers that enable enterprises to leverage AI/MLOps tools fully isolated from the public cloud. New offerings from hyperscale companies enable the deployment of isolated cloud services in cloud regions as well as in on premise or colocation data centers. In these scenarios, the platform operators typically own and manage the information technology equipment and services, but the data remains invisible to them.

For iMasons, who are the builders of the digital age, these data protection trends reinforce the need for flexibility as they consider how to design and operate digital infrastructure that will deliver the digital future.



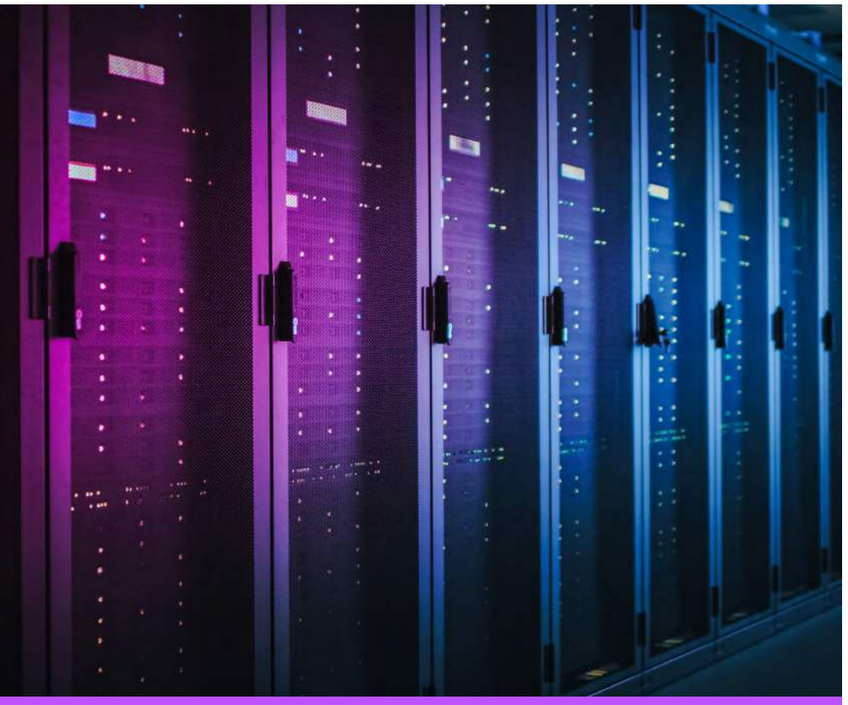
03. Market Insights

Introduction

iMasons represents the builders of the digital age and intentionally takes a wide aperture approach to its definition of digital infrastructure. The definition encompasses all elements that make up the infrastructure landscape of data centers including the information technology equipment that processes and stores data, the facilities that house that equipment and the networks that connect them all.

Businesses that provide market research and intelligence about the digital infrastructure industry may take a tailored view to provide insights relevant to their clients' interests and needs. iMasons collaborated with independent market research firms to collect data and insights on active, under construction and planned data center capacity around the world. Since this information excludes some data center categories in iMasons' definition of digital infrastructure, the data reported here may be an underestimate of the full breadth and scope of the digital infrastructure industry.

Special thanks to the following industry platforms: datacenterHawk, a market intelligence platform that provides data and insight on global data center real estate, DC Byte, a data center market intelligence firm, and the global real estate investment firms CBRE and JLL. The Market Insights section of this report synthesizes and anonymizes input from these platforms, as well as formal and informal interviews with investors and industry members, allowing iMasons to provide a unique perspective on global and regional markets.



As the demand for digital services grows, so too will **the size and geographic reach of the digital infrastructure industry.**

The data reported here about the size, geographic distribution and growth trajectory of the digital infrastructure industry are intended to inform business, policy and community decisions that will shape future growth of the digital infrastructure industry. Data on the size of the industry is reported in megawatts (MW) and gigawatts (GW) of power capacity across three categories: active, under construction and pipeline as well as an aggregate of all three categories.

Active capacity represents digital infrastructure deployments that are actively serving users today. These numbers are a reliable indicator of the state of the digital infrastructure industry today.

Under construction capacity represents digital infrastructure deployments that are currently in the physical process of being built. These numbers are a reliable indicator of near-term industry growth.

Pipeline capacity has been disclosed to the public. These numbers are an indicator of long-term market growth trends; whether and when this capacity will be built is uncertain. Some capacity may represent multiple projects chasing the same client or demand, for example.

Aggregate numbers are inclusive of all three categories and provide a snapshot of the industry's size inclusive of active capacity and development trends for the short and mid-term potential growth projections.

Big picture, these numbers underscore the central narrative of this report: The digital infrastructure industry is undergoing unprecedented growth and must take steps to ensure this growth is sustainable and of the community. Digital infrastructure enables digital services that are as essential to any community today as reliable and stable electric power, water and food supplies, and education, healthcare and public safety services. As the demand for digital services grows, so too will the size and geographic reach of the digital infrastructure industry.

GLOBAL

Between 2010 and 2025, the amount of data created, consumed and stored **increased more than 100 times.**

55 GW
ACTIVE

15 GW
UNDER CONSTRUCTION

135 GW
DEVELOPMENT PIPELINE

205 GW
GLOBAL

Total global capacity of hyperscale, colocation and enterprise data centers that are active, under construction and in the development pipeline exceeds 205 GW. More than 55 GW of that capacity is active, around 15 GW is under construction and at least 135 GW is in the future development pipeline. In the 12 months since SOTI 2024 was released, active capacity is up more than 60%, under construction capacity is up nearly 50%, and pipeline capacity is up more than 160%.

Exponential increases in data creation continue to drive the growth of digital infrastructure around the world. Between 2010 and 2025, the amount of data created, consumed and stored increased more than 100 times, according to Blackstone, an alternative asset manager.

All this data needs a place to live – for social media, cloud computing, content streaming as well as AI.

Established and emerging markets will experience increased development in 2025. Development will cluster where power, land, infrastructure and talent are available. The headline growth driver is hyperscaler investments in digital infrastructure to support AI model training, with commitments from several companies to spend tens of billions of dollars on AI infrastructure in 2025. Several iMasons noted that less headline worthy traditional data storage and cloud-based applications continue to create robust global demand for digital infrastructure.

How much, when and where digital infrastructure is deployed around the world will depend on everything from market demand and supply chain capacity to the availability of people to build and operate data centers and the power to run them. Several industry analysts expect market turbulence over the next several years as the global race to develop next-generation AI systems unfolds, but the long-term prospects for the industry remain robust.

AMERICAS

The bulk of projects in the development pipeline are located **throughout the United States with a smattering across Canada and throughout Latin America.**

35 GW
ACTIVE

10 GW
UNDER CONSTRUCTION

90 GW
DEVELOPMENT PIPELINE

135 GW
GW AMERICAS

5%
VACANCY RATE

2.6%
ONLY U.S.

There is more than 35 GW of active hyperscale, colocation and enterprise data center capacity in the Americas. An additional 10 GW of capacity is under construction and more than 90 GW are in the development pipeline. The bulk of projects in the development pipeline are located throughout the United States with a smattering across Canada and throughout Latin America, including one megaproject in Brazil that accounts for 4.75 GW. Total pipeline capacity in Latin America including the megaproject is 6.5 GW to 8 GW.

Power availability is a major driver of site selection in North America, particularly for developments intended for AI training workloads. This trend was predicted in SOTI 2024 and manifested with mega campuses announced in North Dakota, Ohio, Pennsylvania, Mississippi, Tennessee, and West Texas. Power availability – and in particular clean power – is also behind the megaproject in Brazil, which has access to abundant hydroelectric and wind energy, and in Chile, which has abundant solar power resources.

Power constraints in the United States are driving colocation and cloud providers to develop new facilities in secondary markets such as Reno, Nev., Charlotte, N.C., and San Antonio, Texas. Another notable trend is the trailing out of data center development from established markets such as along the I-95 corridor in Virginia, south of Ashburn, and the I-90 corridor across northern Indiana, east of Chicago, according to observations from several iMasons.

The amount of colocation capacity under construction in North America is at record highs and more than 80%, perhaps as much as 85%, of the capacity is pre-leased. The vacancy rate is at a record low of no more than 3% and trending toward 0%. The limited supply and strong demand have pushed up rent by about 7%. At the end of 2024, rent rates for a 250-to-500-kilowatt requirement was $184.06 per kW a month.

Established markets in North America remain a priority for continued data center expansion. Northern Virginia is the largest market by a factor of four, and providers with capacity scheduled to come online over the next several years are signing contracts for record high lease rates, several iMasons noted. Colocation developers are focused on cities in the North American market with populations large enough to support a professional football team to serve clients that need low-latency interaction for AI applications and content distribution.

Brazil is the largest data center market in Latin America. More than 90% of the power for data centers is sourced from renewables – solar, wind and hydro.

Many of these projects are in the early planning stage as developers secure commitments from the local communities and utilities before they start construction, an iMason said.

Brazil is the largest data center market in Latin America. More than 90% of the power for data centers is sourced from renewables – solar, wind and hydro – which makes the country attractive for data center developers who seek to meet carbon reduction goals. One obstacle to AI development in Brazil is import tariffs that double the cost of chips, according to an iMason.

The five largest markets in Latin America are Sao Paulo and Rio in Brazil, Santiago in Chile, Queretaro in Mexico, and Bogota in Colombia. Just under 75% of the existing capacity is in three of these markets - Sao Paulo, Santiago and Queretaro, which is also where 77% of announced future builds are located. Limited growth is expected in most other Latin American markets.

In Canada, the major data center hubs include Toronto, Montreal, and Vancouver, with emerging markets in Calgary and Quebec City. The country's abundant renewable energy resources, such as hydroelectric power, and favorable climate conditions for data center cooling contribute to its attractiveness as a data center location. Canada's data center market has an estimated power capacity of approximately 1 GW. This capacity is projected to reach 1.5 GW by 2029.

ASIA PACIFIC

The land and power constraints in Singapore **have pushed developers to neighboring Johor, Malaysia, which is undergoing a boom in new and planned capacity.**

10 GW
ACTIVE

2.5 GW
UNDER CONSTRUCTION

25 GW
DEVELOPMENT PIPELINE

37.5 GW
APAC

7%
VACANCY RATE

There is more than 10 GW of active hyperscale, colocation and enterprise data center capacity in the Asia Pacific region. About 2.5 GW are under construction and around 25 GW are in the development pipeline. The vacancy rate is 7%. The region is vast and industrious with pockets of population density and power constraints that present opportunities and risks for the accelerated growth of digital infrastructure.

Singapore is the region's traditional hub for digital infrastructure to support cloud and enterprise workloads. Power and land constraints triggered a moratorium on new data center development between 2019 and 2022. Vacancy in Singapore today is 1%. The country runs an elaborate application process for data centers to secure a share of limited power capacity that leaves almost all participants clamoring for more to meet the demand of their clients, according to an iMason.

The land and power constraints in Singapore have pushed developers to neighboring Johor, Malaysia, which is undergoing a boom in new and planned capacity, several iMasons noted. In January, the governments of Singapore and Malaysia signed a formal agreement to establish a special economic zone in Johor that strengthens economic ties with Singapore and will accelerate growth, according to an iMason. Already, hyperscalers and colocation providers are investing billions of dollars in Johor, making it one of Asia Pacific's hottest markets.

Growth of the digital infrastructure industry is also strong in Australia, which is strategically located within the Asia Pacific region and offers political and economic stability. Sydney is the country's dominant market, which is seeing increased demand from government and enterprise clients shifting from on premise and enterprise data center models to colocation and cloud service solutions. Power constraints in Sydney are pushing some development to Melbourne, an iMason noted. Perth, on Australia's west coast, is also gaining interest as a strategic option to serve and interconnect with growing markets in Southeast Asia and India.

The next wave of growth? Look to **Philippines, Thailand and Vietnam.**

Several iMasons and industry observers have a close eye on India, which SOTI 2024 spotlighted as an emerging market poised for rapid growth. There is currently about 1 GW of active data center capacity in India, more than 500 MW under construction and 7 GW in the development pipeline. Observers expect the development pipeline to grow, potentially by several gigawatts. Mumbai, with more than 600 MW of active capacity, is India's largest data center market and inventory is expected to surge due to strong demand from banking, financial services and insurance companies.

Other markets to watch in Asia Pacific include Tokyo, which several iMasons observe is expensive but offers political stability and power availability, and Indonesia, which could capture demand from China. Seol, South Korea, has captured attention as a market to watch for continued growth as well increasing community pushback on the data center industry. The next wave of growth? Look to Philippines, Thailand and Vietnam.

EUROPE, MIDDLE EAST, AFRICA

The promise of outsized investment, clean power and a business-friendly climate are **attracting developers to the Middle East.**

10 GW
ACTIVE

2.5 GW
UNDER CONSTRUCTION

20 GW
DEVELOPMENT PIPELINE

32.5 GW
EMEA

5%
VACANCY RATE

3.7%
ONLY EUROPE

There is nearly 10 GW of active hyperscale, colocation and enterprise data center capacity across Europe, Middle East and Africa. As much as 2.5 GW of capacity is under construction and potentially more than 20 GW of capacity is in the development pipeline. Vacancy rates are around 2.6% in Europe and 5% when the Middle East and Africa are included. The vacancy rate is around 10% in Africa, where capacity typically takes longer to fill than in established markets, an iMason noted.

Growth patterns diverge across the region. Power constraints and regulatory restrictions keep a lid on expansion in the established markets of Western Europe. Available clean power is a draw to the Nordics. The promise of outsized investment, clean power and a business-friendly climate are attracting developers to the Middle East. The potential of Africa remains unrealized, but conditions for growth across the continent continue to ripen.

Frankfurt, London, Amsterdam, Paris and Dublin, the so-called FLAP-D markets, remain central to the digital infrastructure industry in Europe, but power and regulatory constraints limit the growth of mega-scale campuses associated with AI training workloads. Cloud expansion is moving into second tier markets such as Berlin in Germany, Milan in Italy, Madrid and Zaragoza in Spain, Lisbon in Portugal, and Zurich in Switzerland, according to several iMasons. The bustle of activity on the Iberian Peninsula in southwestern Europe suggests the emergence of a new data center hub.

Hyperscale and wholesale colocation providers are increasingly looking to the Nordics for new development due to abundant clean energy and available land, though the lack of infrastructure and skilled workers is a challenge. Greece is also rapidly becoming a key player with connectivity between Europe, Middle East and Asia.

Saudi Arabia and United Arab Emirates are vying to become AI hubs. Several hyperscalers have established cloud regions in Saudi Arabia and announced billions of dollars in new investments, for example. The solar resources in the region are also seen as ideal for the development of Clean Energy Zones, an iMason noted.

To unlock the type of growth that allows Africa to leapfrog ahead will require **governments and enterprises to embrace cloud computing and AI.**

The potential for rapid growth across Africa was a spotlight in SOTI 2024. Growth in the past year was muted, with just over 100 MW of new capacity added in 2024 bringing total active capacity to 360 MW. An additional 238 MW is under construction and 656 MW is in the development pipeline. To unlock the type of growth that allows Africa to leapfrog ahead will require governments and enterprises to embrace cloud computing and AI, according to an iMason. Simultaneously, investments in digital infrastructure need to be right sized for the market of today with an eye toward expansion as demand grows.

Some of the blockers to development are being removed in Africa, according to several iMasons. For example, new power capacity brought online in South Africa, the continent's most developed digital infrastructure market, has ended the frequent load shedding that forced many data centers to rely on diesel-powered backup generators. Two hyperscale-ready wholesale colocation data centers will be online in Lagos, Nigeria, by the end of 2025 in a bid to jumpstart the digital economy with cloud computing and AI inference workloads. Lagos has access to nearly 500 million people in West Africa vying to participate in the digital economy, an iMason noted. Looking forward, Nairobi, Kenya, is a market to watch.

04. Conclusion

The iMasons 2025 State of the Digital Infrastructure Industry Annual Report underscores the rapid transformation of digital infrastructure in response to the insatiable demand for digital services and charts a roadmap for responsible and “of the community” development that will define the digital future. The report comes as hundreds of billions of dollars are being invested to build hyperscale data centers with city-scale power requirements, which has increased public awareness of the industry. The increased awareness brings increased expectations from governments and communities for responsible and sustainable development. iMasons prepared this report to inform the development decisions that will shape the digital future.

Today, AI is the driving force transforming the digital infrastructure landscape. The vast computational power demands of AI model training are spurring the construction of hyperscale data centers with hundreds of megawatts to more than a gigawatt of power capacity. Over the next five years, the AI workload growth will shift to inference applications that spur the need for edge data centers near population centers. This shift will push the expansion of digital infrastructure into new and emerging markets. AI-fueled growth of the digital infrastructure industry will also amplify efforts to address persistent challenges around power, perception, people, planet and data protection as the industry maintains and reinforces its commitments to communities and carbon reduction.

Power constraints continue to dictate where and when new data centers can be built, requiring innovative solutions such as advanced nuclear reactors, renewables combined with storage and hydrogen fuel cells. The industry’s perception in local communities is shifting, with increasing resistance to data center developments due to concerns over energy consumption, environmental impact and job creation. In response, companies are prioritizing community engagement initiatives to foster positive relationships and earn a social license to operate.

The workforce shortage is another critical issue. The industry struggles to recruit and retain skilled people to build, operate, and maintain data centers. Efforts to expand workforce training programs and attract diverse talent pools are ongoing and require long-term investment and collaboration with educational institutions.

AI-fueled growth of the digital infrastructure industry will amplify efforts to address persistent challenges around **power, perception, people, planet and data protection.**

iMasons believe that people drive **innovation**, and **innovation** drives **efficiency.**

Meanwhile, sustainability commitments are being tested as the race to build AI infrastructure accelerates. The industry must balance rapid growth with its responsibility to reduce carbon emissions and mitigate environmental impacts, necessitating stronger regulations, technological advancements and corporate accountability.

Finally, user data protection has emerged as both a challenge and an opportunity for the digital infrastructure industry. Governments, enterprises and hyperscalers demand greater control over where and how their data is stored and processed, leading to the development of data safe harbors and private cloud solutions. This trend will shape the next phase of digital infrastructure expansion, influencing site selection, regulatory frameworks and investment strategies.

iMasons prepared the State of the Digital Infrastructure Industry Annual Report as part of the organization's mission to unite the builders of the digital age to aggregate, amplify and apply their ideas, insights and initiatives to develop a greater digital future. The report is also intended to help economic development officers and policymakers facilitate responsible and sustainable digital infrastructure development in their jurisdictions; investors make informed decisions about their capital deployments; civic leaders and community members understand the critical role of the digital infrastructure industry in the modern economy and their communities; and job seekers investigate viable career opportunities in a growing industry that is building the digital future.

iMasons believe that people drive innovation, and innovation drives efficiency. To learn more, please visit imasons.org.

Infrastructure Masons

For a Greater Digital Future

Contributors

The challenges and solutions for the continuous and efficient growth of the digital infrastructure industry outlined in this report were identified through formal and informal conversations with iMasons members around the world at different events and interactions. A warm, heartfelt thanks to all the contributors to the 2025 report. You represent the best of our community, and we sincerely appreciate you and all that you do.

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Infrastructure Masons (iMasons) is a global, nonprofit, professional association of individuals connected and empowered to build a greater digital future for all. Since its launch in 2016, the organization has brought together 6,000 individuals representing US$1.5 trillion in infrastructure projects across 130 countries. iMasons provides an agnostic platform for members to connect, grow, and give back.

To date, iMasons has contributed USD 1+ million in scholarships, launched Member Focus Groups and opened regional and local Chapters across four continents. In 2022, iMasons spearheaded the Climate Accord, uniting leaders on carbon reduction in digital infrastructure.

To learn more, visit iMasons.org.

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