



5 DATA CENTER DESIGN TRENDS TO WATCH

The future is now.
Here are the trends
that are driving it.



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Data centers have long been the center of the enterprise IT universe. And as more organizations around the world push forward with digital transformation initiatives, the demand for secure, scalable, and well-connected data centers will continue to grow.

But the data centers of today aren't well-suited to the enterprise demands of tomorrow. In response, data center developers and solution providers are working furiously to make the modern data center more of everything enterprises will demand in the near and distant future — more resilient, more efficient, more connected, secure, and scalable.

HERE ARE 5 DATA CENTER DESIGN TRENDS TO KEEP AN EYE ON:



1. Site Selection Takes Center Stage

Like all real estate, location matters. A lot. Enterprise leaders are taking advantage of the unlikely inventory of build-to-suit and powered shells in Tier 1 markets like Silicon Valley, Northern Virginia, and New York City.

But as that inventory is gobbled up by eager data centers providers and hyperscale developers snatch up existing large parcels — there will be nearly 630 hyperscale data centers worldwide (and most in the US) by the end of 2021, according to projections — data center developers will also continue expanding their search areas to include Tier 2 regions.

The growth in edge computing to accommodate latency-sensitive applications and improve network performance is also creating strong demand for greater geographic diversity. That, in addition to concerns around increasing land and construction costs, climate and disaster probabilities, and favorable business environment is driving new interest and investments in emerging markets as developers try to balance operability with cost management and risk mitigation.



2. Cooling gets “cool”

The days of air-conditioned server rooms are slowly fading into history. Liquid-based cooling systems have reached unprecedented popularity in recent years because they've shown to improve overall efficiency by as much as 8% in some instances⁶, but they're also ecological headaches as water scarcity concerns rise — especially in drought-ridden areas like the West.

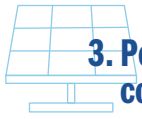
- Data centers may look to municipal wastewater systems for liquid-cooled systems to avoid exacerbating water concerns
- AI-powered systems collect cooling data every 5 minutes and automatically adapt and predict actions to optimize cooling efficiency.
- Two-phase cooling systems have footprints 50% smaller than conventional cooling systems⁷

Now, data centers are employing eco-friendly, AI-powered cooling management systems and pumped two-phase cooling systems that use non-conductive and noncorrosive fluid to cool on contact to improve cooling efficiency, water conservation, and site reliability.

¹ Brown, Christopher. “10 Data Center Trends To Watch In 2019.” Facilityexecutive.com. April 17, 2019.

² “Development of Liquid Cooled Standards.” Center of Expertise for Energy Efficiency in Data Centers. Datacenters.lbl.gov. Accessed September 18, 2020.

³ Source: “4 Data Center Cooling Trends That Will Continue in 2020.” Uptime Institute, 2019.



3. Power generation and consumption is evolving

Digital transformation and the services that come along (especially the increase in cloud consumption with the sudden transition to remote work) with it requires increasingly more power to run. Data center operators have thrown everything they can at driving power usage effectiveness (PUE) — hot/cold aisle containment, installation of blanking plates, and raising set point temperature, among others — but have reached the point of diminishing returns¹.

Instead, they're now seeking to evolve the way its power is generated, stored, and consumed in an effort to balance power costs with reliability and resilience. On-site power generation is an increasingly popular initiative in response to government mandates and market realities.

- Some states mandate large data centers generate up to 90% of their energy from renewable sources by 2040⁴
- Hydrogen fuel cell costs have dropped by 75% since 2018⁵
- Fuel cell technology can make data centers 8-10 times more efficient⁶
- Leading cloud service providers aim to be carbon negative by 2030⁷

On-site power generation via gas-powered generators, solar arrays, or wind turbines at larger campuses will become more important as data centers look to unshackle themselves from the public grid in search of cost-effective and resilient alternatives. Meanwhile, lithium-ion batteries and other new forms of energy storage, combined with intelligent management tools, give data center operators a new set of tools to help improve data center performance.



4. Enhanced, built-in security

Data protection and security is a top priority for data center operators. More than 60% say it's the top challenge⁸, made only more challenging by the sudden and radical shift in remote work driven by COVID-19 that skyrocketed the instances of operating more infrastructure, in more places, and introduced a litany of new endpoints and systems to secure.

In response, data center operators are incorporating automated security solutions to their designs and construction in an effort to help standardize provisioning at scale, proactively assess and mitigate risk factors, and run regular security compliance audits with little or no intervention from IT teams.



5. High-fiber connectivity

Data centers are the central nervous systems of the connected world. And with 70% of data created outside data center walls by 2022⁹, data center developers are building bigger and faster networks with distributed compute capacity (edge) to move increasingly larger and heavier data sets around quickly without the need for specialized external storage systems.

Having access to robust networks of existing fiber networks is vital for keeping pace with the bandwidth and compute demands of modern enterprises, but some developers are also deploying their own fiber and subsea cables for even greater connectivity and employing software-defined networking (SDN) cloud connectivity to enable greater resource pooling, higher utilization, and improve network performance.

The data center industry continues to grow and evolve at a record pace and data center developers and operators are adopting en masse a range of new strategies, technologies, and philosophies to meet the demands of global business today and into the future.

⁴Heslin, Kevin. "10 Data Center Trends to Watch in 2020." Facilityexecutive.com. April 22, 2020.

⁵Nickelsburg, Monica. "Microsoft makes hydrogen fuel cell breakthrough in quest to power data centers with renewable energy." Geekwire.com. July 27, 2020.

⁶Jones, Mark. "Hydrogen fuel cells – the future of clean data centers?" TechHQ.com. July 31, 2020.

⁷Heslin, Kevin. "10 Data Center Trends to Watch in 2020." Facilityexecutive.com. April 22, 2020.

⁸"Voice of the Enterprise Digital Pulse Study 2019." 451research.com.

⁹Miller, Rich. "The Eight Trends That Will Shape the Data Center Industry in 2020." Datacenterfrontier.com. January 6, 2020.