LVI ASSOCIATES

PART OF PHAIDON INTERNATIONAL

MARKET UPDATE

Data Center Growth

INDUSTRY INSIGHTS

Global industry expansion through talent

Global Report

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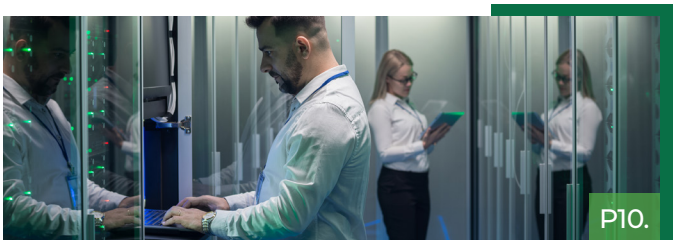

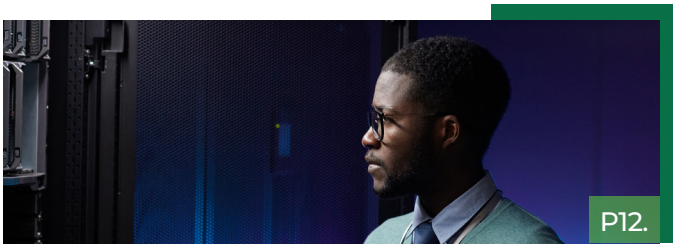

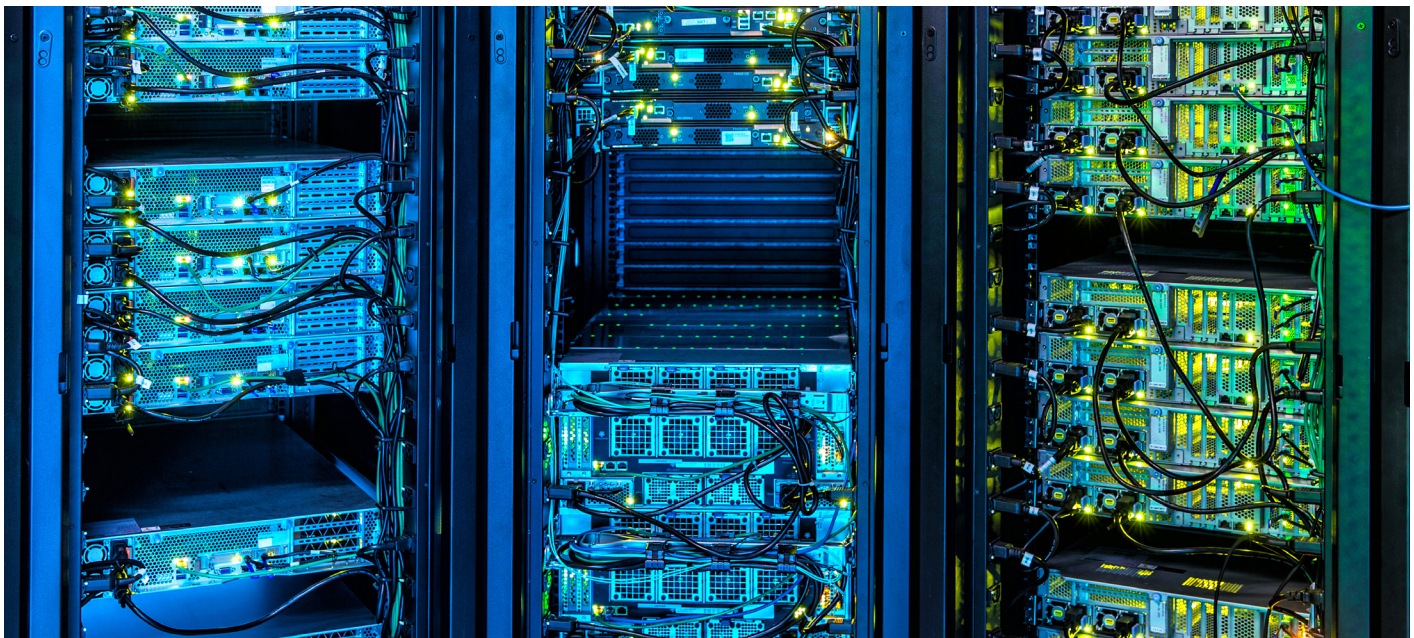

Introduction

Every day, we send vast amounts of data, such as files, emails, photos, and videos, adding to an already enormous amount of digital information. Data centers act as essential nerve centers, managing the storage, processing, and distribution of this exponential growth.

Last year, nearly 100tn gigabytes of data were created and consumed according to International Data Group[1], and that figure will nearly double by 2025. As we navigate through an era marked by unprecedented connectivity and technological advancements, the significance of data centers will only continue to escalate.

From articles published online to crypto tokens traded, everything runs through a data center. In the relentless pursuit of innovation and efficiency, data center operators are grappling with a number of challenges, including escalating energy consumption, upcoming infrastructure projects on the horizon, and the intricacies of regulatory compliance. However, all of these challenges are coupled with the need for the right talent to be able to take on and solve those challenges, ultimately delivering the design, engineering, construction, and maintenance in the data center industry.

With an acute shortage of skilled professionals, attracting and retaining top talent is imperative for industry stakeholders. Our report takes you through some of these issues, alongside how adopting innovative recruitment strategies can help organizations power their growth through talent.

Industry & Talent Hotspots

As organizations embrace the digital revolution, demand for top talent to manage, innovate and optimize data infrastructure in key locations continues to grow. Below is where data center expertise is currently concentrated or moving towards.

USA:

The data center industry's impact on the US economy cannot be understated, adding $2.1t to GDP between 2017-2021. It is also a major consumer of energy itself, but many of the country's data centers are adopting renewable energy sources and improving power usage effectiveness (PUE).

The US currently accounts for 40% of the global data center market, with Virginia alone owning 27% of all US data center capacity.

US data center power consumption is predicted to double by 2030.

Industry & Talent Hotspots

As organizations navigate the digital revolution, the demand for top talent to manage, innovate and optimize data infrastructure in key locations continues to grow. Here is where concentrations of data center expertise is already, or where it is heading to.

Europe:

With the EU targeting a minimum of 42.5% renewable energy by 2030 and aiming for climate neutrality by 2050, the data center industry must swiftly adapt sustainably.

Ireland is home to a whole host of server farms built for Google and Microsoft due to its attractive tax rates and easy to access subsea cables.

In Germany, a data center project is cutting emissions by putting them inside windfarms.

Google is investing $1 billion in data centers in the UK.

Industry & Talent Hotspots

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APAC:

APAC, led by China and India, is experiencing exponential data center growth. This surge is accompanied by an increased demand for energy, prompting a need for sustainable solutions.

China has built commercial underwater data centers, which saves land space and the seawater acts as a natural coolant.

Operational capacities of data centers in APAC passed the 10-gigawatt mark in 2023.

Energy Consumption

As the foundations of an interconnected, digital world, data center energy consumption is critical to not only the industry's own growth plans, but so many others too. However, fears over usage and the pressure data centers place on electricity grids has resulted in some countries curbing new server plans. The industry is incredibly reliant on constrained power and transmission lines[2], and on water as well. Data center units must be remain cool, meaning that vast arrays of servers are stored in rows of energy intensive racks that produce heat, which need specialist cooling systems to regulate temperature.

AI tools such as large language models like ChatGPT also require huge levels of data center power to be able to deliver to consumers and enterprises. This need for vast computing power has resulted in developers working to overcome planning restrictions, increase electricity generation and facilitate upgrades to systems where possible.

But no matter the plans to tackle the energy shortage, demand simply outstrips supply. The chip making giant Nvidia[3] is expected to deliver 100,000 AI server platforms in 2024, with estimates that it could ship 1.5m by 2027. This could use more than half as much energy as today's total consumption by all data centers, according to estimates.

What does this mean for the industry?

It needs to evolve to cope with increasing demand, and fast. What is also crucial is that the power sources that are used are also sustainable. **Grace Goldberg, Vice President - Head of MEP, Structural & Energy Engineering at LVI Associates, explains further:**

> *"In the US, there's been a recent rising interest by energy service companies (ESCOs) in undertaking data center projects – novel when compared to the usual MUSH or federal scopes. With the continual expansion of technology driving demands for data storage, data center operators face escalating pressure to optimize energy consumption.*
>
> *"This challenge is compounded by the soaring costs of energy and stringent regulatory requirements concerning greenhouse gas emissions. Moreover, government-initiated financial incentives promote the adoption of performance-based contracts within data centers, minimizing initial capital requirements while promising substantial future savings. In an industry where efficiency is not yet commonplace, ESCOs are taking advantage of being the 'first to market' in making data centers more sustainable."*

The growth of digital data and the expansion of cloud computing have led to unprecedented surges in energy demand within data centers worldwide. To address strain on power grids, the industry must embrace renewable energy and energy-efficient hardware for sustainable growth. This could also drive job growth in areas such as energy efficiency consulting, renewable energy integration, and green infrastructure development.

Infrastructure Development

As the demand for seamless connectivity and real-time processing intensifies, countries across the globe are investing heavily in enhancing their data center infrastructure.

In APAC for example, many existing facilities are not equipped to support the amount of liquid cooling required. Construction of prefabricated modular solutions to speed up build, as well as retrofits can transform a data center's ability to process for the better[4]. Innovations such as battery energy storage systems (BESS) adapt load management and can integrate with alternative energy sources such as solar, making a center more sustainable. A rise in BESS installations reflects an industry shift towards 'bring your own power', as opposed to pumping pressure onto already stretched power grids. By improving existing infrastructure with retrofits, the lifespan of current servers is also extended, reducing carbon emissions in scrappage.

In Europe, much of the infrastructure developments are driven by new and upcoming regulatory frameworks. Modular designs, enhanced security measures, and advanced cooling technologies are becoming the norm to meet the region's diverse needs, with the strategic location of data centers within Europe heavily influenced by factors such as cross-border data flows and the rising demand for localized data storage, similar to the US. Amidst these developments, there's a growing need for innovative cooling solutions, including the involvement of water engineers to ensure efficient and sustainable operations.

In contrast to edge data centers, secondary markets[5] are also becoming more appealing due to power supply concerns in areas already popular with the industry, which means the likes of Meta, Microsoft, and Google investing in infrastructure to improve latency and fibre connectivity, all of which require engineers and top talent to construct.

Building any data center infrastructure comes with the pressure of making it more sustainable. The industry is guzzling not just electricity, but water too. In the US, one town living under the threat of water shortage restrictions learned that 25% of their supply[6] was used by Google's data center to cool the computers. While this is only one story, it serves of a reminder that while data centers are transforming everyday lives for the better, being reliable, scalable, and secure, they also pose challenges to the environment.

To become more sustainable, as well as stay compliant and competitive, data centers must continually invest in technology upgrades and innovation. This is leading to sky-high demand for engineers, software developers, and technology architects who specialize in designing and implementing cutting-edge solutions.

Regulatory Landscape

There are a number of key considerations regulators are grappling with right now, as they try to keep up with the expanding data center industry. Environmental concerns are a major driver, so too are the considerations around data privacy and security standards. Data centers are not without regulatory oversight, and how the industry proceeds hinges heavily on both the talent of tomorrow, and the regulations shaping the industry's future.

The US regulatory landscape is evolving, with a growing emphasis on environmental sustainability and renewable energy goals at both federal and state levels, something that all in the data center industry must address.

A lot of the criticisms levied at data centers hinge on it being energy intensive, with regulations ultimately being used to curb data centers being built if they cannot tackle the sustainability issues that arise because of them. Already in Germany, Brandenburg authorities denied Google permission[7] to build a data center as Tesla's gigafactory was already consuming to much water. But the industry is demonstrating its ability to pivot, with Octopus Energy in the UK[8] investing $255m in startup Deep Green to capture waste heat from data centers and provide this warmth instead to leisure centers and swimming pools.

Regulatory Landscape

Europe in detail

In the context of Europe's ambitious Green Deal and the urgent global need for sustainable practices, data centers in Europe find themselves at a pivotal juncture. Driven by regulatory pressures and the collective recognition of their role in a sustainable, digital economy, European data center leaders are actively innovating to reduce their energy footprint, **explains Ivan Galenda, Associate Client Director at Phaidon International, LVI Associate's parent company:**

> *"The adoption of renewable energy sources, along with advancements in energy-efficient technologies, illustrates the sector's commitment to minimizing environmental impact. As European countries implement stricter regulations to ensure energy-efficient practices, data centers are also becoming testbeds for sustainable innovation. The simultaneous push for digitalization and sustainability underscores the necessity of a balanced approach that ensures data centers not only meet the growing demand for digital services but do so in an environmentally and socially responsible manner."*

This evolution reflects a broader trend towards sustainability in the tech industry, where energy efficiency becomes a pivotal competitive and compliance factor. Germany's new Energy Efficiency Act (EnEfG) for example, sets forth rigorous mandates for data centers, emphasizing the necessity of adopting state-of-the-art technologies to minimize energy consumption and maximize the use of renewable resources. Further emphasizing the drive towards sustainable operations, the Act introduces the concept of the Energy Reuse Factor (ERF), urging data centers to implement technologies that either avoid waste heat generation or ensure its utilization, such as feeding into heating networks.

> *"The legislation underscores an evolving paradigm where data center efficiency is intricately linked with broader energy systems and sustainability goals. However, these ambitious regulations present challenges, including potential implications for Germany's attractiveness as a location for data center investment and development. Concerns have been raised regarding the feasibility of meeting these stringent requirements, particularly the obligations related to waste heat reuse and the high dependency on renewable energy sources, which might introduce operational and financial burdens on data center operators"*, **Ivan summarizes**.

Regulatory Landscape

Data sharing & security

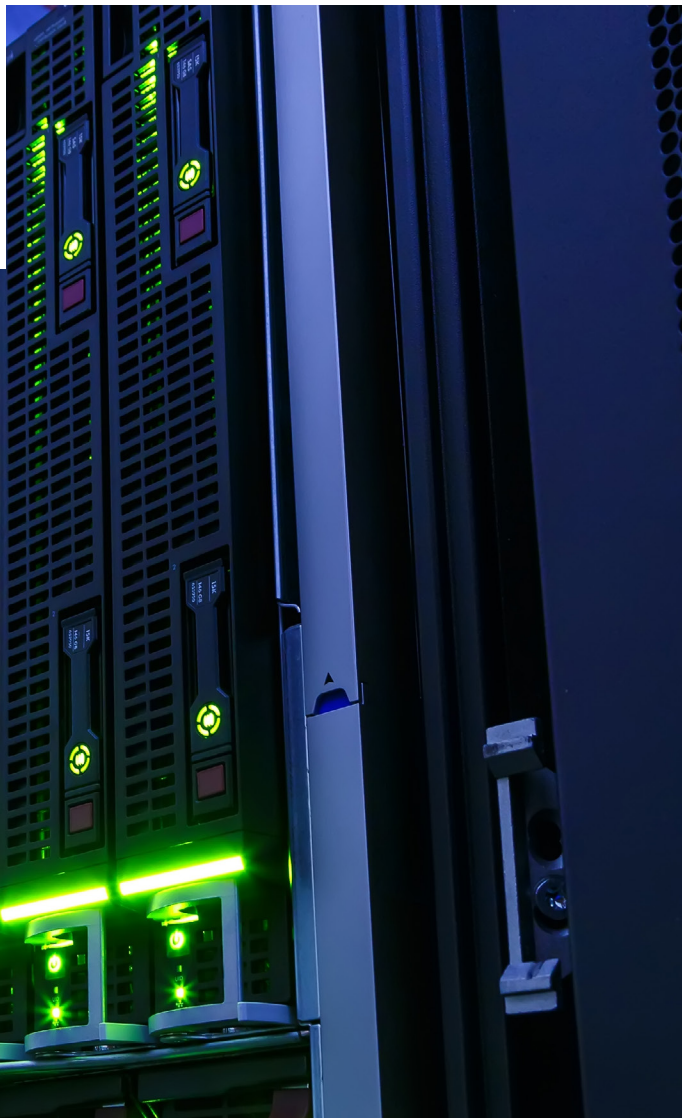
Then there is the question of data privacy and data sharing. Europe's automotive industry has already collaborated under Gaia-X's Catena-X project[9], with BMW, Renault, and BASF brought together under an automotive data space operated on cloud infrastructure. While encouraging data sharing has its benefits, it also brings with it major concerns.

The General Data Protection Regulation (GDPR) in Europe continues to impact data storage and processing practices, and national governments are introducing additional measures to address specific regional concerns. Tiktok opening its data center in Dublin[10] was a move in part to address security concerns, but it then equally put pressure on Ireland's already stretched infrastructure. In the US, privacy and data security regulations, such as the California Consumer Privacy Act (CCPA), are influencing data center operations and location choices, while compliance with local regulations in APAC, such as China's Cybersecurity Law, is influencing data center design and operations.

The need for talent

As data center regulations evolve and become more stringent, there will be a growing need for professionals with expertise in legal, compliance, and governance to ensure the industry adheres to regulations. Compliance officers, regulatory analysts, and governance specialists will be in high demand.

With heightened concerns about data security and privacy as well, data centers must invest in robust security measures and protocols. This creates opportunities for cybersecurity experts, data privacy specialists, and information security analysts to help design, implement, and maintain secure infrastructure.



5 Ways to Address Data Center Talent Shortages

The shortage of data center talent has been an ongoing concern for the industry for some time. A survey by the Uptime Institute[11] showed that over half (53%) of data center operators reported having difficulties finding qualified talent, a 15% rise since 2018. Demand for skilled professionals with expertise in data management, cloud computing, cybersecurity, as well as other specialized skills relevant to data centers is increasing the most, meaning its crucial to explore the strategies, best practices, and emerging innovations designed to bridge this gap and propel the data center industry towards a thriving and sustainable future.

5 Ways to Address Data Center Talent Shortages

01 Transferable skills

The data center industry can and is looking to similar energy and infrastructure fields for talent to power new projects. Data center organizations need to be open and flexible to hiring talent from different backgrounds, and if they are more willing to make concessions on specific experience and focus instead on repurposing a candidate's transferable but still relevant skills, are in a much better position to fill jobs.

Professionals with experience in maintaining systems and implementing them efficiently can transfer over into the data center industry. Candidates with backgrounds in architectural design, construction, engineering, and importantly, critical thinking, can also use their experiences and bring them to the world of data centers. Microsoft for example, when looking for an expert to work on computing with small nuclear reactors to power its AI and cloud data centers sought a nuclear energy professional[12], not a data center professional.

02 Building talent pipelines

The Uptime Institute's "Global Data Center Survey 2022"[13] estimates that many data center employees will retire around 2025, which underscores the industry's need to create early talent pipelines:

> **"**Amidst a staggering 30,000 talent shortage in data centers, it's crucial to foster early interest and entry into the industry. Companies need to lead with comprehensive programs to attract emerging talent, ensuring a strong pipeline alongside proactive talent mapping which is vital for sustainable growth and innovation in data centers. Investing in the next generation of data professionals isn't just beneficial - it's essential for ongoing success,**"** **says Lucy Loomes, Associate Director at LVI Associates**.

Partnering with universities and offering internships or mentoring programs is one place employers can start to attract talent as soon as possible. With Virginia a data center super hub, it's no surprise that George Mason University in Fairfax County[14] (GMU) is creating a data center engineering course with Amazon Web Services (AWS). The university will also unveil a renewable energy lab, emphasizing the importance of sustainably growing the industry to students and beyond.

> **"**As specialists in the data center industry, we stress the need for early and consistent talent pipeline development. With significant generational change on the horizon, we provide clients with guidance to navigate challenges but also be positoned for success**"**, **summarizes Ivan**.

5 Ways to Address Data Center Talent Shortages

03 Train & develop employees

Similarly to starting an early talent pipeline, have a training and development program in place for roles in data centers to constantly upskill teams. This means you also have a succession strategy in motion, and can turn to existing, experience employees to develop such programs before staff turnover or retirement becomes a challenge.

While AWS and GMU's partnership is designed to help new talent to come into the workforce, social media giant META[15] has also launched a new upskilling initiative in Singapore to nurture and train professionals. It is in a company's best interest to upskill existing talent as they'll be able to gain a competitive edge over other businesses.

04 Utilize technology

To address the talent shortage effectively, employers must harness the power of technology within their data centers. By integrating augmented reality (AR) advanced automation, AI-driven analytics, and sophisticated monitoring systems, companies can streamline operations, optimize resource allocation, and minimize the dependency on human labor.

Embracing technological solutions can also alleviate the workload of current employees, helping to handle tasks more efficiently, and ensuring data centers remain agile and capable of meeting escalating demands. However, people are required in the first place to develop these solutions and implement them.

05 Work with a top talent partner

In the face of talent shortages, a talent partner can be instrumental in overcoming workforce challenges. A specialist in recruitment and hiring can leverage their network to identify skilled professionals with the right technical expertise and experience, or the transferability of the candidate, to provide the industry with much needed talent. With targeted talent solutions and rigorous screening processes, a strong talent partner will match qualified candidates with the right roles, so they are not only beneficial to organizations, but to professionals in the data center market too.

Talent partners, such as LVI Associates, can also provide valuable insights into market trends, salary benchmarks, and talent retention strategies, empowering organizations to attract and retain top talent in a candidate short market.

Summary

The exponential growth of data underscores the critical role of data centers for storage, processing, and distribution – you will be reading this report via a data center, for example. But as more data centers are built and consumption continues to skyrocket, operators face challenges such as energy supplies and regulatory compliance. Addressing such issues requires skilled professionals.

The energy and infrastructure industry must invest in talent to maintain and grow a sustainable data center economy. Driven by an increasing global appetite for data, organizations must urgently adapt their recruitment strategies, and adopt proactive measures to attract and retain top talent.

At LVI Associates, we advise data center organizations on how to streamline and improve their hiring processes. We also guide professionals through their career moves, offering insights on salary benchmarking and benefits packages. Whether you are hiring top talent or are a skilled professional looking to make your next career move yourself, LVI Associates is committed to helping you achieve your goals, delivering exceptional talent to the global data center industry and beyond.

About LVI Associates

Energy & infrastructure plays a critical role in creating a future that works for everyone, which is why it is essential to work with the right talent partner who can source and deliver extraordinary people that make a difference.

Providing bespoke talent solutions from our hubs all over the world, we cover the full life cycle of energy & infrastructure projects, across Architecture, Engineering, Construction, and Post-Construction.

As a strategic advisor with a proven track record in helping businesses scale through our services, we are integral to the energy & infrastructure ecosystem, focusing on the talent solutions needed to let organizations get back to what matters - building a better world.

Our Specialisms

- Architecture
- Automation & Controls
- Building Diagnostics
- Building Services
- Civil
- Construction
- Data Centers
- Environmental
- Investigations & Disputes
- Power Delivery
- Renewable Energy
- Technology

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