

Reimagining Digital Infrastructure:

HOW HPC, AI AND COOLING INNOVATION
ARE REDEFINING THE DATA CENTRE

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AS HIGH-PERFORMANCE COMPUTING (HPC) AND ARTIFICIAL INTELLIGENCE (AI) ACCELERATE, DATA CENTRE DESIGN IS BEING PUSHED TO NEW LIMITS. GEOFF BUIDDINGTON, SVP, DATA CENTRE EMEA FOR NETCEED SHARES INSIGHTS ON WHAT THE NEXT GENERATION OF INFRASTRUCTURE DEMANDS—FROM POWER DENSITY AND COOLING TO AUTOMATION, SUSTAINABILITY AND THE ROAD TO QUANTUM COMPUTING.



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HOW DO YOU SEE HIGH-PERFORMANCE COMPUTING (HPC) AND ARTIFICIAL INTELLIGENCE (AI) TRANSFORMING DIGITAL INFRASTRUCTURE OVER THE NEXT FIVE YEARS?

HPC and AI are driving a fundamental redesign of data centre architecture. Traditional enterprise and hyperscale environments are no longer sufficient. We're now facing complete structural overhauls—from compute density to power delivery and thermal management. This shift is not incremental; it redefines how facilities are built and operated. The change has really taken off over the last five years and with HPC and AI forcing a complete overhaul of existing and paving the way for a new era of datacentres.

DO YOU THINK THAT THE EXISTING DATA CENTRES ARE GOING TO HAVE TO BE EITHER EXPANDED OR COMPLETELY RECONFIGURED ON THE INSIDE?

Both. While compute performance is increasing, the physical footprint of compute hardware is decreasing. However, this higher-density equipment introduces complex requirements for power and cooling that exceed traditional designs. As such, we anticipate a gradual scaling down of specific areas, while others expand to meet new infrastructure needs. A 60kW rack, for instance, carries far more thermal and electrical load than its predecessor—even in the same space. Existing data centres must be upgraded and restructured, while new builds require fresh architectural thinking to support both current HPC/AI workloads and the next wave of technological evolution.

WHICH TREND DO YOU THINK WILL HAVE A BIGGER IMPACT ON INFRASTRUCTURE DESIGN: THE RISE IN POWER DENSITY OR THE ADOPTION OF AI-DRIVEN MANAGEMENT?

These trends are linked and address different aspects of the infrastructure. AI is driving the generation of vast volumes of data, while power density is about the ability to process and store that data efficiently. The industry is moving

beyond merely storing data—data centres are now creators of data. This shift necessitates high-capacity, high-power racks, fundamentally altering rack design and deployment. For instance, a 60kW rack has a similar footprint to a traditional rack but demands a radically different structural and cooling design to manage the additional weight and power.

WHAT ARE THE BIGGEST INFRASTRUCTURE CHALLENGES TODAY WHEN TRYING TO SUPPORT 30-60KW+ RACKS?

The primary challenge lies in power delivery. Governments and utilities must adapt existing grid infrastructure to support these escalating demands. In regions such as the UK and across Europe, current infrastructure is already under considerable pressure, and this will only intensify as demand continues to grow.

HOW CAN THIS BE FUTURE-PROOFED?

That's what's caught everybody out. Recent government announcements said that they're going to focus on investment on data centres in the UK, but within hours there was a comment on the UK's power infrastructure not being able to compete. The good thing is that the different government bodies and the investment companies behind data centres are starting to understand that they must work together to execute a 5–10-year, 15–20-year strategy.

IS THE INDUSTRY DOING ENOUGH TO PREPARE FOR THESE CHALLENGES?

There's positive momentum. Governments, regulators, and investors are beginning to think in long-term horizons—five, ten, even twenty years. While the coordination is improving, infrastructure still needs to catch up to demand.

HOW ARE ORGANISATIONS ADAPTING THEIR COOLING STRATEGIES FOR MODERN HPC AND AI DEPLOYMENTS?

Cooling has evolved significantly. It began with conventional air conditioning, progressed to hot and cold aisle

containment, and then to rear-door heat exchangers (RDHX), which offered a more targeted and efficient cooling method. RDHX systems support sustainability by allowing higher compute densities without overhauling the entire infrastructure. The next phase includes on-chip cooling and waste heat reuse—for instance, repurposing expelled heat for residential or governmental heating purposes. The most transformative step is immersive cooling, which demands a complete redesign of the compute environment, from tanks and fluids to cable management and monitoring systems, representing a complete ecosystem change.

ARE TRADITIONAL AIR-COOLED DATA CENTRES BECOMING OBSOLETE?

Not obsolete, but limited. Air cooling still serves lower-density or legacy applications, but it struggles with scalability. For modern workloads, sustainable and high-efficiency cooling systems are the future. Rear-door heat exchangers (RDHX), which offered a more targeted and efficient cooling method. RDHX systems support sustainability by allowing higher compute densities without overhauling the entire infrastructure. The next phase includes on-chip cooling and waste heat reuse—for instance, repurposing expelled heat for residential or governmental heating purposes. The most transformative step is immersive cooling, which demands a complete redesign of the compute environment, from tanks and fluids to cable management and monitoring systems, representing a complete ecosystem change.

HOW FEASIBLE IS IT TO ACHIEVE A POWER USAGE EFFECTIVENESS (PUE) BELOW 1.2 WHEN SCALING AI AND HPC WORKLOADS?

Achieving sub-1.2 PUE is ambitious but possible with a comprehensive approach. This includes upgrading legacy technologies, managing oil containment systems and integrating the latest in cooling and power delivery. At Netceed, we offer end-to-end solutions—from connectivity and power to cooling and racks—because building high-performance facilities requires a holistic strategy. In many cases, constructing new facilities with state-of-the-art technology from day one is more efficient than retrofitting older ones.

FROM THE INDUSTRY

HOW DOES INCREASED AUTOMATION AFFECT SECURITY?

Automation reduces human error but shifts the security threat landscape. AI assists with real-time detection, but both cyber and physical security must be embedded into infrastructure from day one. Integrating security solutions at the infrastructure layer is becoming standard practice. These evolving threats necessitate integrated solutions that span both digital and physical domains. This will remain an area where more resources are required as threats become more sophisticated.

HOW DO YOU DESIGN INFRASTRUCTURE FOR UNKNOWN LIKE QUANTUM COMPUTING?

Data centres require a constant drive for improvement. Data centres need a refresh now every five years - it's a lot more frequent than the fibre optic industry - they're doing so much work in the improvement. The pace of change is eye-watering and it affects every aspect of this industry, so data centres are constantly changing. It's almost as bad as a Formula One car; the next race is almost a brand-new car comes out because that's what they've got to do to be the best of the best. As things develop, they always need more power, more cooling and smaller amounts of space; three aspects that are constantly changing, which obviously has a huge impact when you're a data centre owner.

IS INFRASTRUCTURE AS CODE (IAC) JUST HYPE?

It's essential. IaC introduces consistency, reduces human error and accelerates deployment. As systems grow more complex, the ability to manage them

programmatically becomes a differentiator. They offer consistency, speed and efficiency across infrastructure rollouts, making them essential to future-ready data centres.

WHAT MAKES NETCEED'S APPROACH DISTINCT IN THIS SPACE?

Netceed specialises in uptime-critical digital infrastructure. Unlike general logistics firms, its focus is on integrating best-in-class technology, managing delivery under pressure and keeping stock locally available for rapid deployment. That level of specialisation improves reliability and execution speed. Our team collaborates closely with manufacturers and integrates their technologies to deliver tailored, high-performance solutions for each customer's unique needs.

CAN YOU GIVE A PRACTICAL EXAMPLE OF THIS INTEGRATION IN ACTION?

We recently collaborated with a systems integrator to upgrade a colocation data centre hall to support significantly higher workloads. The project increased cabinet power from 10kW to over 50kW by transitioning from direct expansion (DX) cooling to chilled water systems. We installed new chillers and ran modular pipework beneath the raised floor. A CDU (Coolant Distribution Unit) was used to manage water flow and feed a retrofitted RDHX system. Additionally, we upgraded the PDUS to high-capacity, three-phase models to support the new power demands. The design maintained full N+1 redundancy throughout.

WHAT'S YOUR TOP ADVICE FOR CTOS PLANNING AI/HPC INFRASTRUCTURE?

Generally, understanding the environment of where the data centre is going to go, developing close ties with the local planning authority, the power infrastructure company and local government to ensure that you've got all of those key parts in play, because they are ones that are providing enough of a glide path so that together you're planning where your data centres are going to be for the next five to 10 years; it takes time to achieve that power.

One piece of advice is to focus on power delivery as the first element, and then sustainability to ensure that you can drive your efficiencies. After that, it's about your execution of the project management. Obviously selecting a very good supply chain partner like Netceed can significantly enhance your success.

WHAT EXCITES YOU MOST ABOUT THE FUTURE OF INFRASTRUCTURE?

The pace of change. Every month brings new innovations, each with the potential to transform industries. From media to medicine, infrastructure is becoming the backbone of progress—and building that foundation is a privilege. What energises us most is how these developments are already accelerating everyday work and opening up new possibilities for our customers and the industry.

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