DCS DATACENTRE SOLUTIONS

DEVELOPING DIGITAL INFRASTRUCTURE IN A HYBRID WORLD

SPECIAL EDITION

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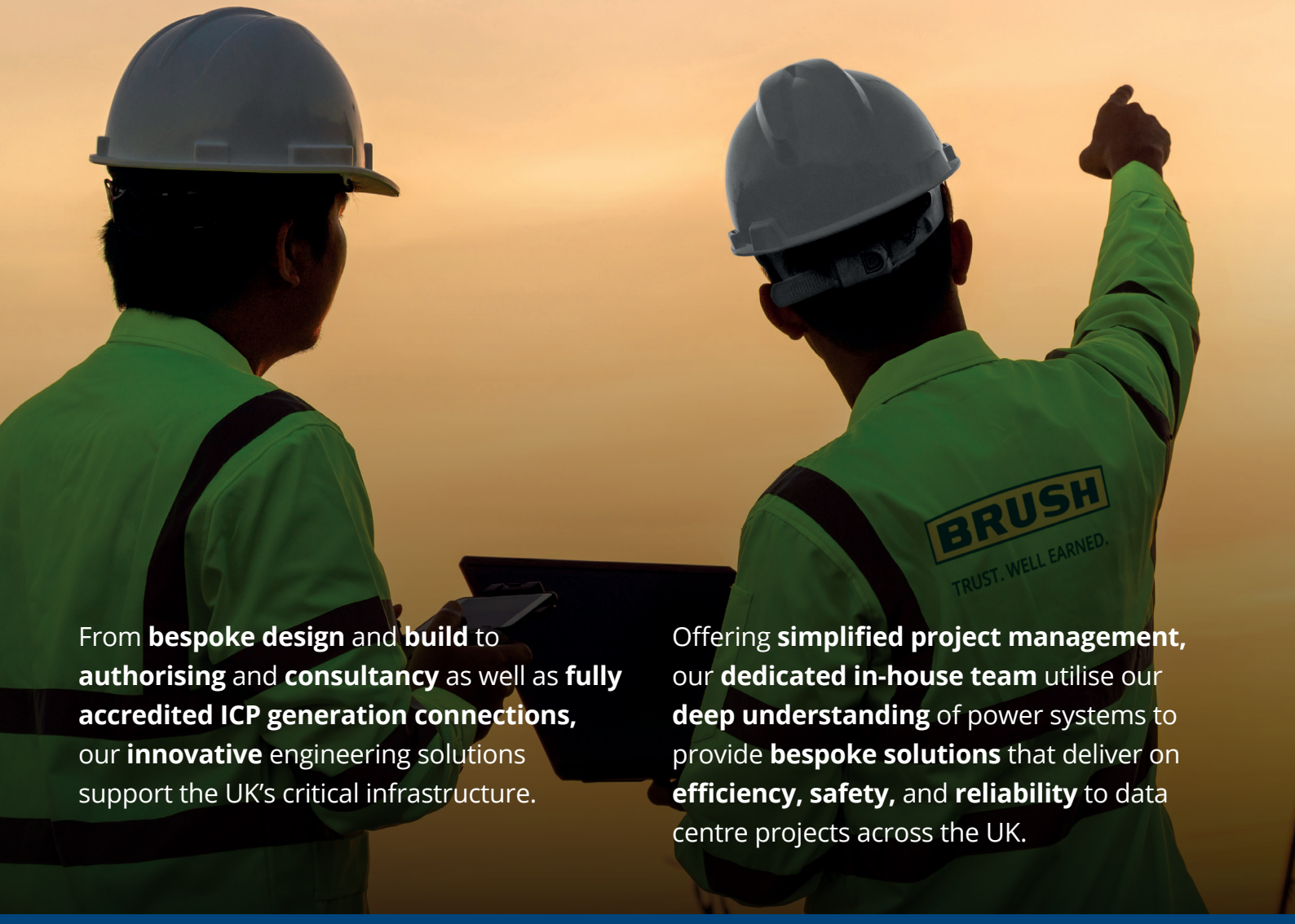

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VIEWPOINT

BY PHIL ALSOP, EDITOR

AI or sustainability – time to choose?

I AM fairly sure that much of the IT industry, and, indeed, the wider world, has already made its decision on this one. AI and all things digital are to be embraced and sustainability must not be allowed to disturb this brave new world – that seems to be the increasingly strong direction of travel. Just as well as, despite the significant progress made by the data centre industry when it comes to sustainability over the past few years, the predicted AI explosion, alongside ever-expanding digital consumption, means that global power consumption is going to increase massively over the next few years. A slightly embarrassing future if sustainability really is the number one objective.

There is to be no environmental revolution – at least not just yet – rather a continued, steady focus on energy efficiency, no matter how much extra energy is going to be consumed over the next few decades. Of course, renewable energy resources, electrification and other 'green' developments (carbon capture anyone?!) will play an increasingly important role in the AI-driven digital world, but there is to be no slowing down of consumption – and without such a shift in focus, there will continue to be a not so gradual depletion of the planet's finite resources and likely increased climate volatility.

There are entertaining conversations to be had as to how many ways and by how much AI can help reduce corporate and private carbon footprints. But building more, ever larger data centres to house the ever-higher density computers demanded by AI and the quantum computing that follows seems to be at odds with any credible sustainability agenda. In the same way that there is a major resetting of global geopolitics right now, with 80 years of received wisdom heading for the waste pile (maybe to be recycled at some stage in the future?!), perhaps it is time to accept a new truth when it comes to AI and sustainability? No longer the need to pretend that AI and sustainability are compatible. Instead, an acceptance that AI and digitalisation are the number one priority, and sustainability must know its place in such a new world order.

Of course, energy efficiency will continue to be a major focus for the data centre sector – after all, it makes complete financial success. However, those individuals who somehow imagined that, faced with a choice of a more digital or a more sustainable world, the planet's future would take priority for governments and businesses alike, are destined for disappointment.

This new normal is great news for the data centre industry. It can continue to innovate, continue to underpin AI and digital activities and all without any Jiminy Cricket-like character asking any potentially awkward questions.

I hope you enjoy the articles in the Best of DCS magazine. They are proof that, no matter the actual priorities when it comes to the twin drivers of AI and sustainability, both are fantastic catalysts for data centre technology innovation.

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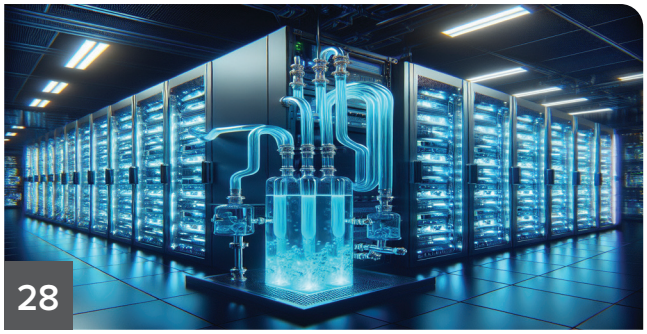

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Don’t be afraid of AI

AI has arrived. I’ve heard rumours that it’s already learned the whole of internet, twice. Eventually, we won’t talk about AI as a separate entity but it will become integrated with everything we touch and use.

BY JOHN KREYLING, MANAGING DIRECTOR, CENTIEL UK

A STUDY by Amazon Web Services (AWS) researchers suggests 57% of content published online is already AI-generated or translated using an AI algorithm (via Forbes). Ultimately, it seems likely that we may need AI to fight AI, with banking checks powered by AI to check against AI fraud, as an obvious example.

There is much consumer fear around the introduction of machine learning. Yes, it is undoubtedly an exciting development and offers huge potential in areas such as medical advancement, however, the practicalities of integration, for some, is truly terrifying. Partly this fear is driven by the unknown.

One thing we do know is that AI requires significantly more computing power and therefore energy. For example, it has been estimated that a voice AI internet search takes up ten times more computing power than a normal query and this has knock on effects in terms of energy use and data.

To quantify this further, the International Energy Agency has stated that data centres currently use about 1% of the global electricity demand.

However, McKinsey estimated Why invest in the data center economy McKinsey that by 2030, data centres’ power consumption will almost double and is expected to reach 35 gigawatts of power consumption annually, up from 17 gigawatts in 2022.

However, we must not fear AI. It’s here to stay. Instead we need to adapt and learn to live with it, and quickly. This means that everyone must play their part from the legislators introducing new laws about issues such as power consumption and even copyright, to those supplying the infrastructure within our burgeoning data centre industry.

We all need to be flexible enough to cope with whatever the AI future will throw at us. However, a little like climate change, we must think of the future but we also need to protect ourselves in the here and now, because change is already happening and is putting pressure on Grid stability as well as infrastructure design changes to accommodate AI. Protecting Critical Power Infrastructure with a UPS is more vital than ever.

From a data centre perspective, protecting power is critical and currently, 99% of the power required

for data centres is unrelated to AI's power-hungry model, for now. In five years' time, data centres will need to scale their UPS solutions and manage their energy storage far better than they do today. So how do we deal with the present day and keep an eye on AI's rapidly evolving future?

Flexibility is key

Data centres are already gearing up to match the increased demand for data. However, no-one can quantify the anticipated size of that demand. I believe underutilized data centres do offer an opportunity to absorb some AI. However, data centres need to embrace this. Currently, everyone is still learning, and AI is being kept in separate data halls but this will change as it becomes more integrated into everything we do.

We don't know what a data centre will look like in 30 years and so flexibility is key. Facilities need to look for solutions which will allow them to scale as needs change but also minimise the cost of investment while the future size of the load is unclear.

Active management

It has been estimated that AI learning requires three times the electricity needed by normal servers and this is set to have a greater impact in the future. Facilities will need to be better at managing energy consumption to become more efficient, so our electrical infrastructure can cope with the dramatically increased energy demands of AI.

Currently, in Ireland for example, data centres are now responsible for a colossal 18% of all electricity use (Central Statistics Office, May 23). In Dublin, new datacentre builds have been banned so they can ensure there is still sufficient power for homes. We have no choice but to manage energy better and look at alternatives.

Simple measures that can be implemented include locating UPS batteries away from any heat source in their own dedicated environment, resulting in a reduction in cooling requirements. Or, consideration given to using alternative battery technology which require less space and can run optimally at much higher temperatures.

Right sizing the UPS is also important. For example: you may have multiple UPS supporting a much smaller load than intended at design stage, so switching off UPS modules that are not required will have a positive effect on efficiency use. There is a nervousness around switching off systems. However, as long as the required resilience level is maintained the positives outweigh the negatives.

To enhance efficiency, some datacentres with a resilience level of N+N and above manage their UPS systems by utilising both economy (eco) mode and true online double conversion (inverter) mode. It may be the case that the A feed (N) will be fed via the inverter and the B feed will run in eco mode. The latest technology offers 97.1% efficiency in normal operation, switching to eco will increase to 99% allowing the data centre to save circa 2% in losses. Over time, this adds up and for anyone running legacy UPS systems with efficiencies as low as 85%, the savings will be much greater. Sometimes this can be perceived as a risk as eco mode is effectively raw mains, but if the mains goes out of tolerance the transfer back to inverter is instantaneous and seamless. This is a good option for datacentres with a minimum resilience level of N+N.

As we can see, there are numerous ways to make an immediate impact on reducing power usage. Getting the right advice and learning how to harvest the information from the UPS means that informed decisions can be made. The overall result is savings on energy and operating costs.

Harnessing and storing energy

In the future we believe UPS will offer a far greater opportunity to help facilities manage energy better. With its associated batteries, a UPS can potentially be used as a micro-grid or energy hub to offset energy use at times of peak demand.

It could also be used as an interface to accept alternative sources of renewable energy which could contribute back to the grid. Energy companies realise how much power data centres use and so are likely to introduce incentives for facilities who can contribute to supporting the grid.

Renewable energy will be useful to re-charge battery banks and this energy used to take the peak off the grid energy demand. We have worked on numerous projects which allow UPS to take advantage of such peak shaving functionality. There is also an opportunity where the UPS could enable energy to be sent back to the grid simultaneously as accepting energy from renewables while supporting the load. The grid, batteries and renewables will need to work together to satisfy and offset future demand.

AI offers the potential for great technological advancement. AI may be good for business and create jobs in the data centre market. However, we need to collaborate now to solve the immediate challenges it brings in relation to energy use and management. One day we can ask the AI to solve these issues, but we are not there yet.

In the meantime, don't be afraid of AI. Protect your critical power now and be ready for the future with a UPS system with a long design life, which is flexible, scalable and adaptable to integrate with different energy management protocols and future ready to accept alternative energy sources.

For further information about Centiel's flexible, future-ready UPS products, please visit: centiel.com

Navigating power demand in the age of AI

As the world increasingly relies on digital services and AI, data centres face a growing problem in terms of power demand. ABB explores what data centre professionals can do to meet surging demand, while staying competitive and meeting their sustainability goals.

DANEL TURK, DATA CENTRES PORTFOLIO MANAGER AT ABB

THE CONTINUOUS GROWTH of AI services since the launch of ChatGPT in 2022 means that data centre power demands will continue to rise. In fact, the International Energy Agency's (IEA) Electricity 2024 report predicted that global data centre electricity use could double by 2026, reaching 1000 terawatt-hours (TWh) – that's equivalent to the annual electricity consumption of Japan.

So, data centre professionals face several challenges when looking to meet that demand in a cost-effective, sustainable way. Here are a few considerations.

Think modular

If you're building or enlarging a data centre, take advantage of a modular approach. Modularity offers a way of scaling sustainably in a way that meets the demand for power and availability while simplifying the specification and installation process.

Rather than constructing or expanding a data centre all at once, you can build it up in blocks. As an example, you can build a projected 200-megawatt (MW) data centre in 20 MW sections – onboarding customers as demand increases. That makes it more cost-effective because it avoids wasted capacity along the way.

It's also an approach that minimises downtime and risk, especially with prefabricated solutions – like skids and eHouses – that are ready for quick and easy installation as they are constructed off-site and then factory-tested before delivery. Besides, buying one prefabricated product instead of a range of individual components that require assembly saves money and time. This approach is favoured by local utilities and governments too, with the smaller incremental growth of a data centre more likely to be approved than the full-scale build of a new one.

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Consider shifting to medium voltage

Medium-voltage (MV) equipment has become increasingly viable and cost-effective especially in the case of rising power demand.

MV UPSs, for example, can be installed modularly. As an example, ten 2.5 MW UPS blocks can be wired in parallel to create a 25 MW system. This enables faster deployment and increases overall system capacity without any additional complexity. It also avoids the challenge of having multiple LV UPSs that need to be regularly maintained and serviced. In addition, the lower currents at MV level mean cables can have a smaller cross-section, leading to additional savings.

Furthermore, MV UPSs are often more energy efficient than their low-voltage (LV) counterparts, and can provide power protection for the entire data centre, not just the server racks. So, switching to MV can offer long-term cost savings.

Be more sustainable with BESS

Meeting sustainability goals is a challenge for data centre operators when it comes to the increase in power demand.
One solution is using battery energy storage systems (BESS) to reduce reliance on diesel gensets as they can integrate renewables, like wind and solar energy, into the local energy mix. By using a BESS, excess energy from solar panels on the roof can be stored and used at another time, optimising renewables usage. Using BESS can also provide load shifting and frequency response services to the grid, further aiding negotiations with the local utility, and creating potential new revenue streams via give-back schemes during peak demand.

First, though, it's important to plan carefully and consider what your energy demands are to avoid over-specifying – after all, specifying for five hours of uptime would require a lot of batteries.

Make use of AI

The onward development of AI might be driving the increase in power demand, but it can also help to make data centres more reliable and efficient.

This could happen through optimised cooling, predictive condition-based maintenance, data access and transfer, and demand balancing.

The key to this is connectivity. An automation system running an AI suite can keep track of the hundreds of thousands of monitoring points deployed in a typical mid-to-large data centre. This provides operators a 360 overview of the data centre's performance, energy use and asset health at any given point.

This data can then be used to make efficiency improvements. Take the example of a cooling system. While the upstream chiller and the distribution system are often viewed separately – leading to operational inefficiencies when attempts are made to make it more efficient – an automation system lets operators see holistically how one part affects the other. As a result, operators can make more informed decisions to improve overall efficiency.

Invest in SF6-free equipment

Moving to SF6-free equipment now will ensure that you're prepared for incoming regulations on the use of electrical equipment which contains the insulating gas. This will make your sustainability reporting easier. Regulations have been proposed because SF6 can leak to the atmosphere, where it has a global warming potential around 25,000 times greater than CO_2.

Adopt a TCO mindset

When considering how to grow efficiently and sustainably, data centre managers need to adopt a total cost of ownership (TCO) mindset.
This involves calculating and assessing all the direct and indirect costs of an asset over its entire lifecycle to determine its cost, as opposed to a more traditional view of separating capital and operational expenditure. By viewing expenditure with a TCO mindset, future operating cost savings are seen as net present value.

A simple way of looking at this is where you have a machine that will be running continuously for around 20 years; by investing in a more energy efficient model now, you will see significant cost and emission savings over the long term.

Power demands might be growing as AI and digital services expand exponentially, but data centre managers and operators can meet these challenges with the right strategies in place. While these challenges will become more urgent as demand increases, acting now, with a TCO mindset, will help to ensure data centres continue to make a positive impact.

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How eCommerce and fintech firms are leveraging the transformative power of AI-enabled data centres

Andy Connor, EMEA Channel Director at Subzero Engineering, examines the impact AI, blockchain and process automation is having on the eCommerce and fintech sectors.

THE FINTECH and eCommerce sectors are booming. By 2026, the global eCommerce market is expected to be worth more than $8.1 trillion1 annually. Meanwhile a recent study by McKinsey revealed there are now more than 272 fintech unicorns, with a combined market cap of $936 billion – a sevenfold increase in just five years.

Technologies such as artificial intelligence (AI), blockchain and process automation remain critical to sustaining this growth, with companies such as NVIDIA turning to GPU-powered servers to overcome the limitations of conventional data centre infrastructure.

Designed originally to accelerate computer graphics and image processing, GPUs perform complex three-dimensional vector calculations, enabling them to perform multiple operations simultaneously.

Making sense of vast amounts of data

This ability to multitask on a huge scale makes GPUs an ideal tool for managing and analysing vast volumes of data. For example, GPUs, can process neural network training data up to 250 times faster than conventional CPUs. They can also do the job more accurately, making them particularly well suited to high-quality data-driven decision making. For example, credit specialist Capital One uses a suite of GPU-optimised data libraries to accelerate its data science and analytics pipelines. The firm has not only achieved a 100-fold increase in data model training times, it has also reduced its costs by nearly 98%2.

This uptick in processing power means forward-thinking firms now have an opportunity to explore data models faster and with greater confidence. They can also do so in a more cost-effective and energy-efficient manner, and with a faster time to ROI.

Automating and improving processes in financial services

Financial services firms are among those with the most to gain from the huge potential of GPU-powered AI, and many companies are already leveraging this technology to automate and improve mission-critical processes. These use cases include.

- **Algorithmic trading:** analysing historical market and stock data to generate investment strategies, build portfolios and automatically buy and sell investments. Established banks which have developed algorithmic trading strategies include BMP Paribas, Deutsche Bank and Credit Suisse.
- **Detecting fraud:** combatting the most sophisticated types of transaction and identity fraud, increasing fraud detection accuracy, and boosting anti-money laundering and know-your-customer regulation. American Express, BNY Mellon and PayPal are already using a form of AI called natural language processing (NLP) to detect and prevent financial fraud.
- **Accelerating payments:** Fintech payment firms such as PayPal are using machine learning to improve payment authorization rates on their platforms. One way it does this is by predicting

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and efficiently managing instances where a bank could decline a payment.

Achieving competitive advantage in eCommerce
eCommerce companies are also waking up to the power of AI, using the technology in innovative ways to achieve competitive advantage. Among some of the innovative use cases in the eCommerce sector include:

- **Predicting and managing customer churn:** AI can analyse customer behaviour and identify which customers are most likely to make repeat purchases This enables sales and marketing teams to target and better allocate resources to more profitable customers.
- **Dynamic pricing:** eCommerce giants such as Amazon and eBay are long-term advocates of AI-powered dynamic pricing. They use the technology to analyse market demand, competitor pricing and other factors so they can adjust their prices in response.
- **Enabling visual and voice search techniques:** Retailers such as ASOS, Forever 21 and Home Depot are using AI to free their customers from their keyboards, find the products they really want and accelerate their path to purchase.

It's interesting to note that financial services and ecommerce, as well as many other sectors, are exploring how AI can drastically improve online customer interactions. Thanks to generative AI (GenAI), clunky chatbots will soon be a thing of the past. Instead, GenAI-powered solutions are particularly good at finding the best answers to customer questions and sharing that information in a human-like way. Deutsche Bank, American Express and Wells Fargo are among the banks that are starting to go live with such GenAI-powered solutions.

Using AI to optimise the data centre

There is clearly huge scope for using GPU-powered AI to improve products and services within the eCommerce and financial services sectors, but the benefits don't end there. The technology is also transforming how data centres critical to these sectors are managed and optimized, how uptime is ensured, and higher levels of sustainability are achieved.

AI is not only helping data centre managers identify, troubleshoot and mitigate outages in a reactive way, it is also automating this process, predicting faults and triggering self-healing mechanisms. For instance, AI can be trained to identify unusually slow traffic within a particular node, and then re-boot a process or the entire node fix the issue. Other tasks such as energy management (including cooling and power management), inventory management and systems update management can also be automated in a similar way using AI.

AI is also being used to boost data centre visibility and decision making, helping managers to identify opportunities to optimize resource allocation and improve both workload management and capacity planning. Such processes can reveal golden opportunities to right-size data centre infrastructure, cut power consumption and reduce environmental impact.

Research by Schroders3 suggests that AI-related data centre power consumption is likely to increase sevenfold to 7GW by 2026. However, this spike in energy consumption and associated carbon emissions can be reduced, at least in part, through the careful use of GPUs. That's because GPUs are more powerful, fewer servers are needed, and data centre physical footprint and cooling requirements are reduced.

Simplifying and accelerating financial transactions with blockchain

Blockchain is another GPU-reliant technology helping to disrupt both the financial services and ecommerce sectors. Fintech firms such as OpenZeppelin are harnessing the power of smart contracts to simplify complex financial transactions. Smart contracts, which are powered by blockchain, automatically execute when certain conditions are met. They remove layers of intermediaries, reduce cost, and speed up contract execution. For example, a smart contract can be programmed to make a payment when a product or service has been successfully delivered.

Meanwhile Ripple, one of the best-known blockchain-based payment systems, enables banks, corporations and crypto exchanges to transfer money without the need for a third-party processor. The firm's solution has made cross-border payments significantly easier, faster, cheaper and more secure.
The data centre as the backbone of innovation
As transformative technologies such as AI and blockchain continue to evolve and become more integral to the success of the fintech and eCommerce sectors, the role of data centres becomes increasingly critical.

Data centres equipped with GPUs deliver the necessary computational power that AI applications require. As we continue to push the boundaries of what AI can achieve, the role of data centres will only grow in importance. They are not just a supporting infrastructure, but a vital component in the journey towards a more AI-driven future.

FURTHER READING / REFERENCE

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Embracing prefabricated modular data centres for scalable growth

Prefabricated modular data centres have emerged as a powerful solution in the digital age, offering unparalleled benefits for rapid and scalable growth in the data centre industry.

BY ALEX BREW, REGIONAL DIRECTOR, NORTHERN EUROPE AT VERTIV

BOOSTED BY the rise of artificial intelligence (AI), the digital era is ushering in a new age of technological advancements and unprecedented demand for data processing and storage. In this rapidly evolving landscape, data centres play a pivotal role as the nerve centres of our interconnected world. To meet the evolving needs of hyperscalers, enterprises and digital services, data centres are undergoing a transformative shift towards optimising efficiency and adaptability in both construction and operation.

One key driving force behind this transformation is the widespread adoption of prefabricated modular data centres. These innovative solutions offer a host of benefits, revolutionising the way data centres are designed, built and operated.

The power of this approach

Prefabricated modular data centres, commonly referred to as PFM data centres or integrated solutions, offer a multitude of advantages that revolutionise the way we approach data centre infrastructure. These benefits extend across various aspects of design, construction, performance, and geographic deployment.

One of the most prominent advantages of PFM data centres lies in their ability to expedite the design and deployment process. This is achieved through a unique prefabrication process, involving the off-site manufacturing and assembly of capacity units. Unlike conventional on-site construction, this approach allows for parallel activities, making it significantly more efficient. As a result, these modular data centres can be designed, tested and made operational in a remarkably shorter time frame compared to traditional construction methods. This rapid design capability is crucial in addressing the pressing need for data centre capacity, especially in the face of unpredictable and growing demand.

Furthermore, the modular nature of these data centres allows for a more agile response to demand. Instead of planning for unforeseen growth, organisations can build capacity to precisely match their current requirements. The modular approach enables them to scale their data centre infrastructure in a modular fashion, effectively aligning capacity with business demand. This minimises the risks associated with either overbuilding or underbuilding, ensuring a more efficient allocation of resources.

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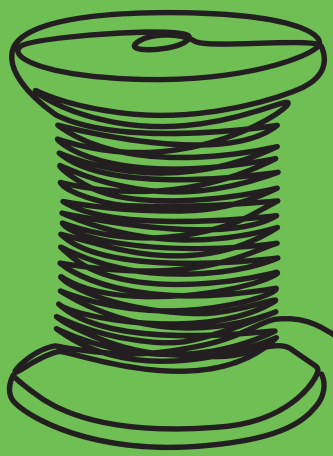

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Another notable benefit of is the optimisation of component performance within a holistic system. These data centres take an integrated approach, enhancing the performance and efficiency of individual components by tightly integrating various systems, including power, thermal management, and IT components. By designing, configuring, and fabricating these components off-site, they work seamlessly together, contributing to the reliability and overall performance of the data centre.

Quality control is a crucial aspect of data centre construction, and prefabricated data centres excel in this area. The manufacturing and assembly of units in controlled environments result in higher quality controls. This not only increases the reliability of the components but also extends the geographic reach of data centre deployment. Prefabricated units can be transported and assembled in various locations, even in regions where traditional construction methods might face challenges. This flexibility in deployment enhances the adaptability and scalability of prefabricated modular data centres.

Delving into the distinction between standardisation and localisation

While the approach of standardisation is widely recognised for its role in streamlining and enhancing data centre deployment, it is essential to appreciate the subtle yet significant disparities between standardisation and localisation. These two methodologies each bring their own set of considerations and implications to the table.

Standardisation is rooted in the principles of uniformity and consistency. It involves the adoption of pre-established designs, components, and practices that are designed for replication across diverse deployments. Embracing standardisation empowers data centre operators to swiftly deliver a consistent and seamless experience in terms of infrastructure, functionality, and operational procedures. This approach not only facilitates the harmonious integration with existing systems but also paves the way for efficient scalability.

Conversely, localisation places a strong emphasis on customisation and adaptability to meet regional requirements and preferences. This approach is particularly pertinent in regions where regulations exhibit significant variations. It acknowledges that different geographical locations may be subject to distinct building codes, regulations, standards, and environmental considerations that wield a substantial influence over data centre operations.

Unlocking long-term success

So, while there are certainly subtleties to consider, as evidenced by the difference between standardisation and localisation, we can clearly see that as the data centre industry continues to evolve, the benefits of prefabricated modular data centres become increasingly evident. Accelerated deployment timelines, reduced costs, improved operational efficiency, compliance with regional requirements all contribute to the long-term success and establishment of this trend.

Prefabricated modular data centres have emerged as a powerful solution in the digital age, offering unparalleled benefits for rapid and scalable growth in the data centre industry. By embracing prefabricated modular data centres, or standardised elements of the approach, companies can harness their potential to unlock new opportunities, enable efficient and reliable data processing and storage, and drive economic growth.

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Data centres and augmented reality:
a blueprint for industry transformation

The days of physically configuring server rooms filled with cryptic codes and blinking lights are becoming a thing of the past as Augmented Reality (AR) begins to make its mark on the data centre sector. This transformative technology is taking root at the beating heart of the digital world, completely revamping data centre operations.

BY JAB JEBRA, PRESIDENT AND CEO OF HYPERVIEW

THIS IS NOT MERELY a glimpse into the future, but a tangible revolution reshaping the present, and we are only just witnessing the beginning of how AR will transform business operations across all sectors. According to a McKinsey report, 2.7 billion deskless workers, representing roughly 80% of the global workforce, could become the primary users of immersive reality technology. This potential isn't just confined to distant possibilities, it's unfolding right now, with data centres creating the blueprint for other industries.

AR is not just streamlining data centre operations, but it also emerging as a powerful force in driving sustainability initiatives for organisations. With the infusion of AR in business, we may be looking at a world where most business travel comes to an end. AR is proving to be a secret weapon that propels us towards a reality where business operations are more efficient, more sustainable, and more responsible.

The infusion of AR and Data Centres

But first, the marriage between AR with Data Center Infrastructure Management (DCIM) starts with identifying the need for AR in data centre operations. The next step involves selecting compatible AR and DCIM platforms and connecting

them, usually via APIs. AR models of the data centre infrastructure are then developed and overlaid onto the physical world when viewed through an AR device. The integration is tested for accuracy, and data centre staff are trained on how to use the new system. The final step involves continuous monitoring and improvement of the AR system to ensure its effectiveness and efficiency in managing operations.

AR lets users explore a digital twin of the entire data centre. Conveniently scan QR code, bar codes and tags with a glance, conduct audits and inspections remotely, collaborate with experts worldwide – all while troubleshooting issues swiftly. Downtime, a data centre's worst nightmare, and typically caused by human error, is drastically reduced. Faster problem-solving and preventative maintenance minimise the risk and duration of outages, ensuring smooth operation and satisfied customers.

Without physically being there, AR enables data centre operators to monitor server health, temperature, and energy usage, among other critical metrics. This enhanced visibility is a game-changer for decision-making processes, with operators able to make informed decisions based on real-time data, rather than relying on periodic reports or manual checks.

Imagine a technician facing a massive server rack. No longer just metal and wires, the equipment comes alive with real-time information floating within view due to an AR headset. Data flows and energy usage are visualised, helping identify areas for optimisation.

In essence, AR empowers data centres with unprecedented visibility and control. It bridges the physical and digital worlds, providing technicians with the information they need, exactly where they need it. Ultimately, this leads to improved decision-making, faster problem-solving, increased operational efficiency, and reduced downtime, all of which are crucial for the success and competitiveness of data centres in today's digital age.

Sustainability: A shared responsibility

Beyond purely operational benefits, AR also plays an important role in driving sustainability efforts within data centres. As environmental consciousness is on the minds of business and society as a whole, data centres are embracing this technology to help reduce their environmental impact.

For example, business travel is important for employees so that they can have visibility of their operational hardware, but on the flip side, business travel is proving a major detriment to the future of our planet. According to the IEA, air travel from business trips contributes about 2% of the world's harmful emissions. This is where AR can help. Remote monitoring and troubleshooting made possible by AR dramatically lessen the need for on-site visits. This translates directly to a smaller carbon footprint as emissions tied to travel are reduced.

This use of AR in data centres provides a blueprint for other industries to follow suit to strive for a greener future, especially when it comes to reducing travel. It's a solution that is universally applicable, given that business travel is a staple for most companies—whether for hosting crucial meetings in distant locales or necessitating in-person inspections and audits—its applicability spans across all sectors.

Furthermore, the insights gained through AR data play an important role in identifying energy inefficiencies within the data centre. This information allows operators to optimise operations and reduce energy consumption, making the data centre a more sustainable and responsible part of our digital infrastructure.

In short, AR encourages remote collaboration and virtual experiences, providing a green solution for many industries. It leads the way to a future with less unnecessary travel and more energy efficiency, where business and sustainability work hard in hand.

Time to turn the tide with AR

Looking ahead, integrating Augmented Reality (AR) is set to become a cornerstone of successful business operations across numerous industries. Data centres that are adopting AR, serve as a compelling blueprint for other sectors. By embracing this transformative technology, businesses can reimagine their operational efficiency and contribute to a more sustainable and responsible future.

The time for cautious observation has passed. AR adoption as a companion to DCIM is no longer a question of "if" but "when." Businesses that fail to embrace AR risk being left behind as their competitors reap the benefits of increased efficiency, improved decision-making, and a more sustainable future.

How must data centres evolve to meet AI workloads?

Artificial Intelligence (AI) and Machine Learning (ML) are becoming mainstream and they can't be avoided or ignored. This is having a knock-on effect on the infrastructure that powers our lives as these technologies will only work if there are powerful computers that can process millions of data points every single second. As a result, the growth of AI and ML, along with the continuing increase in cloud and enterprise workloads, means that the need for computing power is also growing - and the most efficient way to achieve computing power at scale is in data centres.

BY DARREN WATKINS, CHIEF REVENUE OFFICER AT VIRTUS DATA CENTRES

DEMAND for data centre space has been growing at an exponential rate for decades, driven by the digital economy. However, the overlay of AI and ML deployments are increasing demand further and faster across the world. Statista predicts that the data centre market will reach US$349.20bn in 2024, growing to US4438.70bn by 2028, causing data centre providers to re-evaluate their strategies.

Traditionally the backbone of many technological advancements, as computing power is the fuel of our technologically advanced society, data centres are now faced with the imperative to be more than infrastructure providers. They have a new critical challenge where they need to provide more than the essential network and infrastructure supporting data storage, management and cloud services in an always-on manner.

The rapid growth of AI and ML means that data centres need to be to be even more agile, innovative and collaborative to power this new era. This includes managing sustainable power at scale and implementing designs that support rapid and scaleable AI deployments, whilst consciously aligning with values that benefit the data centre provider, the customer and wider society responsibilities.

Location: where to build?

Many existing European hyperscale facilities simply aren't capable of meeting the short-term future demands of AI and there is a shortage of the right type of supply i.e. large scale facilities with renewable energy close to, but not in, a major European metropolitan city. So where can data centres be built to accommodate this growing demand for computing power?

Over the past few years, location has been a very specific, deliberate choice as the technological landscape was meticulously mapped to minimise latency. Today, with power constrained central metropolitan areas and the integration of AI and ML workloads which are less latency sensitive, are orchestrating a shift in priorities. These advanced AI workloads challenge the traditional principles that often dictated optimal data centre locations. The result is a profound reconsideration of what defines an ideal site, and new locations are opening up as potential locations for data centres.

This shift isn't about lessening the importance of low latency - it's about recognising the evolving needs of integrating AI and ML. The move towards larger campuses is a calculated strategy that acknowledges the non-linear cost relationship inherent in these operations; larger megascale campuses capable of 200-500MWs can often afford providers - and therefore customers - greater efficiencies. This bold step challenges the long-standing industry norm, presenting a compelling argument that prioritising sheer scale over proximity and access to renewable energy can yield more efficient and sustainable outcomes.

Sustainability is even more important

While some may consider access to power, water and connectivity traditional requirements, from a customer's perspective that will remain unchanged. However, for data centre providers, with the increase in computing power required to enable AI and ML workloads, comes an increase in the power needed to operate facilities.

Worldwide, data centres consume about 200 terawatt hours of power per year - more than some countries. And the forecast is for significant growth over the next decade, with some predicting that by 2030, computing and communications technology will consume between eight percent and 20 percent of the world's electricity, with data centres accounting for a third of that. This requires the technology industry and data centre providers to be even more innovative to lower Power Usage Effectiveness (PUE) and Water Usage Effectiveness (WUE) and in turn reduce their reliance on diesel generators.

Power must come from a renewable source and be used efficiently, and this means the facility must be designed to be as efficient and sustainable as possible. Sourcing only 100% renewable energy and contracting with Power Purchase Agreements (PPAs) to use dedicated solar and wind farms to power data centres are all critical initiatives which the most sustainable data centre providers are embracing. In some countries like Germany there are laws regarding the power usage effectiveness (PUE) of data centres to drive responsible behaviour.

With regards to cooling, unfortunately it is impossible to beat the laws of thermodynamics; heat generated by the computer systems still needs to be removed from a facility using power. However, there are methods that are more efficient than others; for example, removing the heat direct from the chip involves liquid and not air – and it requires design changes to the infrastructure to enable this. Another alternative is immersion cooling which is generally more suited to a bare-metal solution.

Reuse of waste heat has been in the headlines recently and is another way to achieve PUE. It's an interesting discussion as traditional data centres do not produce heat of a high enough grade to be very useful. However, higher density solutions to support the new AI / ML workloads will provide useful heat and, in some countries legislation is being introduced into municipalities to ensure they invest in the capability to reuse waste heat.

In this new era the industry is also placing an unprecedented emphasis on the benefits a data centre can bring to the local community beyond waste heat reuse. This includes striving to build facilities that are harmonious with the local environment, reducing the negative aesthetics of data centre buildings, providing local employment and potential upgrades to the local infrastructure.

The spotlight on sustainability is not just a buzzword but a strategic acknowledgment that data centres, powered by renewable energy, are integral to a future where efficiency and environmental consciousness go hand in hand. The technology industry and data centres must demonstrate a real commitment to sustainability and recognise the crucial role energy efficiency plays in the ongoing transformation of data centre operations. And the move towards larger campuses needs to align seamlessly with the imperative to reduce environmental impact.

It is clear that the data centre landscape is undergoing a profound evolution. The integration of AI and ML workloads, the redefinition of scalability, and the strategic development of AI ready megascale campuses collectively mark a new chapter in the story of data centres. This is not merely about keeping up with demand; it's about steering a course towards a data-driven future that is as dynamic as it is sustainable.

Preparing data centres for a much cooler, more fluid future as AI advances

Data centre operators know they must constantly adapt to the changing needs of their clients. With the relentless advance of AI applications, the demand for high-capacity computing is set to grow significantly. The high processing speeds and energy demands of this technology present increased pressure on cooling systems, necessitating new, more robust approaches.

BY OZGUR DUZGUNOGLU, DESIGN AND ENGINEERING DIRECTOR, TELEHOUSE EUROPE

MOST SENIOR PEOPLE within the IT world, regardless of industry, know compute requirements are set to increase substantially as AI and edge computing gain greater adoption. Recent Telehouse research revealed that 89% of IT decision-makers anticipate they will need high-performance, high-density computing systems by 2030. AI workloads are not currently large but could expand quickly, requiring low latency, high-bandwidth connectivity from data centres.

From the outset, data centres have always incorporated cooling mechanisms. Traditionally, the favoured technique has been air cooling, a method that relies on the simple physics of circulating cold air around operational hardware to mitigate the heat produced. But the modern workloads we witness, particularly those spearheaded by AI, are stretching the capacities of air cooling to their very limits.

With natural boundaries to heat transfer capabilities, air cooling technology could hinder the rollout of newer, more energy-intensive, heat-generating services to meet the new demand. This could cap the total volume of AI workloads a data centre can handle unless there is a change to a more efficient cooling technology. This is where liquid cooling technology comes into play.

The inherent limitations of air cooling systems in terms of heat transfer efficiency pose significant challenges. As we look to the near-future, ever-increasing computing power is likely to side-line air cooling. Operators will need to think very seriously about liquid cooling technology.

Although the current demand for liquid cooling remains low & steadyit is poised to assume a central role in the future of digital infrastructure.

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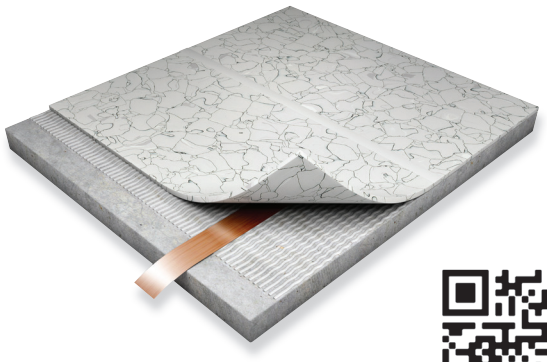

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With intensifying pressure for cooling systems to be sustainable and eco-friendly, liquid cooling is on the brink of becoming the industry standard. Data centre providers need to ready themselves now for what is an impending shift.

Understanding liquid cooling

Two primary forms of liquid cooling are set to dominate the data centre sector. First, conductive liquid cooling harnesses the potential of liquids to directly extract heat from processor components. This system uses heat sinks attached straight to heat-generating units like central processors. These are then connected via tubes, facilitating fluid circulation and ensuring efficient heat removal.

Conversely, immersive liquid cooling necessitates the complete submersion of servers in a purpose-designed, non-conductive fluid. This enables the heat to be effectively dissipated into the liquid medium. However, this approach requires specific modifications to the servers to guarantee safe immersion. Adopting liquid cooling brings a plethora of benefits to the table. It allows for the augmentation of rack densities, with some reaching an impressive 100KW per rack. This capability enables innovation-driven clients to implement power-hungry workloads vital for their growth. Furthermore, these cooling methods typically have a lower energy consumption, mitigating operators' worries about rising energy costs.

The reduced energy consumption translates into reduction in an improved PUE (power usage effectiveness) rating and reduction in the overall carbon footprint. Additional advantages include freeing up data centre space due to the removal of CRAH/CRAC units and a reduction in noise levels with the elimination of fans.

Yet, the transition to liquid cooling is not without hurdles. The introduction brings its own set of complexities, especially during the design and installation phases. Potential leaks pose significant threats, leading to catastrophic hardware destruction or data loss. The quality of water used in the building's cooling system requires rigorous monitoring, and the financial implications of potential damage and maintenance should not be underestimated. A comprehensive approach, involving specialised equipment, must be considered during the planning phase by the design team.

Planning for implementation

Given this level of investment, how should operators position themselves in anticipation of the rising demand for liquid cooling? A robust and diverse supply chain is crucial. Diversifying suppliers can act as a safeguard against potential component shortages. Additionally, fostering close ties with customers is essential. Through transparent dialogue, operators can gather insights about expected workload trajectories, ensuring all parties are on the same wavelength. AI is also set to become one of the cutting-edge technologies within this process. Operators will lean heavily on advanced systems to manage data centre functions and power consumption. AI will monitor building temperatures and recommend optimisation tactics. As the demand curve rises, the layouts of data centres will undergo a series of transformations, seamlessly incorporating liquid cooling solutions.

Anticipating the liquid future

While some operators may currently be satisfied with their well-established set-ups, especially if their customers are not crying out for demand-intensive workloads, such equilibrium is likely to be fleeting. An increasing number of organisations of all types will soon rely on high-density computing services, aiming to offer more advanced and competitive solutions to their customers.

Given the surging demand generated by AI applications for significant computational power, operators need to be one step ahead. Liquid cooling stands as the most effective means to meet these heavy heat-reduction demands. Companies need to start open dialogues with digital infrastructure providers about their anticipated needs so they ensure that the supply is in sync with demand. Everyone should be looking ahead to the next ten years.

Liquid cooling's appeal is multifaceted, not restricted to its efficiency alone. By closely collaborating with suppliers and establishing a harmonious relationship with the broader supply chain, operators can guarantee the on-time acquisition of essential components. Continued open communication with customers will be utterly essential, so operators have insight into their changing objectives and are able to plan with confidence, meeting sustainability goals in the process. Looking ahead, tools powered by AI will be invaluable, enabling operators to consistently monitor ambient temperatures and proactively implement liquid cooling solutions without compromising on emissions and energy efficiency targets. The clarion call is clear – the time to prepare for liquid cooling has arrived.

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Revolutionising data centre sustainability

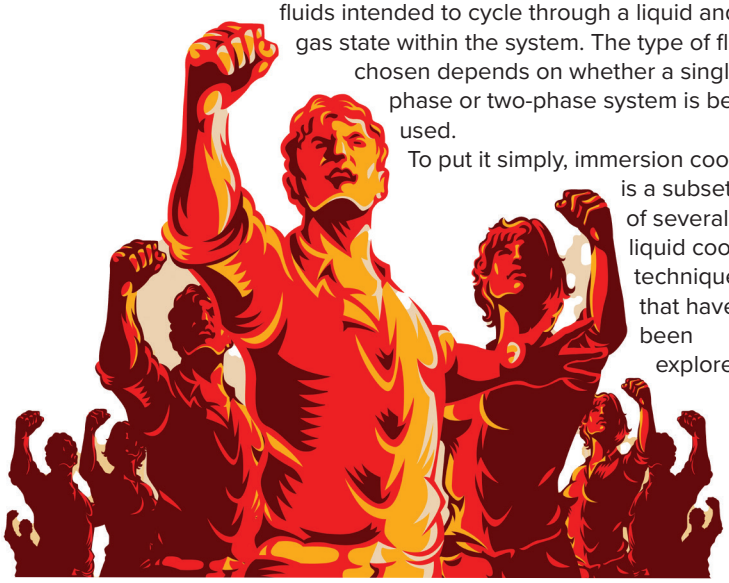
The power of liquid immersion cooling technology.

BY CHRIS CARREIRO, CTO, PARK PLACE TECHNOLOGIES

IMMERSION COOLING is a type of liquid cooling used to moderate data center equipment temperature by submerging it in a cooling fluid. Server immersion cooling helps to dissipate heat and keep components like CPUs performing optimally. Immersion cooling systems prove to be more efficient than traditional data center cooling methods (like computer room air conditioning, or CRAC) due to the increased thermal conductivity of most liquids compared to air.

Because 1-1.5% of electricity use across the globe is attributable to data centers, companies have been innovating to find a liquid cooling solution that can reduce that energy demand. Dielectric fluid immersion cooling is one solution that could increase CPU density in data centers while consuming less energy. Dielectric liquid cooling depends on the use of a thermally conductive but not electrically conductive fluid that will not disrupt the function of electrical components like servers. Examples of dielectric fluids include mineral oil hydrocarbons, synthetic fluorocarbons, and silicone fluids.

Immersion cooling technology can rely on dielectric fluids purpose-chosen to remain in a liquid state, or fluids intended to cycle through a liquid and gas state within the system. The type of fluid chosen depends on whether a single-phase or two-phase system is being used.



To put it simply, immersion cooling is a subset of several liquid cooling techniques that have been explored.

Other types of liquid cooling include direct-to-chip (DTC), rear-door server rack cooling, waterborne data center cooling, and evaporative cooling.

With immersion cooling, whole data center components are directly submerged into a specially designed tank. In contrast, water-cooled server racks look very similar to traditional rack-mount servers, but they are networked with waterblocks and tubing that circulates fluid to help dissipate heat.

The “phases” in single-phase and two-phase immersion are a reference to states of matter, and not physical stages in the system. The physical footprints of these two immersion cooling tanks are not drastically different, but their cooling cycles and contained fluids set them apart.

In single-phase immersion cooling, heat from the immersed server components is transferred directly to the surrounding fluid. However, the dielectric fluid does not undergo a “phase change” from a liquid to a gas. Instead, the fluid is cycled out of the immersion tank by a coolant pump that runs through a heat exchanger and is returned to the immersion tank at a lower temperature where it continues this heat transfer cycle.

In two-phase immersion cooling, heat from immersed server components causes the special immersion fluid to boil. The resulting steam heats a condenser coil in the top of the sealed chamber. The coolant in the condenser coil is cycled out of the chamber to a heat rejection mechanism (cooling tower, etc.). Then, the coolant is sent back to the sealed chamber at a lower temperature, ready to continue the heat transfer cycle.

Because of the steam from the phase change in two-phase liquid immersion cooling, the chamber must be sealed during operation. This means that performing maintenance requires a cooling and unsealing process that costs valuable operation time (which can cost as much as $5,600 per minute). The average power usage effectiveness ratio (PUE) within a data center can be measured by

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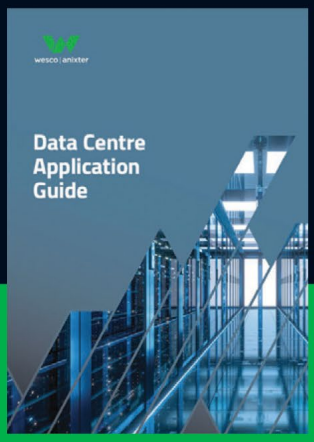

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dividing total energy consumed by energy used by computing equipment. This means that as PUE gets closer to 1, efficiency is improving. According to The Register, PUE for a traditional data center in 2022 was approximately 1.58, while single-phase immersion was able to bring this number down to the 1.05 to 1.10 range.

Not only does immersion cooling improve the energy efficiency of data centers, but it can save valuable space as well. According to a 2023 research article, immersion cooling only requires about one-third of the space to that of an air-cooled configuration.

One of the main contributors to this efficiency is the improved rack power density from not having to allow for air flow within servers. CRAC, one of the main traditional cooling methods for data centers, is reliant on the use of fans. This means that traditional data centers are very loud. Immersion cooling server configurations don't rely on fans and air flow for cooling. Because of their liquid cooling function, immersion cooling has proven to reduce data center noise.

Launching a liquid cooling solution comes with a list of challenges, like preparing existing hardware for immersion, training maintenance staff (or finding qualified third-party maintainers) on the repair process for immersed gear, and managing vendors for the tanks, dielectric fluid, and more. But the ROI and sustainability benefits make liquid cooling an exciting part of future data center planning.

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Sustainability is good for business and good for the planet, and DCIM is critical to reduce energy consumption and waste

The introduction of new model based, automated sustainability reporting features within the company's EcoStruxure IT DCIM software - discussing the importance of accurate performance metrics as data centres respond to the business imperatives of energy efficiency and performance optimisation as well as the march of environmental legislation - with the EU Energy Directive already making an impact.

BY KEVIN BROWN, SENIOR VICE PRESIDENT, ECOSTRUXURE SOLUTIONS, SECURE POWER DIVISION, AND ALISON MATTE, SUSTAINABILITY LEAD ECOSTRUXURE IT, BOTH AT SCHNEIDER ELECTRIC

DCS: *Schneider Electric has introduced some new features to the* EcoStruxure *IT DCIM. It would be good to understand the industry background that has led to the need for these new features?*

KB: It's an interesting time for the industry because it really sits at the intersection where IT and OT meet. And that is fundamentally where DCIM tools exist. One of the things that we're seeing in the industry is a bigger focus on sustainability. Now, it varies in different parts of the world. Obviously, in Europe, you have the EED and some of the reporting requirements that are coming in. But in general, when you look at the energy consumption of IT and as well as data centres, and certainly with the recent AI boom, you're seeing a greater focus coming from governments and industry on what are we doing to ensure that the energy consumption of IT is being done in a responsible and professional way. And we really feel that DCIM is in a unique position to give insight for customers on that energy consumption, because we already have a lot of the data. If somebody's deployed a DCIM solution, we have the data.

But what we realised, and it came from a project we did with our own CIO team, is the tools weren't oriented in a 'user-friendly' way - it wasn't as easy to get that data and to organise it as required, number one. Number two, sometimes the data was incomplete. As a result, we've done some work recently so that customers can meet a very simple challenge of: how much energy is my IT consuming and can I report on it so that I can manage it more effectively? We're really quite excited about what we've brought to the market, and we think we're getting some pretty good response to it as well.

DCS: *Schneider Electric rightly has a well-earned reputation for being at the forefront when it comes to sustainability. It would be good to understand what you are seeing sustainability-wise within the data centre industry, and on a global basis, as to the actions required. Is progress fast enough or are we where we need to be, for example?*

AM: Everyone realises that data centres are consuming quite a significant amount of energy and electricity, and there is a massive strain on the grid to respond to the needs of every customer and every company. Where data centre growth is exponential in certain countries, we're seeing regulations coming into those countries as well to limit the amount of data centres that are being built, but also to start controlling the energy consumption of these data centres. Europe is at the forefront right now with the Energy Efficiency Directive and with other regulations. The EU Commission has set the EED, that's coming into force in September. Additionally, Germany, for example, is adopting its own set of rules. The Netherlands is doing the same. We're seeing regulations spread throughout not only the European continent, but we're also international regulations as well.

Sustainability is a way to limit the energy consumption. It is also a way to reduce costs related to energy and to reduce waste in data centres where all these IT assets that are being managed. We're seeing DCIM play a role, and we are seeing an opportunity to help customers manage those IT assets and also to report on the regulations that are coming in.

DCS: *In terms of the legislation that's now coming in, is it because the industry hasn't moved fast enough and so it's been given a little nudge, or do you think it was going to happen anyway? However well the industry performed, legislation was inevitable?*

AM: One of the main metrics that the industry has been tracking is PUE. That's been around for decades, and it's stagnating. I do think the regulations coming in is to push customers to start actually reporting, but also to align on key metrics and ways to understand what these data centres are actually consuming, because a lot of the times there are assumptions that are being made. Regulations are creating baselines for companies to be able to actually make progress. And regulations do help push things along.

KB: Just to augment what Alison is saying, all the metrics that are the EED, they all make sense from our point of view, and they really came from the industry, and they came from things that we're doing. As Alison is saying, the EED is formalising it and putting a structure around it. Where there's going to be a lot of discussion is around how good does your data need to be in order to report against that? Because part of the reason PUE is stagnating, using Alison's term, is because sometimes you don't have all the data. You get into some of the smaller data centres, server rooms, wiring closets (which, aren't covered by the EED, but we think they will be over time), and it's not easy to get some of these metrics, and I think that's really what's going to be interesting for those in Europe, right? And the other thing for customers in Europe concerns what level of detail do I need in order to report against the EED? And this is where we've been developing tools to model it out and make it a little easier.

You know, in the other parts of the world, like in the US, I would make the argument to many CIOs, the metrics that the EED has adopted are the ones that really we would consider best practise. So, why not use those to report everywhere? Our philosophy on it is, look, even if it's model-based, it's good to start getting a benchmark. It's good to start tracking this information, even down to the smallest sites, and then you can get better over time. So, your question is quite interesting. Is it because the industry wasn't doing the right things that the regulations came in? No, I think it's because the industry was doing the right things. Now, because it's becoming so prominent in the discussions, the EED is formalising it. For those in Europe, it's going to be a real question about what's the level of detail that I need in order to comply and be auditable against the regulation? But for other people in the world where you don't have quite the same strict regulation in place, the argument is that you should be doing this anyway. We have examples of our own CIO team implementing our tools and getting some great results from a business standpoint.

DCS: *In terms of the DCIM features that have been introduced by Schneider Electric, they are providing more of the required metrics and visibility. I believe the company talks about enhanced visibility, historical data analysis, and things like fast intuitive reporting. Fundamentally, the objective is to provide more of this information and, whether you developed it specifically for the directive or not, it's a lot of the information that people will be required to report on. Is that right?*

KB: Yes. Much of the learning that we did and what we built in was as a result of watching our own CIO team do their own green IT initiative internally. They started using our own tools. They were doing

Sustainability is a way to limit the energy consumption. It is also a way to reduce costs related to energy and to reduce waste in data centres where all these IT assets that are being managed

a refresh of their IT infrastructure. And the EED was in the background because we saw the EED coming. So obviously, those two things really played together. Much of the work we did was around trying to make it easier for somebody to get those metrics. And again, as I mentioned, one of the big challenges is that people don't always have the data, and we did not limit it. I think the EED, if I remember, it's like 500 kilowatts and above, right? Certain countries might have a lower threshold. We actually think you should be implementing this at even the smallest server rooms and wiring closets, and that's what our own CIO team was doing. When you have incomplete data, what do you do? The reality was that we've spent the last 10 to 20 years working on data centres and modelling out PUE and what that looks like.

We've also spent the last 10 or 15 years, becoming a leader in sustainability as a business. You take that combined expertise - we say it's model-based, data-based modelling. Let's call it AI, because everybody has to use AI these days as a term! We looked at our knowledge of what we had internally, and we did use algorithms to help people start modelling out what these sites look like. And now you can obtain this information very easily - with the push of a button, you can get the PUE of a site in effect. Based on the model, we give people a level of confidence about what is the PUE at that site. And if we get more data, the confidence level gets better. And we're going to keep working on this because we have data coming into our cloud which we can continue to work on and analyse. These models are going to get better and better. And so in effect, it's a very easy way to get a baseline of what is your energy consumption, including the losses of the physical infrastructure. What we're most excited about is that we are enabling people to have a very fast and easy way to get started on this journey of really measuring what is your performance.

DCS: *I guess the next logical step at some stage, and it may already be happening to a certain extent, is once you've got all this information, clearly you can take actions based on it. I'm just wondering what the balance is at the moment and maybe plans for the future in terms of humans versus AI. AI has the potential to take a load of data and maybe recommend some actions based on it. What are you doing with it or what plans do you have with the decision making beyond the raw input of data that you're collecting?*

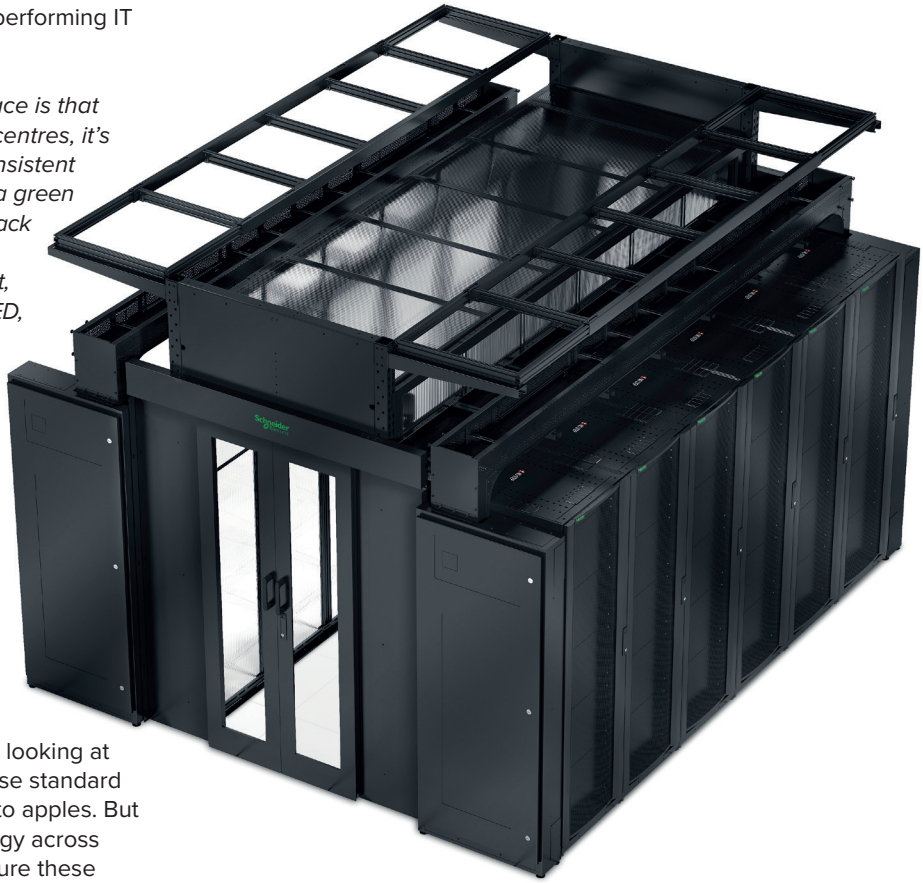
AM: I can give you an example from our own CIO team project. On our Lexington site, which had about 10 network closets, 10 IT rooms (so not a full data centre), they were able to start monitoring and tracking their energy consumption. They actually found zombie servers, and they found certain inefficiencies. With the recommendations that we were providing with our DCIM, alongside some upgrades to their assets, they were able to reduce their energy consumption by 20% in the first year. In carrying out that exercise, reducing 2 % their energy consumption, they reduced about 30% of costs. When you look at the sustainability side, they were able to reduce their carbon emissions by 17 tonnes that first year, just on that site, which is massive.

KB: The way this is going to play out is, when people go out and start measuring, it's going to point them in a direction about where's your worst performing site. And in the example Alison shared, they knew there was a lot of opportunities. Now, our software wasn't smart enough to tell them, hey, go virtualize this and go do that...you still need a human in there. But because they started running these tools and looking at the data, it pointed them in a direction to go. And what I think will happen is over time, as we start learning more from customers about what are their opportunities, you can see a day not too far in the future where we can sit there and go, based on what we see and based on benchmarks of other things that are similar, we think you may have a 30% opportunity at this site, and you should go look there. So that's really where we are in terms of the sophistication of the tool - it is giving people a very easy way to get a very broad view of their complex hybrid infrastructure and enabling them to start finding out where they should start looking and then really tracking the subsequent continuous improvement exercise.

Some of the savings that they got at our Lexington factory were because they went and did some higher-level IT stuff. They bought some new IT equipment, they virtualized things, and they were able to achieve, again, a 30% energy reduction, but that was a tremendous ROI from a business standpoint. Sustainability is good for business. I think that's an important message, and one we're trying to promote - when someone takes a sustainability initiative, a green IT initiative, they end up with a better solution that's more resilient and has a lower energy consumption. We maybe don't have don't have all the data as yet to support that assertion, but I think there's a lot of evidence that this will be the case. We're excited about this, not just because of the EED, but we think it's also

going to lead to less waste and better performing IT infrastructure.

DCS: *One of the problems end users face is that when they're looking at different data centres, it's very difficult to obtain, shall we say, consistent statistics. Everyone will say, we've got a green data centre, and they might be able to back it up with some data, maybedepending on how they interpret it. Do you think that, with the combination of DCIM and the EED, at some stage we might arrive in a great place where you can compare five different data centres with the exact same set of metrics? You will know the actual performance of each data centre, as opposed to some of the marketing/ greenwashing that might still be going on?*



AM: They're using Cenelec methodology, which has been around for years, to calculate these metrics. There is a lot of standardisation. With these regulations that are coming into force, and the EED in particular, if we're looking at the same methodology to calculate these standard metrics, then you can compare apples to apples. But if you're not using the same methodology across your sites to be able to track and measure these metrics, you're not going to be able to compare. You're not going to be able to see, to have a good baseline. So that's the power of regulations and standards. It allows you to do so.

KB: Historically, we've all seen there's two things that have happened in the industry where not everyone's PUE was calculated the same way, and people would play some games with it. I think that's fair to say. And the second thing is, there's been a self-selection bias, when people go and publish 'we have a PUE of 1.15 or whatever'. Is that just for one data centre on the best day of the year? Is that an average number? What is that number? We don't know. And that's where I think, rightfully so, there's been some suspicion about some of these marketing initiatives, talking about how green data centres are. And that is a role where regulations and standards come in. It's all defined. So now the question is going to be, if you have to comply with the regulation and it's auditable, that's going to take away, let's call it, some of the game plan. And that's one of the things we did with the tools. We built in that methodology so that when you run a report, it is consistent with the standards that are in place, and it should give you a pretty good estimate.

And there's going to be a debate as to whether or not a model-based solution is good enough? Good enough to be able to comply with the regulations? But our broader point here is that, if I use these standards and I use a model-based solution for those areas where maybe I don't have all the metering in place that you need to comply with the regulations, it's still going to ensure that you're running better infrastructure, and that it's as energy-efficient as possible, it's as robust as possible. Let's not lose sight of this goal for the industry. We are looking at that broader goal as well as the narrower goal of can I report against the EED? We help you with that. But there's a broader goal about using these model-based, data-based AI engines, to help people get a handle on their whole infrastructure. Keep in mind, our best estimate is that at least half of energy consumption is outside of data centres.

If you look at energy consumption, about half of it is in server rooms, wiring closets, networking closets. And today, the EED doesn't cover that, but that's half the problem. It doesn't get the headlines that the large data centres get, but it's still there. And we would argue that over time, regulators like to stay busy, too. I mean, they're going to keep lowering this threshold. That's what I would guess. They're going to go from 500 kilowatts to 250 to 100. It's going to keep coming down. Why not get ahead of that on best practises and make sure that you are looking at your infrastructure, particularly when it's very cost-effective and very easy to do so?

This Q and A article is based on a video interview between DCS and Schneider Electric. The video can be viewed via the DCS website at: https://datacentre.solutions/videos/4660/schneider-electric-continues-to-drive-the-data-centre-sustainability-agenda

The data centre of 2030: smarter, faster and more sustainable

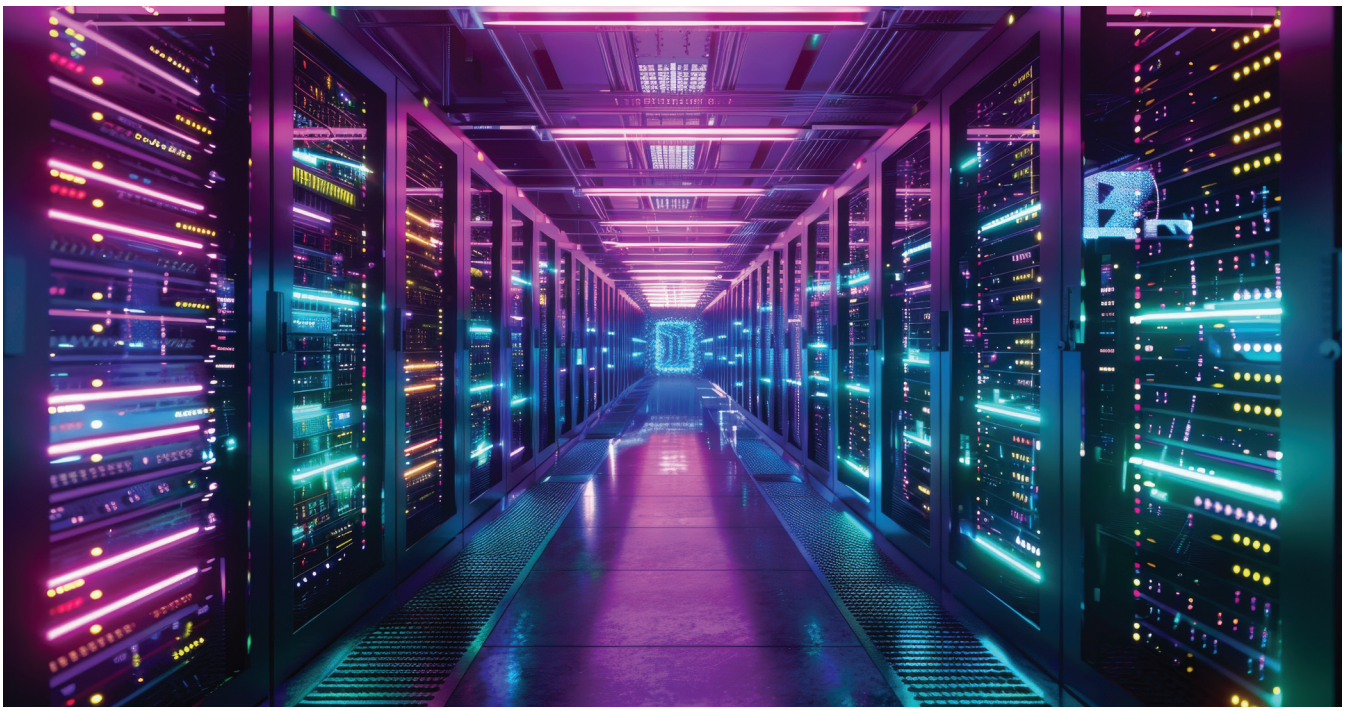
Data centres are poised for an era of rapid change, and by the end of this decade they will be very different, with the data centre of 2030 built for sustainability as well as computing power.

BY IAN JEFFS, UK&I COUNTRY GENERAL MANAGER AT LENOVO INFRASTRUCTURE SOLUTIONS GROUP

THE REASON for this is simple, the power demands of data centres are rising rapidly. Data centre technology already accounts for 2% of energy use worldwide, according to the International Energy Authority (IEA), and by 2026, that figure could well double, with the demands of data centres equalling the electricity consumption of Japan. In Britain, the National Grid predicts that data centre power consumption could increase six-fold over the coming decade. These predictions are set to drive a surge in demand for sustainable computing.

One of the reasons behind the exponential rise in electricity demand is artificial intelligence (AI) and in particular generative AI, alongside other innovative technologies such as quantum computing. Generative AI's appetite for energy is enormous. Research estimates that generating just one image with AI uses as much energy as fully charging a smartphone. But this must be weighed against the important role AI has to play in the battle against climate change, with AI expected to deliver breakthroughs in clean energy (for example designing nuclear fusion reactors) and in other areas such as limiting methane emissions from waste. The challenge is clear: the world must find a balance to enjoy the benefits of AI, while also containing its impact on the environment.

So how can we build data centres fit for a cleaner future? Business leaders need to take an overview of the real energy impact of data centres, taking



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in everything from how servers are cooled and how that energy might be reused, to how they are shipped and the mix of energy used. Understanding the true impact of data centres is the first step towards a smarter, more sustainable future.
Powering progress

With generative AI appearing in software ranging from email apps to internet search, the energy demands of the AI industry is going to continue rocketing, with one study in the journal Cell suggesting the power demand of AI alone could match the demand of the Netherlands by 2027. The compute power required to train AI doubles every six months, and Gartner® predicts[1] that 'by 2030, AI could consume up to 3.5% of the world's electricity'. The IEA's report suggests that adding generative AI to search (as companies including Google are rushing to do at present) could multiply the energy demands of internet searches by 10.

All of this requires the technology industry to design carefully for sustainability, not just at the chip level, but at the server level and data centre level. It's also worth bearing in mind that there is a flipside to this in terms of the environmental benefits of innovations sparked by new technologies. Emerging technology such as quantum computing will be more energy-efficient and could also mean that problems are solved exponentially faster than classical computers. Both quantum and AI are expected to drive rapid innovation in everything from demand response in the electricity grid to photovoltaics to electricity generation technology. The 'smart grids' of the future will be powered by AI. In building decarbonisation, to take one example, Mckinsey estimates that AI can accelerate the process 100-fold compared to existing technologies.

Smarter systems

The data centre of the future will be designed from the bottom up with sustainability in mind. Technologies such as warm water cooling enable high performance with far less energy use, provided a host of power consumption benefits. For instance, in data centres that use warm water-cooling, there is much less need for high-speed fans to dissipate heat. Air-cooling systems can often consume vast amounts of energy in themselves.

Furthermore, any wasted heat can be reused effectively because warm water-cooling systems produce heat waste at a temperature that is more easily reused for other purposes. Not only will this improve energy efficiency across an entire data centre facility, but this energy can be successfully recycled in sustainable ways in the wider community. By 2030, recycling the heat from data centres will become the norm, from heating nearby buildings and swimming pools to piping warm liquid under roads and walkways to melt ice.

The data centres of the future will also be built around renewable energy, from renewable sources to solar panels on roofs, driving towards a future of carbon-neutral or even carbon-negative operations. Organisations will adopt 'as a service' approaches to AI to improve efficiency, and increasingly businesses will harness the power of AI to optimise electricity consumption in data centres themselves.

Just as AI will assist in demand response in the electricity grid, within the data centre, algorithms can help with optimisation, predictive maintenance and energy management. This can reduce energy consumption by improving cooling efficiency, minimising waste and optimising resource allocation.

Circular thinking

When designing and building a data centre fit for the future, it's key for business leaders to take a view across the whole lifecycle of their data centre and the servers that will work in it. Everything from how components are designed and manufactured to how they are shipped, deployed and disposed of at the end of their lives matters, and taking a holistic view is key to making real sustainability gains.

Through this decade, asset recovery services (ARS) and recycling of computer equipment will grow in importance. Other markets in Europe have already implemented legislation to reduce the environmental footprint of digital technology.

For example, France introduced a mandate that 20% of IT devices bought by organisations need to be refurbished, with a target of 40% by 2040.

Manufacturing products regionally to cut shipping miles will also be a key differentiator. The current shift towards 'as-a-service' approaches to everything from hardware to software will continue, with business leaders focusing on avoiding overprovisioning to cut carbon emissions.

Towards net zero

The challenge facing the technology sector is clear. AI's hunger for energy is set to catalyse a race to adopt smarter and more sustainable approaches in the data centre as this decade unfolds. By 2030, we will see a new kind of data centre powered by renewables, and integrated thoroughly into the community around it with excess heat efficiently re-used to heat buildings and swimming pools. They have the potential to power a new era of quantum and AI, which will help unearth breakthroughs to tackle global issues, such as climate change.

FURTHER READING / REFERENCE

1. Gartner Says CIOs Must Balance the Environmental Promises and Risks of AI. GARTNER is a registered trademark and service mark of Gartner, Inc. and/or its affiliates in the U.S. and internationally and is used herein with permission. All rights reserved.

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New technologies, new frontiers

Revolutionising data centre maintenance for the Digital Age

BY ANNA MAZZOLENI, GLOBAL PRODUCT MANAGER, ELECTRIFICATION SERVICE, ABB

IN 2023, it was estimated that there were now 5.4 billion people online globally. With more of our lives increasingly being lived virtually, businesses, governments and consumers are now undeniably reliant on digital services. Forming the foundation of these are droves and droves of data centers which have become an integral part of our data-driven society, making the stakes for their operators higher than ever.

Cybersecurity risks notwithstanding, having a firm grasp on inherent operational and structural risks is critical. In the context of data centers, this means being able to provide a constant and reliable stream of data services. Yet, the threat of power failures that cause data center outages remains a significant challenge — and the resulting downtime that comes with it is not only highly disruptive, but costly.

With our dependence on data centers showing no signs of abating, we need to get ahead of these challenges. For one, enhanced approaches to asset servicing and maintenance through the use of innovative technologies, such as augmented reality (AR), are a way to mitigate these risks. Together, these offer a promising path forward for safer, smarter and more reliable data center operations.

Enabling the next frontier in servicing innovation

It's well-chronicled across a myriad of industries that the pandemic catalyzed novel ways of doing business — asset servicing and maintenance are no exception to this, and we've seen this specifically through the use of AR.

With an AR-enhanced maintenance app on their smartphones, technicians can see more than what meets the eye: technical information and servicing guidance through images, instructional videos and documentation are overlaid on the physical equipment in front of them.

This is done in such a way that enhances their perception and interaction with their surroundings, all while preserving the necessary level of environmental awareness to ensure the safest user experience while minimizing human error.

Such maintenance apps can also be designed to be device-agnostic, accessible across mobile, tablet and desktop, but also hands-free devices such as industrial smart glasses. This would enable engineers and technicians to operate hands-free, improving both safety and productivity as they conduct their assessments and repairs in the harshest environments.

Scaling servicing capabilities

Through AR, technicians also benefit from real-time, remote support from experts, assisting them with complex repairs and maintenance tasks. For data centers, especially, where every second of downtime translates to lost revenue, remote support is especially vital as it provides access to near instantaneous expert support and solutions to the technical issue at hand. This enhances first-time fix rates while also extending service reach to remote and under-served areas.

With data centers often located in remote locations, the benefits as it pertains to cost- and time-efficiencies are clear. But these equally extend to sustainability considerations: Remote servicing saves up to 171g of CO2 emissions per passenger-kilometer, totaling to 332 tons of CO2 emissions per year by reducing up to a third of customer site visits by field service engineers.

At the same time, the use of technology to power remote support capabilities equally translates to more opportunities for immersive remote training which is proven to deliver better knowledge acquisition and retention. This, compounded by self-learning on virtual systems fosters a culture of first-rate support and servicing. AR can also power hands-on training experiences, enabling technical servicing teams to scale their junior talent. Junior technicians benefit from practical training opportunities through a virtual system before applying their skills in the field.

Taking the smart approach to maintenance

Businesses tend to maximize their capital expenditure by running their equipment, unknowingly, to the point of failure, which leads to longer term losses. In fact, this can cost up to ten times more than investing in regular maintenance and often contribute to more severe outages — and the older the equipment is, the greater the severity. According to the Uptime Institute's 2023 Global Data Center Survey, such outages can cost from US$250,000 to more than US$1 million.

Regular monitoring of facilities, especially mission-critical equipment, is essential for guaranteeing reliable service provision — and smart maintenance can better support that.

A preventative approach involves replacing older, non-digital circuit breakers with intelligent, sensor-enabled breakers linked to cloud-computing

platforms. Real-time data and analysis on asset condition and performance can prevent potential issues before they arise.

According to the Deloitte Analytics Institute, predictive maintenance increases productivity by 25%, reduces breakdowns by 70%, and lowers maintenance costs by 25%. Despite these benefits, less than 50% of global manufacturers use predictive maintenance technologies. The gap itself presents an opportunity for businesses to increase productivity and build a competitive advantage.

Digitally driven, digitally resilient

For businesses today, the incorporation of more digitally-integrated approaches that can ensure greater reliability is no longer a luxury but a necessity — and it's simply no different for data centers. With the cost of outages increasing and data center downtime costing nearly US$8,000 per minute, every second of downtime translates to revenue lost and reputational damage that's hard to come back from.

As the backbone of our increasingly digital world, data centers are pivotal in ensuring the smooth operation of critical services, be it in healthcare or financial services. To keep them running, we need to rethink our approach to servicing and maintenance, bringing outdated methods into the future. Powerful innovations such as augmented reality unlock new opportunities for predictive, data-driven maintenance all while also significantly reducing environmental impact and operational costs.

Ultimately, taking a more digitally-enabled approach to asset maintenance is essential to navigating the challenges associated with increased digitalization. Thankfully, innovative technologies are set to play a pivotal part in ensuring data centers to remain resilient and operationally-ready to meet the growing demands of data services.

It's time to rethink data centre power

The AI revolution is fully under way. But without a top-to-bottom reassessment of power solutions, its progress could slow to a crawl.

BY TOD HIGINBOTHAM, COO, ZINCFIVE

WITH BUSINESSES clamoring to harness the potential of AI, data center operators have a mandate to outfit their facilities with the latest CPUs, GPUs and other components that power the most demanding workloads. That level of power, however, has sparked a surge in electricity needs. And meeting those needs is harder than it sounds.

Already, data center projects are being hamstrung by power problems. Data center operators need more power -- and they need it from clean power sources. They also need a transmission system that can handle a heavier load. The burden, however, doesn't belong solely to utility providers. Data center operators also need to innovate. By rethinking data center design, operators can minimize their power needs. Meanwhile, they need to strategically monitor and manage their power usage to ensure optimal operations.

The AI revolution is fully under way. But without a top-to-bottom reassessment of power solutions, its progress could slow to a crawl.

A surge in demand

Insufficient power resources are already slowing projects down by years, according to a recent report from Cushman & Wakefield, a global commercial real estate services firm.

"Over the past year, power has become the number one consideration for data center operators as they conduct site selection to rapidly grow their portfolios," the firm's 2024 Global Data Center Market Comparison says. "Many utility providers are suggesting wait times of 2-3 years or more for sizable power to be delivered to their developments."

Data center operators are expanding their footprint in anticipation of the growth of AI. Currently, hyperscalers need around 10 kW to 14 kW per rack, the commercial property consultancy Newmark noted in a recent report. However, AI workloads will push that requirement up to 40 kW to 60 kW per rack. All told, Newmark expects AI to drive US data center demand to 35 GW by 2030, up from 17 GW in 2022.

As they anticipate greater power demands driven by AI, data center architects should consider what types of AI loads they are building for -- in other words, whether a data center operator will manage primarily inference or training. With AI training, there

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may be extreme load steps that require larger utility feeds or the use of innovative battery storage. There is interest in using batteries to offload these peaks and spare the uninterruptible power supply (UPS) from these load steps. These batteries could be located relatively close to AI servers and allow for a significant reduction in utility MWs to the facility.

Securing access to different power sources, transmission lines

When data center architects plot out new builds, they aren't just thinking about power availability but also the source of that power. Across the globe, more stringent regulatory environments as well as pressure from corporate stakeholders are driving data center operators to step up their reliance on renewable energy.

The demand for renewable power is reflected in forecasts for U.S. energy production: Solar installations will account for "almost all growth" in US power generation in 2024-2025, according to the U.S. Energy Information Administration (EIA). Utilities are opting for solar installations, Reuters notes, thanks to tax credits available from the 2022 Inflation Reduction Act.

While the shift to clean energy is happening, data center developers still need to think strategically about siting new facilities. Even with the increase in solar installations, the EIA said that by 2025, solar will still only account for 7% of power production in the US.

Along with power generation, data center developers need to consider transmission. On both of these matters, developers can collaborate directly with utility providers to ensure they can access the power they need.

The US electric grid faces capacity shortfalls, the North American Electric Reliability Corporation (NERC) warned in December, due to increases in demand and fossil fuel generators coming offline.

Delivering sustainable backup power

Transmission lines should also be assessed for reliability. Aging transmission lines, as well as transmission lines impacted by extreme weather events, can potentially cause costly outages. Power issues are consistently the most common cause of serious and severe data center outages, the Uptime Institute found in its annual outage analysis. More than half of the respondents surveyed by the Institute said their most recent significant, serious or severe outage cost more than $100,000.

The costly nature of outages underscores the importance of backup power systems. As with other power sources in the data center, developers face an imperative to make backup systems sustainable. Nickel-zinc (NiZn) batteries, an innovation in battery technology led by ZincFive, can power UPS systems more sustainably than traditional lead-acid batteries or lithium-ion batteries. In comparison to other chemistries, NiZn produces lower GHG emissions and offers a smaller water footprint and energy footprint. Specifically, NiZn batteries' lifetime greenhouse gas emissions are 4x lower than lead-acid and 6x lower than lithium-ion emissions. Nickel-zinc batteries use common, widely available, conflict-free materials. They're also highly recyclable.

Meanwhile, major corporations are exploring a range of alternative energy sources for backup generators. Microsoft, for instance, has been testing the viability of using large-format hydrogen fuel cells to supply data center backup power. Microsoft is also installing a "resiliency microgrid," which relies on renewable natural gas, for backup power at its San Jose, Calif. data center.

Dealing with heat

Data center developers and operators should also be looking for ways to more efficiently manage the heat generated by their infrastructure. Cooling systems are all the more critical as businesses adopt AI and HPC systems that emit greater levels of heat. Typically, cooling systems consume around 40% of a data center's power.

In addition to offering sustainable backup power, NiZn batteries allow data center operators to reduce the footprint of their cooling systems and other safety infrastructure. Nickel-zinc batteries exhibit no thermal runaway at the cell level and are thus non-flammable, unlike other UPS battery alternatives.

Conclusion

While power plays second fiddle to innovations in computational hardware and increasingly sophisticated AI workloads, it's a fundamental part of the data center. And as with other elements in the data center, it's rapidly evolving. To build a data center that can meet the demands of tomorrow's workloads, data center developers and operators should reconsider their power infrastructure, top to bottom.

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Transforming data centres to meet AI's evolving demands

While 2023 marked a pivotal moment in recognising the vast potential of artificial intelligence, 2024 kicked of what is becoming a truly transformative period. AI's broad applications, ranging from machine learning and deep learning to natural language processing have seamlessly integrated into our everyday lives, revolutionising how we live, work and connect.

BY KAMLESH PATEL, VP DATA CENTER MARKET DEVELOPMENT AT COMMSCOPE

As AI's popularity soars, data centre managers and their teams are grappling with the challenge of managing, not only the surge of petabytes of data flooding their networks, but also the need for ultra-low latency. Additionally, they are attempting to tackle the increased power demands and higher fibre counts needed to support the advancements that come from supporting AI.

Similarly, the rise of artificial intelligence has caused a fundamental shift in data centre design, significantly impacting network infrastructure in areas such as cabling, connectivity, architecture, resilience and adaptability.

Here are the key challenges and opportunities that I believe come with cabling AI data centres, some best practices and tips for success.

The unstoppable surge in power demand

Regions that house data centres are experiencing a surge in power demand. In the Republic of Ireland for example, data centres now consume over 20% of the country's electricity, a significant increase from just 5% in 2015. Consequently, for the first time ever, there is no longer a guarantee that the power needed to support data centre operations can be reliably supplied.

Recently, the 'net zero' goals of major tech companies have been challenged by this increasing power demand, a direct consequence of AI and energy-hungry data centres. Google reported a 48% increase in its greenhouse gas emissions over the past five years, largely due to the growth of its data centres, while Microsoft's Scope 3

emissions have risen by over 30% since 2020. To strike a balance between enhancing sustainability and expanding capacity and performance, data centres will require support from their infrastructure technology partners.

Ultra low latency meets ultra high connectivity solutions

Because the models used to train and run AI consume significant processing capacity and are typically too much for a single machine to handle, processing these large AI models requires numerous interconnected GPUs distributed across multiple servers and racks. This presents a unique challenge for the cabling infrastructure that links everything together to keep data flowing.

For instance, GPU servers demand significantly higher connectivity between servers, but due to power and heat limitations, fewer servers can be housed per rack. As a result, AI data centres require more inter-rack cabling compared to traditional data centres. Each GPU server is linked to a switch within the same row or room, with these connections needing 400G and 800G speeds over distances that traditional copper cables like DACs, AECs or ACCs can't handle. Moreover, every server must also be connected to the switch fabric, storage, and out-of-band management.

In an ideal setup, GPU servers in an AI cluster would be close together, because AI and machine learning algorithms - like high-performance computing (HPC) - are highly sensitive to latency. It's estimated that 30% of the time spent running a large training model is due to network latency, while 70% is spent on compute time. To reduce latency, AI clusters strive to keep GPU servers in close proximity, with most links limited to 100 metres. However, not all data centres can place GPU server racks in the same row. These racks require over 40 kW to power a GPU server, far more than typical server racks, forcing traditional data centres to space them out accordingly.

Although extra space isn't feasible in the densely packed server rack layouts of modern data centres, managing the narrow, congested pathways and the added cabling complexities brought by AI is made possible through innovations like rollable ribbon fibre.

The innovative design allows for the installation of up to six 3,456 fibre cables within a single four-inch duct, providing more than double the density compared to traditionally packed fibres.
In the rollable ribbon fibre cable, the fibres are attached intermittently to form a loose web. This design makes the ribbon more flexible, allowing the fibres to flex with a degree of independence from one another. The fibres can now be "rolled" into a cylinder, making much better use of space when compared with flat ribbons.

While the cables are lighter and simplify handling and installation, their intermittent bonding enables installers to position the fibres naturally into a smaller cross-section making it perfect for splicing.

In an ideal setup, GPU servers in an AI cluster would be close together, because AI and machine learning algorithms - like high-performance computing (HPC) - are highly sensitive to latency

Data centre architecture of the future

Looking to the future, the value proposition for data centres will hinge on their extensive processing and storage capabilities and operators need to thoughtfully select the optical transceivers and fibre cables for their AI clusters.

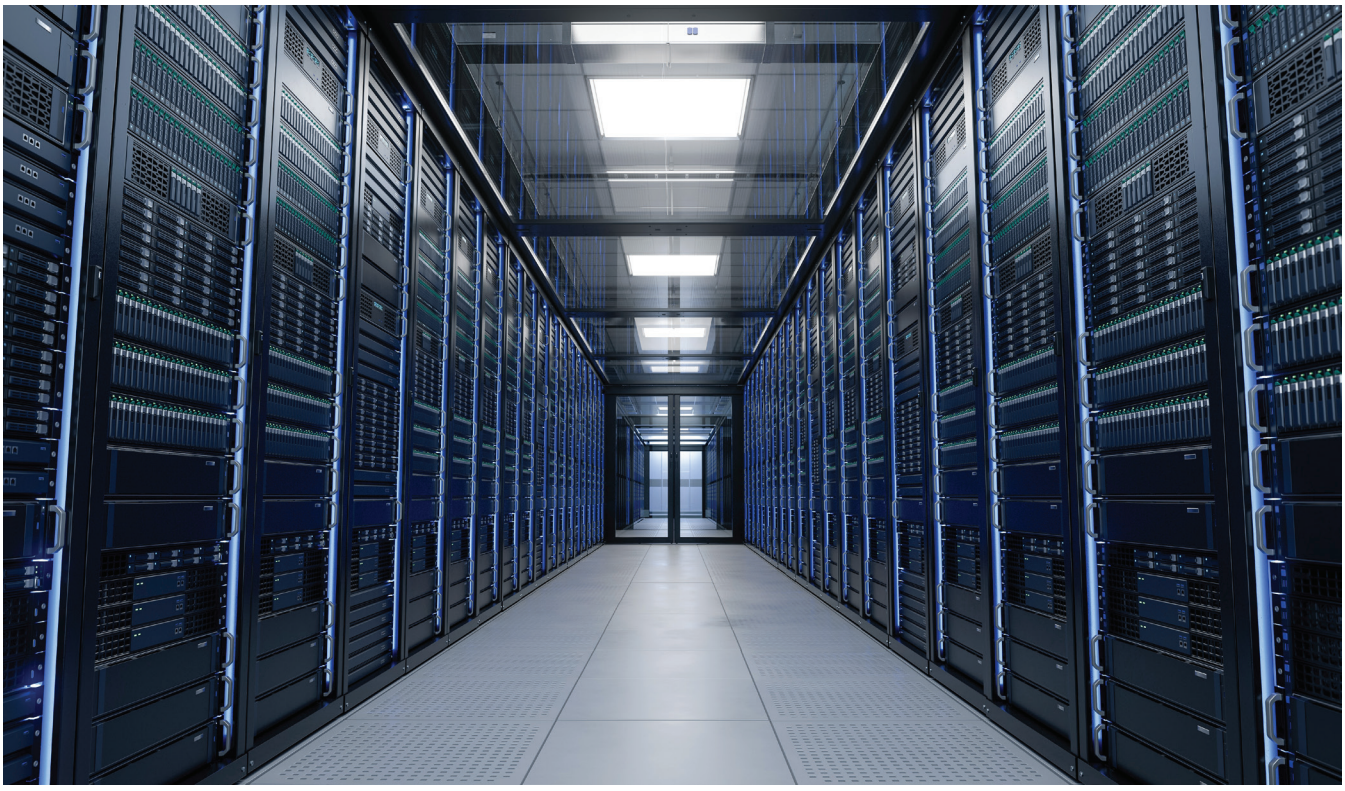
In an AI cluster, the optics cost is primarily driven by the transceiver due to its short links. Transceivers that utilise parallel fibres are particularly beneficial because they eliminate the need for optical multiplexers and demultiplexers, which are typically required for wavelength division multiplexing (WDM). This results in reduced costs and lower power consumption for transceivers with parallel fibre.

Links up to 100 metres are supported by both singlemode and multimode fibre applications and advances such as silicon photonics have lowered the cost of singlemode transceivers.

In many AI clusters, active optical cables (AOCs) are used to interconnect GPUs spread over many servers and racks. These cables are usually designed for short distances and are commonly used with multimode fibre and VCSELs. The transmitters and receivers in an AOC may be the same as in analogous transceivers but are the castoffs. These components don't need to meet stringent interoperability requirements since they are only required to work with the specific unit attached to the other end of the cable. Additionally, since the optical connectors are not accessible to the installer, there is no need for specialised skills to clean and inspect fibre connectors.

Strategic planning for AI cluster cabling

In summary, data centres must evolve and adapt to meet the growing demands of artificial intelligence in business applications and customer service delivery. Infrastructure designers and planners must focus on improving efficiency, scalability, and sustainability. Key to these advancements is the upgrade of cabling systems, which will help reduce costs, energy usage, and installation times. By embracing these innovations, data centre facilities will be well-equipped to manage both current and future AI-driven workloads.



Liquid assets

The significance of liquid cooling for data centre sustainability

BY ALISTAIR BARNES, HEAD OF MECHANICAL ENGINEERING AT COLT DCS

AMONGST the escalating demand for more energy from data centre (DC) customers, maintaining a low Power Usage Efficiency (PUE) rating by DC providers is paramount. With low PUE comes the ability to identify cost saving measures and recognise areas for improvement, whilst also reducing carbon footprints and impacts on the environment.

Yet, as more organisations deploy high performance computing (HPC) and greater IT workloads to support their business requirements, the by-product of heat from power usage is also on the rise. In order for DC providers to ensure that their equipment and systems remain in top condition to serve demand, suitable cooling and heat management is a must.

One effective strategy is building DCs in cold climates and leverage free cooling methods. When the external temperature of a DC is considerably lower than the internal temperature of a facility (as little at 2°C), natural air can be used to directly cool the site and therefore, reduce – if not completely eliminate – the need of mechanical cooling processes. As a result, energy consumption is decreased significantly, and equipment life can be extended reducing embedded carbon. However, geographical constraints such as proximity to key markets and infrastructure mean that not every organisation can benefit from this advantage. For those unable to build in cooler regions, advanced cooling techniques offer a promising alternative.

Among these, liquid cooling has emerged as a particularly effective solution, offering significant advantages over traditional air-based methods. Let's delve into the options and benefits of liquid cooling in modern DCs.

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What is liquid cooling?

Rather than utilising traditional air-cooling technology, liquid cooling is a method that uses liquids such as water to conduct heat away from IT equipment.

Compared to air, liquid has a much higher heat capacity (1.004 vs 4.18). Therefore, by using liquid cooling methods, the absorption and transfer rate of heat released from IT equipment will be much higher and more effective when dealing with increasing levels of power.

The different types of liquid cooling

Several liquid cooling methods are available for DC providers. Rack-based liquid cooling circulates coolant through racks to absorb and remove heat directly from servers. Direct-to-chip cooling, including liquid-to-chip methods, targets heat sources by circulating cool liquid through a 'cold plate' in direct contact with components like GPUs. In contrast, immersion cooling submerges entire servers in a thermally conductive liquid, efficiently dissipating heat across all components. Let's delve into this in more detail.

Rack-based liquid cooling:

Rack-based liquid cooling is a method where coolant is circulated through the racks that house servers, absorbing and removing heat directly from the equipment. This approach is highly efficient, allowing for better heat management and enabling higher server densities within DCs. By reducing reliance on traditional air-based cooling, it can significantly lower energy consumption and operating costs.

However, implementing rack-based liquid cooling requires significant upfront investment and infrastructure modifications. Additionally, managing potential leaks and maintaining the cooling system can be complex, posing challenges for DCs not initially designed with this technology in mind.

Immersion Cooling:

Immersion cooling submerges servers in a thermally conductive, dielectric fluid that absorbs excess heat and stabilises IT equipment temperatures.

The process can be single-phase, where the liquid remains in a constant state, or two-phase, where the liquid evaporates and re-condenses to remove heat. Immersion cooling offers significant benefits, such as drastically lowering PUE levels – sometimes as low as 1.10 – by eliminating the need for traditional air cooling systems like CRAC units, which also reduces noise and saves space. However, implementing immersion cooling requires specialized infrastructure and careful management of the dielectric fluid.

Direct-to-Chip Cooling:

Direct-to-chip cooling involves circulating cool liquid through a system that directly contacts the chips and other heat-generating components. This method is more efficient than immersion cooling in dissipating heat at the chip level because the circulating fluid is typically cooler.

Direct-to-chip cooling allows for higher compute densities without needing additional space, making it an excellent option for upgrading existing air-cooled DCs. However, it still requires supplementary cooling for other IT equipment, typically using chilled air, which adds some complexity to the overall cooling strategy.

Hybrid approaches for a balanced PUE

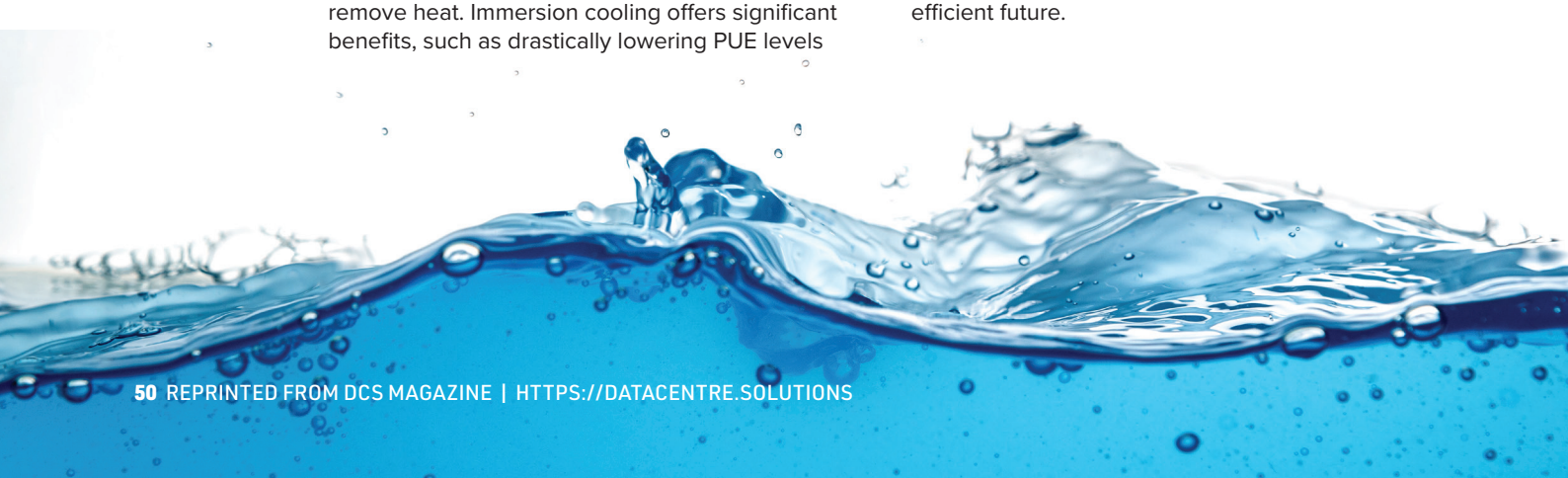
While liquid cooling is an innovative solution, this technology is not yet in a position to completely replace air cooling in DCs. Even if equipment is cooled by liquid, heat will be transferred to it and some of this will be dissipated into a room or surrounding space where air will be required to remove this.

Therefore, a hybrid approach is the best option where liquid and air techniques are used together to offer the best balance of PUE performance.

Furthermore, it is important for organisations to know what options are available to them by working with a DC partner that fully understands their needs. DC providers must be able to review and manage their operations in real-time to ensure efficiency and to meet corporate sustainability goals.

By using modern data analytics tools, businesses can monitor power usage, internal and external temperatures, and electricity usage for cooling to optimise processing loads for cost-effectiveness and proactively monitor equipment maintenance.

Hybrid solutions are increasingly being adopted to combine the strengths of different cooling methods, improve PUE, and pave the way for a more energy-efficient future.



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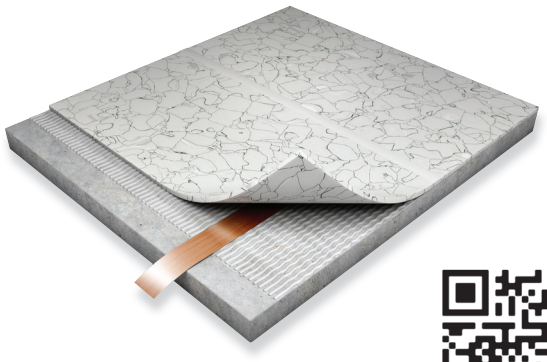

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Base 16 Technology in the data centre: what are the benefits?

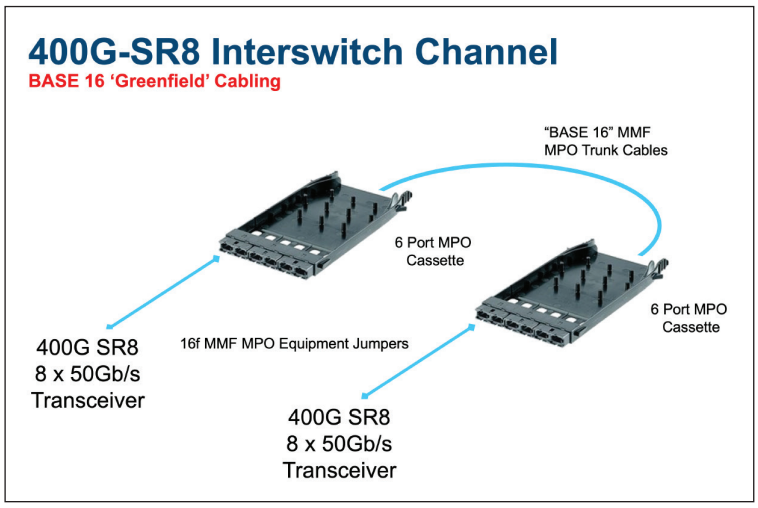
As the data centre market transitions to higher data speeds, it is important to consider what solutions provide the speed and bandwidth necessary to enable those applications that require faster and larger datasets.

BY MICHAEL AKINLA, PANDUIT

HYPERSCALE AND EDGE data centers are installing or upgrading infrastructure fabrics to 400G and even 800G (2x400G) for switch to server and leaf-spine connectivity, for which there are several MMF and SMF transceiver options to choose from. Among these options, many customers are evaluating multimode parallel optics for short-reach network connectivity. 400GBASE-SR8 transceivers over 16 parallel MMF strands (50Gbps on each strand of MMF), require Base 16 MMF structured cabling systems, providing significant value for short-reach connectivity systems interconnecting MOR/EOR switches to servers.

Newer technologies and applications that require faster interconnect, increasing bandwidth, and network capacity require innovative solutions to enable operators to offer leading-edge platforms. There is keen interest in 400GBASE-SR8 systems utilizing multimode transceivers, that for switch-to-server connections provide lower cost and power consumption than SMF alternatives such as 400GBASE-DR4.

Base-16 structured cabling, with small form factors cassettes, MPO-16, and Base 16 cabling simplify network deployment in greenfield networks as shown in Fig. 1. To take full advantage of multimode short reach variant, Base 16 interconnection with SR8 transceiver, can be utilised over existing Base-12 structured cabling infrastructure conversion cassettes.



➤ Figure 1. 16 fibre MPO Solution

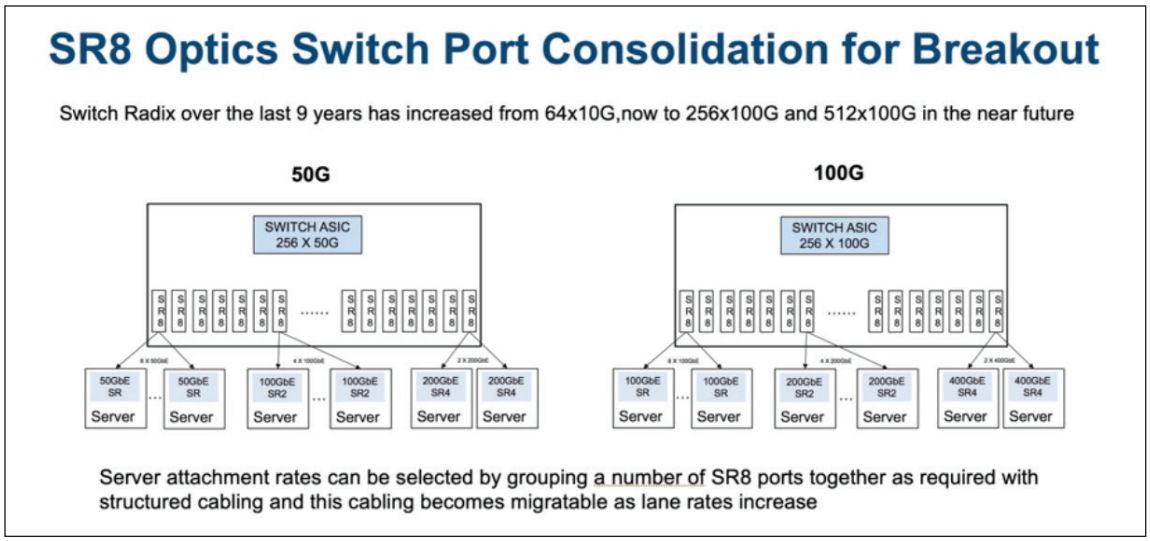
We are currently seeing single mode traffic in terms of some customers moving from 400G to 800G (2x 400G), however, our customer interactions indicate that the multimode 16 fibre MPO modular cassette solution certainly has a place in the market, particularly for MOR/EOR switch to server interconnections due to the previously mentioned advantages. This is especially true in respect of preterm assembly offering speed of deployment, with highly flexible cassette configurations.

Expanding capacity

The key benefit that enabling high density breakouts of 50G server ports using SR8 is the level of expansion if offers. When you have Base-16 fibre from an SR8 perspective it offers 50G breakout, for example, from a 400G SR8 optic, being delivered as a 32 port 1RU modular 400G switch, will then enable 256, 50G breakout ports in terms of a high Radix.

A benefit of this approach is a reduction in the number of optical links and supporting cable plant (patch panels and connectors) as the deployment is 400G to 400G and then using breakout technology to get the 50G at the top of the rack (TOR) server end without using an actual TOR switch. This allows operators to deploy less fibre infrastructure into the data center environment. A further benefit therefore is the fourfold increase in respect of aggregator switch bandwidth, and in some situations a lower initial installed cost, depending on the SKU.

Moreover, the replacement of several TOR switches with a few MOR/EOR with more capable and efficient switches that produce significant reduction in power consumption.



➤ Figure 2. SR8 Optics Switch Port Consolidation for Breakout

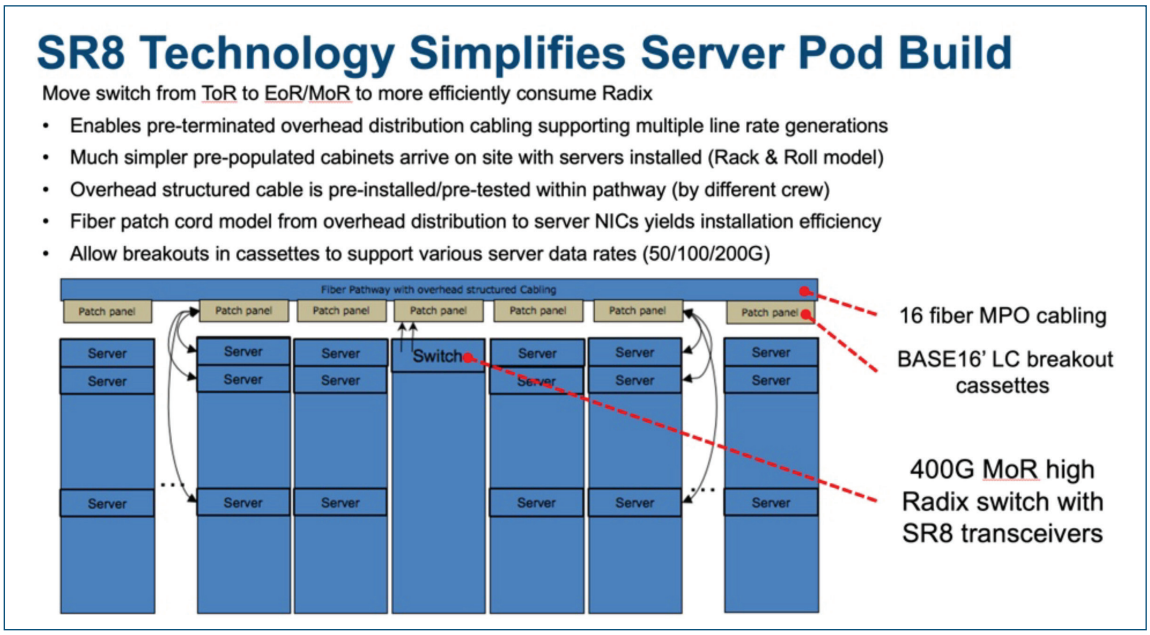
The 400G breakout to 50G servers appears to be a sweet spot from a multimode perspective, using a variety of options such as the conversion cassettes, for customers who want to use existing infrastructure across legacy Base-8 and Base-12 fibre cable plant in conjunction with SR8 Base-16 optics.

400G DR4 transceivers can also breakout into 4 streams of 100G. This can be useful to implement the spine-and-leaf connections between switches. Breakout cassettes as the one shown in Fig. 3 can be used. However, contingent on the deployment length and application, SR8 multimode can provide advantages compared to single mode fibre DR4.

SR8 technology helps to simplify the server pod build providing different options. Data centers can deploy patch panels above the servers which breakout of the 400G transceiver with Base 16 MPO coming into the fibre panel into duplex LC ports, and then use patch cable to connect to the servers at 50G. Another option is to breaks out, with a hydra, from the Base 16 MPO delivering 50G into the server environment, together with an EOR/MOR Switch with 400G ports that break out onto the patch panel and feeds the servers. These deployments enable pre-terminated overhead cable providing simplified cable distribution in pre-populated cabinets. Overhead infrastructure is advantageous in a rolling rollout environment allowing easier access to end of life cabinets and hardware (Fig. 43.

Conclusion

As the data center market transitions to higher data speeds, we need to consider what solutions provide the speed and bandwidth necessary to enable those applications that require faster and larger datasets. Essential to this is the consideration of how the devices that enable this connectivity to interoperate with existing networks, and how their introduction will move the capabilities forward. Base 16 has a place in that discussion as business drivers for data center operator include new network upgrades and increasing bandwidth while reducing latency.



➤ Figure3. Simplify Server Pod Build , SR8 Technology Simplifies Server Pod Build

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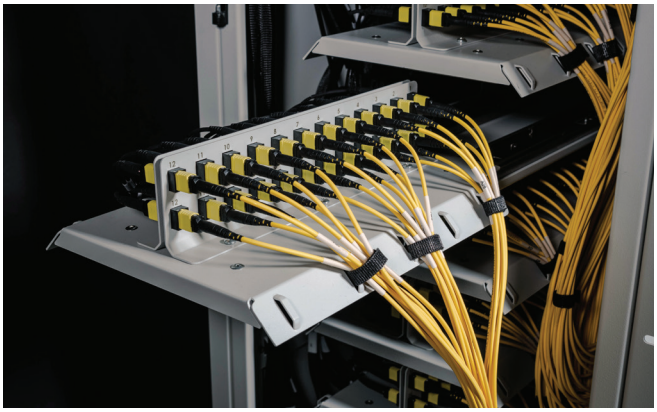
Experience live demonstrations of Fujikura's industry-leading fusion splicing technology. These demonstrations will showcase how precision splicing can dramatically reduce your installation timelines while ensuring the lowest possible loss values—a critical factor in maintaining performance headroom as your network scales.

Visit Stand DC265: Where your challenges meet our solutions

The AFL team at DCW London 2025 isn't just presenting products—we're bringing four decades of problem-solving expertise directly to you. Come prepared with your most pressing data centre challenges, and let's work together to find the right solutions that align with your technical requirements and business objectives.

Whether you are planning a greenfield deployment, upgrading existing infrastructure, or seeking to optimise performance, the AFL team is ready to demonstrate why leading data centre operators worldwide trust us as their connectivity partner of choice.

Stand DC265 at DCW London 2025 – Where your vision for data centre excellence becomes reality.



Is liquid spray cooling the future for data centres

Maintaining the temperature of critical infrastructure within Data Centres through the use of air-cooling technology has dominated the industry for many years, whilst the demand in data consumption has increased year-on-year and in turn has increased the amount of electricity consumed.

ELECTRICITY CONSUMPTION for IT and Cooling systems accounts for approximately 86 percent of the total energy consumption within a Data Centre, while cooling alone can account for up to 40 percent.

Furthermore, in recent years we have seen server technology evolving at a fast pace, resulting in an increase in heat density. Typically, heat density increases by an average of 1kW per rack every two years and we are now starting to reach the point where the effectiveness of air-cooling technology, in some cases, is restricted due to the air's heat transfer coefficient, which limits its ability to remove heat from today's modern chips. Dealing with this issue has been at the forefront of industry debate. The solution in overcoming these limitations is Liquid Cooling.

Some Data Centres are already adopting Liquid Cooling, but the specific technology that has so far been predominately implemented is immersion cooling. Although it is an efficient method in removing heat from CPUs, the technology still has some reliance on mechanical cooling, which makes it less sustainable, and limits the ability of the Data Centre in moving closer to net zero. Combined with the growing pressures of the global energy crisis and repurposing waste heat from the Data Centre, what could be the solution?

Established in 1995, Airsys is a market-leading cooling solutions provider, who think globally, but act locally. We deliver innovative, high-efficiency, precision control thermal solutions for the built environment. With over 25 years' experience, combined with multiple manufacturing facilities and offices globally, Airsys are able to deliver sustainable solutions for critical environments such as Data Centres and Telecoms environments.

A focus on understanding the customers' needs, combined with our technological expertise, has allowed Airsys to develop a liquid spray cooling solution, called the LiquidRack™ which addresses the current limitations of existing technology and moves Data Centres closer to achieving their sustainability goals.

LiquidRack ™is a liquid spray cooling solution designed for multiple types of digital data infrastructures, such as cloud service, telecommunication facilities and more. Differing from immersion cooling, our pioneering approach keeps the dielectric fluid moving, spraying directly onto the CPU. Adopting a liquid spray cooling approach significantly increases the heat transfer coefficient,

in comparison to immersion cooling. Increasing the heat transfer coefficient, allows the dielectric fluid being sprayed on the CPU to be elevated up to a temperature of 65oC, without comprising performance of the CPU. This provides two major benefits. Firstly, the elevated fluid temperatures eliminate the need for chillers, and they can be replaced by dry coolers in environments with ambient temperatures up to 50oC. This means that there are potential free-cooling applications in geographic locations such as the Middle East, for which free-cooling has been traditionally hard to achieve. Secondly, the elevated water temperatures allow for heat recovery.

Heat recovery means that the recovered energy from the Data Centre can be recycled for multiple applications, such as district heating and industrial scale greenhouses to name but a couple. The Data Centre now becomes an energy producer, helping to achieve Net Zero emission goals. LiquidRack™ can offer a seamless connection for heat recovery to district heating systems, due to the high running temperatures, which is another advantage to the solution.

The largest obstacle for the adoption of liquid cooling technology has always been the significant expense involved in transitioning away from air-cooled solutions in existing Data Centre environments. The project complexities and capital expenditure were previously considered to be high-risk. LiquidRack™ changes this, now the transition is seamless. LiquidRack's™ vertical design, size, and lower operational weight, when compared to immersion technology, allow for easier integration into existing Data Centres. Each LiquidRack™ consists of two drawers, with each drawer, for our standard design, able to accommodate up to 7 x 2U servers, therefore each system can hold up to 14 x 2U servers. LiquidRack™ has been designed to provide a cooling capacity of 20kW to 150kW per rack. Each server can be slid out and locked into position for hassle-free inspection and maintenance.

The system is fully adaptable to different server brands, different server layouts and even a mixture of CPUs and GPUs within the same drawer. Designed as a decoupled system, each drawer contains two low powered pumps (N+1) and a highly efficient heat exchanger. The LiquidRack™ design offers an unbeatable fantastic cooling capacity when compared to its modest footprint.

As the LiquidRack™ directly cools the CPU via spray technology, not relying on immersing the server, the dielectric fluid needed is typically reduced by 80% when compared to immersion technology. This provides CAPEX advantages in terms of dielectric fluid procurement and reduces structural issues in relation to weight.

By spraying directly onto the CPU, the LiquidRack™ provides a constant flow and eliminates uneven

fluid flow that can occur using other methods of liquid cooling technology, which can result in server reliability issues. Uneven flow can occur when there is a mixture of different servers immersed or if one or more servers are removed for maintenance, resulting in the dielectric fluid following through the path of least resistance, thus starving the CPU of the flow needed to remove heat. Therefore, LiquidRack™ offers a more reliable solution to preserve servers and maintain Data Centre uptime.

As data consumption becomes ever more important in our day-to-day lives both personally and professionally, global Data Centre electrical consumption is predicted to reach 4% of the total global electrical consumption by 2030. A combination of the world's reliance on gas and oil, and the surging costs associated with them, turbulent energy prices affecting operating costs and budgetary planning, and the need to move towards a more sustainable future, are driving change in the industry.

The Data Centre community needs to quickly adapt and Airsys passionately believe they have a game changing technology that provides a low CAPEX and low OPEX solution that can turn a Data Centre into an energy producer, whilst achieving free cooling anywhere in the world. Liquid Cooling is the next step for the Data Centre industry to achieve their aims of sustainability and Net Zero, and liquid spray cooling is the pioneering next step in the liquid cooling journey.

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As data consumption becomes ever more important in our day-to-day lives both personally and professionally, global Data Centre electrical consumption is predicted to reach 4% of the total global electrical consumption by 2030

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Maximising efficiency whilst reducing costs and carbon:

How tailored end-to-end solutions are the answer to energy management

The data centre industry has become a cornerstone of the modern digital economy. As demand for cloud services, digital communication, and data processing grows exponentially, so too does the energy consumption of data centres.

BY CONRAD ENERGY

FOR OPERATORS in the UK, where energy costs are high and sustainability is increasingly scrutinised, managing energy usage effectively is both a financial and environmental imperative. In this article Tim Foster, Director of 'Energy for Business' at Conrad Energy, explores the challenges of power usage in UK data centres, looks at regulatory requirements and offers actionable and innovative energy management strategies to reduce costs and carbon.

The energy challenge for UK data centres

According to industry reports, data centres account for approximately 1-2% of global electricity consumption, with the figure rising steadily as demand for digital services grows. In addition to financial considerations, environmental impact is a growing concern. With the UK government's commitment to achieving net-zero emissions by 2050, data centres face increasing regulatory and consumer scrutiny. This dual challenge of reducing costs and meeting sustainability targets necessitates a strategic approach to energy management.

The importance of energy management

Effective energy management is about more than cost savings – it is integral to operational reliability, regulatory compliance, and environmental responsibility. The four key goals of energy management in data centres are:

- **Cost efficiency:** Reducing energy expenses to enhance profitability.
- **Sustainability:** Minimising carbon emissions and environmental impact.
- **Operational stability:** Ensuring consistent performance while optimising energy use.
- **Compliance:** Meeting legal and regulatory requirements related to energy and emissions.

Data centre operators must strike a delicate balance between efficiency, reliability and sustainability. Leveraging new technologies and adopting best practices are key to achieving this balance.

Regulatory and market considerations

The UK's regulatory landscape is increasingly focused on sustainability and energy efficiency. Initiatives like the Climate Change Levy (CCL) and the Streamlined Energy and Carbon Reporting (SECR) framework incentivise businesses to adopt greener practices. Data centres that proactively implement energy-saving measures cannot only reduce costs, but also avoid penalties and enhance their reputation.

In addition to regulatory drivers, market demand is shaping energy practices. Customers are prioritising

environmentally responsible providers, and green credentials can be a differentiating factor in a competitive market. Meeting Environmental, Social, and Governance (ESG) requirements is now a critical consideration for many operators. By aligning with these standards and investing in sustainable energy solutions, data centres can appeal to environmentally conscious clients and gain a competitive edge.

Seven tips to help you meet your energy management goals

With energy representing a significant portion of a data centre's operational costs (in the case of enterprise data centres reaching 46% of spending, rising to 60% for service provider data centres), getting a handle on your energy management is key to improving your bottom line. It's a complex world to navigate and with so many options on the table it can be hard to ascertain what's the right energy mix for your data centre. Here are seven opportunities you should consider:

Work with an energy provider offering a holistic view of your needs

Every data centre is different and needs a bespoke approach which takes into account not only your energy usage but also your ESG goals, location in relation to the grid, and opportunities to generate your own energy through installing an on- or off-site energy installation. Find the right partner who can take a long-term view and offer end-to-end solutions so you can reduce the headache of proactive energy management, as well as your carbon footprint and costs.

Take your data centre to the energy source

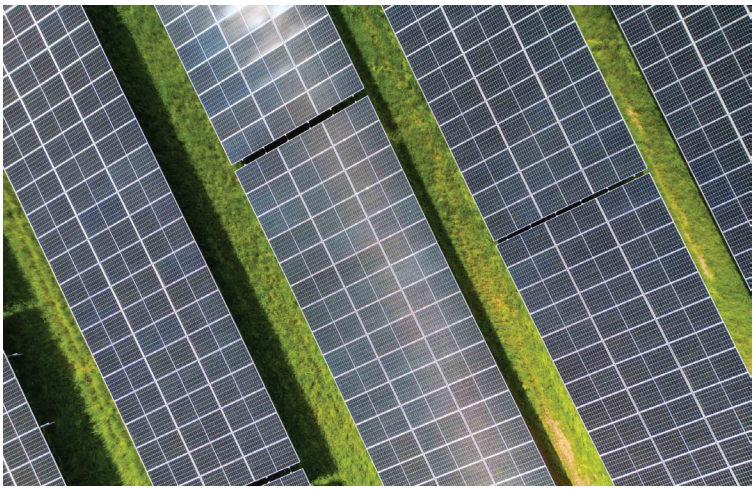
If you're looking to build a new data centre, get creative about the way you approach energy generation. Work with your energy needs not against them. Look at where to locate from an energy point of view, as often the grid connection is harder to secure than the fibre connection. Co-locating a renewable energy installation, such as solar panels or wind turbines, eliminates the need to transport electricity over long distances. Plus, the closer you are, the greater the reduction in energy loss during transmission, ensuring more of the generated power is effectively utilised on-site.

Increase your energy independence

Through generating power locally, a data centre reduces its reliance on the grid. This shields operators from fluctuating energy prices and potential surcharges, providing lower and more stable energy costs. Talking of costs, locally generated energy can be used during peak demand times when electricity prices are higher. This helps offset expensive grid electricity during critical periods, further reducing overall costs.

Enter into long-term Power Purchase Agreements (PPAs)

This approach allows you to secure energy from



renewable sources located further afield at a long-term fixed cost to reduce price volatility. This option will provide your data centre with cost and carbon certainty, helping with your ESG reporting as well as your bottom line.

Match energy consumption with renewables:

Use strategies such as buying renewable energy credits (RECs) to align consumption with sustainable practices. When considering green energy supply, look to half-hourly matched renewable generation against your demand to maximise your environmental impact. Products such as our own market-leading Match+ product can offer this level of transparency.

Monitor and analyse energy usage

Comprehensive monitoring is critical for identifying inefficiencies and implementing improvements. Make sure your supplier offers you an easy-to-use energy visualisation platform to track energy consumption in real-time. Leverage the insights to identify trends, anomalies, and areas for improvement as well as to benchmark performance.

Work with your local community

Sharing renewable energy installations with other facilities or communities can spread the cost of implementation and maintenance. It also enhances an organisation's ESG credentials by demonstrating collaborative and sustainable energy practices locally, which can attract environmentally conscious clients and investors.

The path forward

As the backbone of the digital age, data centres must lead the way in sustainable energy practices. While challenges remain, the combination of technological innovation, strategic energy management, and regulatory incentives offers a clear path to efficiency.

The journey is ongoing, but every step forward makes a difference. In a rapidly evolving digital landscape, energy management is not just a necessity but an opportunity to demonstrate leadership and commitment to a greener world.

Essentra at Data Centre World

At Data Centre World, Essentra is set to showcase an extensive range of access hardware, innovative electronic locking solutions, and a broad selection of standard components designed to optimise data centre operations. As a global leader in manufacturing and supplying essential components, Essentra is committed to providing tailored solutions that enhance efficiency, security, and durability in data centres worldwide. Visit stand DC464 to experience our latest advancements firsthand.

TAILORED SOLUTIONS for the Data Centre Industry
At Essentra, we recognise that even the smallest details can significantly impact the efficiency, security, and longevity of data centres. Our comprehensive portfolio includes a vast selection of standard components, but if an off-the-shelf solution doesn't meet your exact needs, we offer customisation options ranging from simple colour changes to fully bespoke parts designed for your unique application.

Our in-house capabilities, coupled with advanced industry-leading testing, ensure that we deliver precisely engineered solutions that meet your specific requirements. Whether you need robust locking mechanisms or durable gaskets, Essentra is your trusted partner for precision-engineered components.

Unmatched in-house expertise

Essentra's strength lies in our comprehensive in-house tooling and manufacturing capabilities, spanning 14 global manufacturing facilities. Our highly skilled tooling teams collaborate with clients to optimise designs for superior performance and longevity. Meanwhile, our dedicated research and

development teams conduct rigorous testing, including:

- IP sealing tests to ensure protection against water and dust ingress
- Salt spray corrosion resistance assessments for enhanced durability
- Environmental stress testing to confirm performance under extreme conditions

We test to IP specifications directly in our laboratories, ensuring that our components meet the toughest industry standards and perform reliably in the demanding data centre environment.

A comprehensive product portfolio

With over 45,000 stocked products and more than 1 billion components in inventory, Essentra ensures that you receive the components you need, when you need them. Our extensive portfolio includes:

- **Locking solutions –** swing handle locks, rotary latch systems, cam locks
- **Hinges –** for doors, cabinets, and panels
- **Feet and castors –** for enhanced mobility and stability
- **Sealing gaskets and edge protection –** for superior environmental resistance
- **Handles –** offering ergonomic and durable designs
- **Cable entry systems –** for organised and secure cable management
- **Panel fasteners and clips –** to streamline assembly and installation
- **PCB hardware –** for secure electronic board mounting

Our newly expanded linear handle range is just one example of our commitment to continuous innovation and responsiveness to customer needs. Whether you require standard components or high-strength stainless steel options, our team is ready to discuss solutions that align with your operational requirements.

Custom solutions designed around you

Recognising that every data centre has unique requirements, Essentra goes beyond standard solutions by offering customisation options, including:

- **Custom Colours & Branding –** Choose powder-coated finishes, engraved logos, or printed branding for a professional and personalised touch.
- **Specialised Components –** From modified gaskets to bespoke handle designs, we work closely with you to develop the ideal solution tailored to your specific application.

Global reach, local support

With a presence in 29 countries and 24 strategically located distribution centres, Essentra provides fast, reliable service wherever you operate. Our expert teams offer tailored support, ensuring that components meet your exact specifications and are delivered promptly. As a trusted partner to over 70% of the world's leading global manufacturers, we bring decades of expertise and innovation to every project.

Engineered for performance and sustainability

Essentra's components are meticulously designed to enhance the lifecycle of data centres. From advanced sealing gaskets that prevent dust and water ingress to durable coatings that withstand harsh conditions, our products are built for reliability and efficiency.

We are also committed to sustainability, incorporating up to 50% recycled content in many of our protection ranges and developing recyclable components that support your environmental objectives.

Why choose Essentra?

With over 65 years of industry experience, 3 billion components manufactured annually, and a relentless commitment to innovation, Essentra is the trusted partner of choice for data centres worldwide. Whether you need readily available off-the-shelf solutions or custom-engineered components, our expertise ensures you receive the best-fit products for your operations.

Visit us at Data Centre World

Explore how Essentra can elevate your data centre operations by visiting stand DC464 at Data Centre World. Meet our expert team, witness live demonstrations of our electronic locking solutions, and discover how our tailored components can enhance your efficiency and security.

Get in touch today:

- Phone: 0345 528 0474
- Email: sales@essentracomponents.co.uk
- Website: essentracomponents.com for the latest news, insights, and product resources.

colorex® SD/EC

Keeping the environment under control

Forbo Flooring Systems is an international market leader with a wealth of experience in floor coverings, offering a range of ESD solutions which can serve the highest demands and requirements of controlled environments.

Reducing the generation of electrostatic charges is the main purpose of control measures in ESD protected areas (EPA). In areas such as data centres, the right floor covering plays a crucial role. It not only drains electrostatic charges from personnel and equipment, but it also reduces the generation of charges where they occur, at the interface between the soles of shoes and the floor.
For this segment, Forbo recommends the Colorex SD | EC ranges of static control flooring.

There are conductive and static dissipative options along with an adhesive free loose lay version called Colorex Plus, that is ideal for overlaying existing flooring where downtime, cost or subfloor repairs are an issue.

An advanced technical flooring system specifically designed to control static discharge in sensitive areas such as data centres. It is also aesthetically pleasing, enhancing any interior.

Colorex SD/ EC tiles

Colorex tiles are manufactured using a unique production method in which the product is heated and pressed inside an oven for close to an hour. This unique production method offers a range of benefits.

- It creates the most dense, compact and resilient ESD control tiles available.
- It allows a range of surface repairs to be conducted not possible on other products.
- It provides ESD conductivity that is stable for the life of the product.
- It allows us to directly injection mould onto the tile itself, creating an exceptionally robust loose lay ESD tile solution (Colorex Plus).

With Colorex SD & EC, static charges flow easily through the dense network of tiny conductive veins that run through the whole thickness of the tile. If the installation is direct to a concrete subfloor, the charge is transmitted via the conductive adhesive and securely discharged to earth via the copper strip. When combined with raised access panels, adhesive and contact to the aluminium panel conducts the charge away to the pedestals and hen grounding. The loose laid `plus` system requires no adhesive and can overlay any flat and mechanically sound existing surface.

The unique construction of Colorex tiles means that conductivity is not affected by changes in temperature or humidity.
Colorex tiles are available with two levels of conductivity:

- **EC** - Electro Conductive
- **SD** - Static Dissipative

The benefits of Colorex:

- Forbo's unique production method and technology ensures a permanently conductive floor covering guaranteeing optimal performance throughout the lifetime of the floor, regardless of the humidity level of the area. Colorex fully complies with all ESD standards.
- Thanks to the polymeric nature of the tiles and their highly compact construction, the surface of Colorex can be fully restored and repaired extending it's useful life.
- Low plasticizer content in Colorex tiles creates excellent dimensional stability and prevents shrinkage.
- The low plasticizer content also ensures extremely low emissions and outgassing. Colorex fully complies with all cleanroom standards, confirmed by the Fraunhofer institute.
- The dense construction of Colorex and the Colorex plus loose lay system provides excellent resistance to heavy loads making it an ideal solution for commercial and industrial environments.
- Colorex is available in tile format, a prerequisite for raised access floors found in many data centres and server rooms.
- There is an option to add high visibility integrated safety signs and guiding with Colorex signal and Colorex signal glow.
- Being one of the most trusted brands on the market, you can have peace of mind that Colorex complies to every standard and norm that is required today.

Creating better environments

Forbo Flooring Systems constantly strive to produce sustainable flooring systems that create better environments. At the same time helping take care of the natural environment through a commitment to sustainable development, responsible raw material procurement and manufacturing processes. All Colorex products are manufactured using 100% renewable electricity and are REACH compliant.

For more information about the ESD floor covering solutions from Forbo Flooring Systems please contact us:
www.forbo-flooring.com
industry@forbo.com
Tel: 01773 744121

An advanced technical flooring system specifically designed to control static discharge in sensitive areas such as data centres

Revolutionizing data center power management in 2025

The power challenges of tomorrow's data centers demand bold thinking and innovative solutions today.

BY DAVID WOOD, SENIOR PRODUCT MANAGER, EDGE COMPUTING AT NVENT

AI, MACHINE LEARNING, the proliferation of cloud and high-performance computing and digitalization trends are driving the need for more data centers, IT infrastructure and communications technology. Powering next-generation IT equipment efficiently and effectively is a complex challenge, as evolving technologies demand higher energy densities and dynamic workloads continuously reshape power requirements for high-tech equipment racks.

Strategic and innovative power management will be the cornerstone of scaling artificial intelligence and machine learning applications in 2025.

Meeting the massive power demands of AI

As data centers continue to expand, data center managers need systems that not only deliver the right amount of electricity to power IT equipment but also prevent stranded power—making sure every watt is utilized effectively while remaining within the cooling system's capacity to handle heat loads. By carefully managing power delivery, data centers can optimize energy efficiency, protect equipment, and avoid waste.

As racks become denser and AI workloads demand increasingly concentrated power, data center managers should expect growth in demand for high amp PDUs, which can safely deliver more power within racks to power next-generation equipment. At the same time, efficient cooling systems will be paramount to effectively manage heat loads and sustain equipment performance. Data center managers must proactively ensure uninterrupted operations, even during power outages. By leveraging DC power sharing features, one PDU can draw power from another to maintain uptime and provide personnel the crucial time needed to address issues and restore normal operations. Coupled with continuous monitoring systems, managers can stay informed in real-time so they are equipped to respond swiftly and effectively.

Retrofitting the past, powering the future of AI

As demand for data skyrockets, the industry is racing to construct new data centers while breathing new life into existing ones. Older facilities often fall short of meeting the power demands of today's AI and machine learning applications.

To keep up, data center managers must reimagine their power infrastructure, investing in high-density, cyber-secure solutions that can handle the challenges of modern workloads.

To stay ahead, data center managers must prioritize partners capable of delivering on their promises while seeking products designed for seamless deployment. Innovations like color-coded rack PDUs simplify installation by enabling quick identification of primary and secondary power feeds, reducing downtime caused by human errors. Additionally, color coding for voltage, phase, or current ratings ensures safer and more efficient operations.

From basic to brilliant: The growing need for smart PDUs

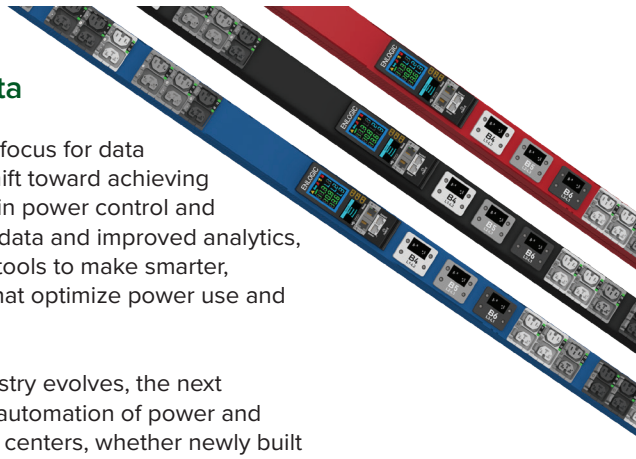
Basic PDUs power equipment effectively but lack advanced features for monitoring and control. Smart PDUs go a step further, integrating technologies to monitor power usage across multiple devices, provide proactive alerting and actively safeguard critical IT systems by detecting electrical and environmental risks.

The remote monitoring and control features of smart PDUs are game-changers in boosting energy efficiency and preventing downtime. Input metering allows operators to remotely track the electricity flowing into a PDU, reducing the chance of overloading and tripped breakers. By staying ahead of capacity limits, managers can mitigate risks before they escalate. High-accuracy metering provides real-time insights into power consumption, helping operators pinpoint inefficiencies and refine capacity planning.

Modern PDUs take monitoring to the next level by integrating outlet-level metering, offering advanced control and insights. This allows operators to track the energy consumption of each connected device, compare efficiencies and identify underutilized or "zombie" devices that waste power. By remotely addressing these inefficiencies, managers can optimize energy use. Advanced PDUs are also equipped with environmental sensors that help ensure critical IT systems remain protected from temperature and humidity risks.

Modern data centers demand tools that combine real-time monitoring with seamless maintenance. Remote alerts ensure potential issues are identified immediately, while hot-swappable controllers let teams address these challenges without shutting down critical systems. This combination keeps operations smooth and resilient.

Redefining operations: Automation in data centers



In the years ahead, the focus for data center managers will shift toward achieving even greater precision in power control and monitoring. With richer data and improved analytics, managers will gain the tools to make smarter, data-driven decisions that optimize power use and efficiency.

As the data center industry evolves, the next leap forward lies in full automation of power and operations. Future data centers, whether newly built or retrofitted, will rely on automated processes to streamline efficiency, enhance reliability and elevate user experience. AI and machine learning will play pivotal roles, enabling smarter power management systems that are not only safer but also more efficient. To prepare for this future, here are some essential features data center managers should prioritize:

- Advanced networking capabilities
- Environmental monitoring paired with access control
- DC power sharing for redundancy
- Intuitive electronic color coding
- Toolless, hot-swappable components
- Precision high-accuracy metering

The power challenges of tomorrow's data centers demand bold thinking and innovative solutions today. From smarter power distribution to full automation, the industry is set to redefine efficiency, reliability and sustainability. By embracing advanced tools and technologies, data center managers will not only meet the demands of AI-driven workloads but also unlock new levels of performance and scalability. The journey to the future of data center power management starts now.

Delivering on data: How technology can help deliver projects more effectively

Demand for new data centre infrastructure is outpacing supply. Appetite is being fuelled by the increasing adoption of digital services, streamed content, online gaming and the spread of connected devices — as well as by the uptick in artificial intelligence capabilities and activities across many industries and sectors. As businesses and individuals generate and consume more data, the need for robust data centre infrastructure to store, process and distribute this data is critical.

BY PROCORE

DATA CENTRE construction projects are by their nature complex and face challenges of rising costs, project delays and increased operational costs. Projects require intricate planning around the provision of electrical systems, power and backup availability, cooling and airflow design and physical security above and beyond the considerations of traditional construction projects.

The European data centre construction market is poised for significant growth over the next five years. Western Europe currently leads the market, accounting for 66% of Europe's total data centre power capacity. However, further development in this market is being hindered by power availability and expensive land costs. As a result, developers are exploring opportunities in new territories in Southern Europe and the Nordics.

With some European governments — including in the UK and France — also designating data centres as critical infrastructure, the demand for new builds is putting more pressure on successful delivery and highlighting the need for developers to have the right technology tools to deliver projects at scale.

Technology, and specifically construction management platforms, can be an enabler for delivering new data centres at scale. Modern construction platforms enable companies to improve project efficiency, allow remote teams to collaborate seamlessly, help manage risks and drive down costs to deliver higher return on investment.

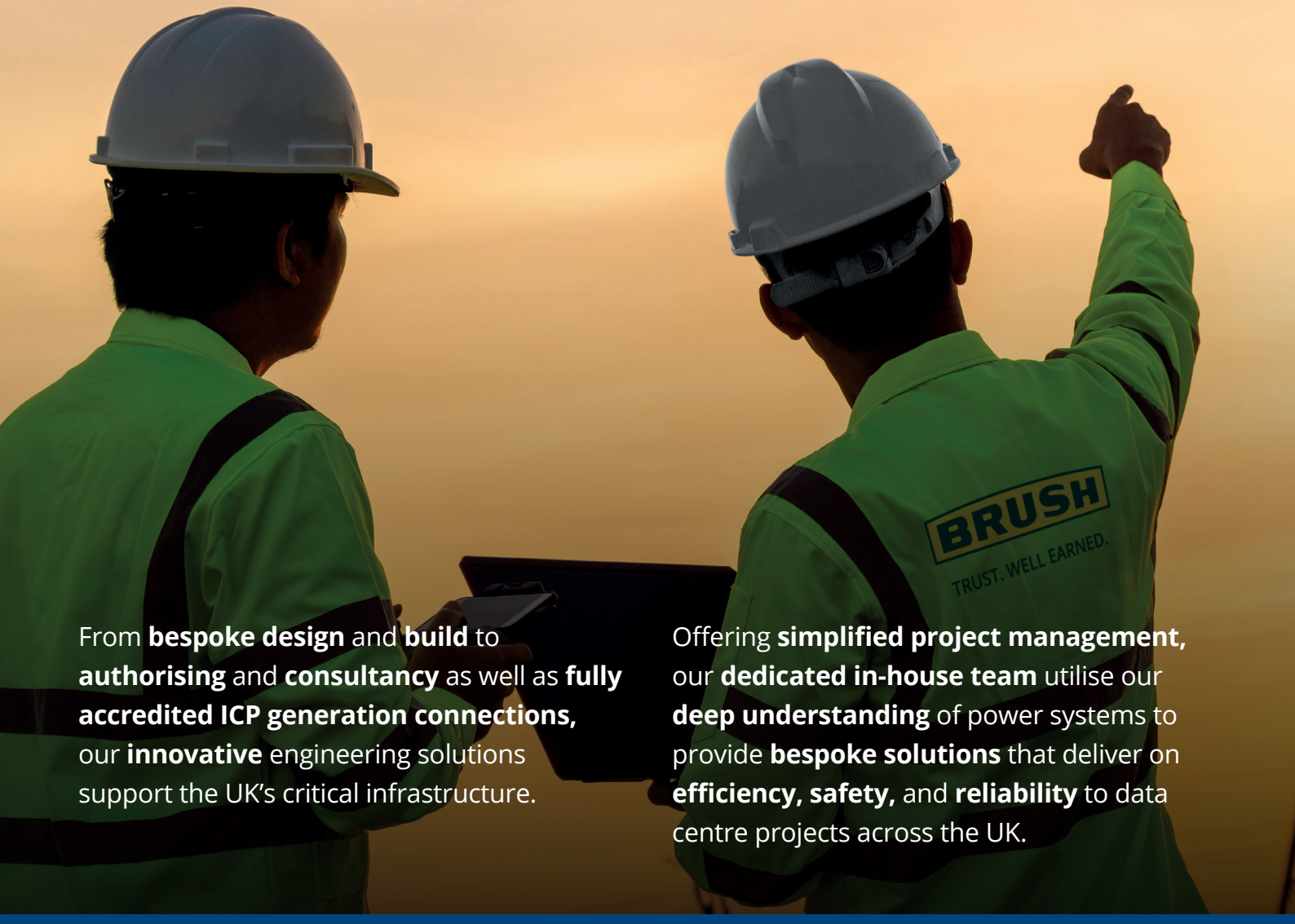
But many construction software solutions lack the real-time visibility needed to mitigate the challenges of construction, especially the additional challenges of data centre developments. Traditional, manual processes that rely on spreadsheets can't support the complexity of data centre delivery at scale in high-pressure environments. There is a need for solutions that can streamline processes, enhance coordination and improve time to market across all phases of construction. Developers need a platform that can provide a unified 360-degree view of projects in real time.

Dedicated to the construction industry, Procore unites real-time data, flexible project and cost management, and advanced analytics for both the office and site. It empowers all project stakeholders with access to essential information to accelerate decision making and time to value, ensuring predictable and sustainable outcomes.

BRUSH

TRUST. WELL EARNED.

FROM CONCEPT TO CONNECTION, AND BEYOND



From **bespoke design** and **build** to **authorising** and **consultancy** as well as **fully accredited ICP generation connections,** our **innovative** engineering solutions support the UK's critical infrastructure.

Offering **simplified project management,** our **dedicated in-house team** utilise our **deep understanding** of power systems to provide **bespoke solutions** that deliver on **efficiency, safety,** and **reliability** to data centre projects across the UK.

Come and see how **we're redefining what's possible** at **stand DC486** or email **info@brush.eu** to discover how we can take your project from **concept to connection, and beyond.**

brush.eu

The platform helps address one of the key challenges of data centre construction by centralising all project data and documentation in one online hub. This helps promote collaboration and improves efficiency and communications. Teams on site and in the office can use integrated solutions to access real-time, accurate information. This is a massive help to teams managing complex projects proactively, as well as mitigating risks and adhering to schedules in the face of constantly changing demands.

Improving connectability by storing information centrally helps to remove data silos, where information fails to flow between teams and systems making a 'whole project' view impossible to achieve. Standardisation is another benefit of a centralised solution, allowing teams to work with greater predictability. The automation of many project activities saves time, reduces admin and helps teams focus on tasks that really matter.

With so many moving parts to data centre construction, managing risk is a mammoth challenge. The Procore platform enables teams to take control of key data, processes and reporting standards to ensure projects are delivered safely, reliably and in full compliance with all regulatory and sustainability standards.

A centralised solution ensures the traceability of key data and decision making to minimise the risks of disputes and rework. Integrated tools help improve safety on site by allowing teams to predict and course correct issues before they become problems. By ensuring consistent quality controls and adhering to industry standards, developers are actively maintaining their reputation.
Instant access to real-time data gives you full visibility across your project and entire portfolio, and in turn, better control of resources in a fast-moving and dynamic market. With greater clarity on costs, you can predict and stay ahead of deviations in financials and avoid overruns. Powerful, built-in analytics gives managers a better understanding of the business with dashboards and visual tools. And ultimately, as your data grows, the business gains more insights into how project decisions impact the bottom line now and in the future.

Many data centre owners and operators are already using Procore to deliver their projects. Vantage Data Centers was facing challenges managing its large, complex projects efficiently. Using Procore helped it improve team communications. Having all its data and documentation stored in one central place helped reduce complexity. Accurate benchmarking analytics gave it data-driven insights to help manage its risks and it brought its costs under control with real-time financial tracking, allowing it to improve forecasts and avoid overruns. Abhilash Kunnatoor, director, solutions architecture and engineering at Vantage said: "Procore is a centralised source of truth and it helps us at a project level, but also at an executive level because we have real data with integrity to base our decisions on."

Data centre construction specialist, Ardmac, also turned to Procore to help streamline its operations and deliver complex projects. Its remote teams now work on centralised data with a platform that allows them to share information freely and use analytics to help inform decision making. With drawings stored centrally using proper version control, the risk of rework is reduced by ensuring that everyone works from the correct version. Ardmac's teams also use automated timesheets for tracking productivity, saving the company time by eliminating error-prone and time-consuming manual processes. Ardmac's technical manager Fergus Nugent appreciates Procore's simplicity: "You have access to everything you need, all on one platform. It's easy to use, it isn't scary, and you can't break it."

With the right tools and technology, data centre developers can deliver at scale and at pace. Procore empowers all stakeholders involved in data centre construction with access to essential information to accelerate decision making and time to value, ensuring the predictable and sustainable delivery of mission-critical infrastructure.

With so many moving parts to data centre construction, managing risk is a mammoth challenge. The Procore platform enables teams to take control of key data, processes and reporting standards to ensure projects are delivered safely, reliably and in full compliance with all regulatory and sustainability standards

Building the Future of Data Centres

Making better connections.

“Procore is easy to use, and you can’t break it. It has ensured we’re able to better plan, collaborate, and deliver on data centre construction projects.”

Fergus Nugent ⬣ TECHNICAL MANAGER, ARDMAC

PROCORE

⬣ PROCORE.COM

Optimizing containment for sustainable data center goals: Enhancing efficiency and reducing environmental impact

The rising complexity of AI and high-performance computing (HPC) that data centers have increasingly had to handle has meant that they have now become hugely energy-intensive buildings. In addition, data center operatives have the ongoing challenge of minimizing environmental impact while maximizing energy use.

BY ANDY CONNOR, CHANNEL DIRECTOR EMEA FOR SUBZERO ENGINEERING

ENVIRONMENTAL consciousness and power resourcefulness are now essential objectives in the struggle to balance operational efficiency with sustainability.

One of the best strategies to accomplish these objectives is utilizing optimized containment. Containment systems offer improved cooling capacity with reduced energy use. By enhancing airflow control and lessening the pressure on cooling systems, containment can help data centers to save energy, not consume more.

Understanding containment systems

By keeping hot and cold air streams separate, to limit mixing, and increase cooling effectiveness, containment systems facilitate a regulated airflow environment. There are two primary types of containment systems:

- **Hot Aisle Containment (HAC):** This system encloses the hot aisles guiding the hot exhaust air away from server racks. The hot air is then returned to the AC return system. The HAC can increase cooling efficiency by 30%.
- **Cold Aisle Containment (CAC):** This system isolates the cooled supply air from the CRAC units within direct proximity of the air intake of critical equipment.

While each has its benefits, data center layout, cooling infrastructure and sustainability goals can influence the choice of approach.

Best practices for containment optimization

Containment should be the fundamental starting point for maximizing cooling capacity and energy efficiency in data centers. However, there are several needs to consider when determining the best containment strategy for the data center's needs.

- **Efficient layout**
  The current airflow dynamics firstly need to be assessed to examine and understand before the movement of air within the facility can be managed.
- Ensure high-density rack layouts are arranged together.
- Seal gaps and openings to prevent air leaks.

Floors and ceilings are the most obvious leak areas but so are grommets and blanking panels.

- **Adaptive cooling systems**
  Intelligent cooling technologies such as variable-speed fans and economizers can be used, alongside real-time temperature and airflow monitoring.
- AI-driven analytics can also be used for proactive energy management.
- **Continuous monitoring and adjustments**
  Real-time monitoring tools should be implemented to track temperature, humidity and airflow to ensure ongoing efficiency.

Key benefits of optimized containment

Optimizing cooling by separating the hot and cold air can ensure stable and consistent temperature distribution. By improving energy efficiency and overall cooling effectiveness, this can deliver on significant energy savings.

With optimized airflow control, any strain on cooling systems can be alleviated by targeting cooling levels precisely where they are needed. This targeted cooling can enable those higher-density server racks that are crucial for handling AI and HPC loads in specific sections of the data center, decreasing the risk of those zones overheating. This facilitates better utilization of the available space while reducing thermal stress on hardware, preventing premature failures and prolonging the ITE lifespan. Furthermore, intelligent containment solutions can use adaptive energy management integrated with a dynamic cooling control to adjust power usage based on real-time demand.

The cost savings accredited to these energy management techniques can contribute to a much quicker return on investment in infrastructure, while lowering operational costs. But as an added benefit, greenhouse gas emissions associated with excessive power use can also be drastically lowered, leading to a more sustainable operation.

No Containment?

What if you don't use containment? While it may be possible to maintain enough airflow at the ITE intake to cool up to 6 kW per rack, more fan energy and lower supply temperatures would be required. Cooling systems would need to work much harder to maintain optimal temperatures effectively in the zones where the hot and cold air mixes, increasing the draw on energy. Hot spots and uneven cooling may also occur, negatively affecting the equipment's performance, longevity and reliability.

Any negative effect on ITE performance or lifespan leads to increased maintenance costs or premature replacement. The direct consequence of producing more e-waste also contributes greatly to carbon emissions, adversely impacting sustainability efforts.

Reducing environmental impact

Containment strategies can significantly reduce the unfavorable environmental consequences of the data center. Water-intensive cooling systems can be eliminated, wasteful airflow and recirculation can be restricted and cooled air can be stopped from escaping. Efficient and effective cooling can lower both energy consumption and carbon emissions. Optimizing containment is a vital first step toward achieving sustainable data center goals. Intelligent cooling systems, that decrease energy waste, and efficiently regulate airflow, can enable data centers to maximize and boost operational efficiency while minimizing their impact on the environment.

Optimizing cooling by separating the hot and cold air can ensure stable and consistent temperature distribution. By improving energy efficiency and overall cooling effectiveness, this can deliver on significant energy savings

Carbon neutral consciousness

Long-term environmental goals need to be supported by sustainable infrastructure built with energy-efficient technologies and renewable energy sources. Utilizing containment to conserve energy can accomplish sustainability objectives while preserving high performance and reliability. This not only lowers the total cost of ownership (TCO), but helps to deliver on global environmental goals, enhancing eco-friendliness and reputation.
As the industry shifts to greener technology with a greater consciousness of carbon-neutral industrial sciences, optimized containment will continue to be a key strategy in the development of the next generation of high-performance yet environmentally friendly data centers.

Navigating the AI Revolution: Powering the Next Generation of Data Centers

The data center landscape is experiencing a seismic shift driven by the exponential growth of artificial intelligence (AI). As the prevalence of AI technologies continues to rise, providing power distribution to meet the demand for high-performance computing and advanced data processing capabilities becomes a growing challenge.

BY LEGRAND

A RECENT International Energy Agency report forecasts that data center's total electricity consumption could double by 2026, reaching more than 1,000 terawatt-hours (TWh) in 2026.

As AI algorithms become more advanced and workloads increasingly dynamic, power requirements can exceed 40kW, potentially straining equipment. However, traditional power distribution systems often fail to meet these facilities' changing needs.

Operational and power design challenges

The increasing power density of AI systems also has implications for data center design and operations. As power distribution systems expand to accommodate higher ampacities, data centers' physical footprints may need to increase. This presents challenges in terms of building design, floor space utilization, and operational logistics. Additionally, the shift to higher power densities poses operational challenges, such as the need for more frequent maintenance and the potential for increased temperatures in the data center environment.

Common power distribution challenges include:

- **Rising Power Density:** Increasing demands on IT infrastructure require higher power densities, leading to complex wiring setups that hinder airflow and efficiency.
- **Installation Complexity:** Traditional systems often involve intricate installation processes, leading to delays and increased labor costs.
- **Lack of Design Flexibility:** The ability to adapt to changing power requirements and scale operations is paramount, but rigid power distribution systems can make this challenging.
- **Power Quality Fluctuations:** Lack of visibility into harmonic currents and voltages in power systems can lead to efficiency issues, overheating, and safety hazards.

Data center sustainability challenges

Data centers must also grapple with the dual challenge of accommodating growth and increased energy consumption while prioritizing sustainability and energy efficiency. Regulatory bodies like the European Union (EU) closely monitor data center energy usage through the Energy Efficiency Directive. This directive mandates that data center operators with a total rated power of 500 kilowatts or above are required to publicly report their energy performance data annually.

An integral aspect of sustainability involves addressing 'Scope 3 emissions' under the Greenhouse Gas Protocol. While there's a significant focus on Scope 1 and 2 responsibilities, which measure emissions from a data center's own operations and electricity usage, Scope 3 emissions encompass the broader environmental impact of indirect emissions generated by data center operations outside its premises.

To effectively navigate these challenges, data center infrastructure and strategies must adapt to ensure continued reliability, efficiency, and environmental responsibility.

Track busway systems

Data center managers must consider upgrading power systems and integrating power monitoring points to address these challenges. This strategic approach can optimize power and cooling systems, enhancing operational efficiency, particularly as Machine Learning integration becomes more prevalent.

Track busway systems offer several advantages over traditional power systems. Suspended or mounted track busways negate the necessity for a remote power panel (RPP) in data centers or pipe and wire electrical distribution in other facilities. This eliminates the need for extensive wiring setups, resulting in enhanced flexibility and scalability for

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STARLINE TRACK BUSWAY

5 Key Advantages

- Flexibility
- Energy Efficiency
- Scalability
- Reliability and Safety
- No-Routine Maintenance

www.legrand.com/datacenter

electrical reconfiguration, and optimizes airflow and energy efficiency, improving the overall sustainability of the data center ecosystem.

Implementing a busway solution that monitors power at various points along the busway is pivotal for ensuring a dependable and secure power distribution system. This approach furnishes real-time voltage, current, and power data for analysis, enabling the identification of potential enhancements in energy efficiency and reliability. Accurate and reliable data empowers data center managers to make informed decisions, resulting in effective strategies that optimize operations, yield significant cost savings, and enhance overall performance.

Track busway qualities to look for

Data center managers should consider selecting track busways that offer the following features:

- **Flexibility and Scalability:** A continuous access slot design that allows self-contained plug-in units to be positioned at any point along the busway, offering high plug-in unit density, and allowing for seamless expansion and adaptation to changing power requirements.
- **Real-time Power Monitoring:** Advanced energy metering capabilities for branch circuit and end feed monitoring. This empowers data center operators to make informed decisions to enhance energy efficiency and report on energy usage.
- **Ease of Installation and Maintenance**: Plug-inunits that can be easily and quickly added, removed, or relocated that require no routine maintenance.
- **Customization:** Flexible design to offer customizable lengths, sizes, colors, and configurations to meet your unique specifications.
- **Service Offering:** Look for a supplier that offers a range of ancillary services, including on-site support, recertification, and extended warranty plans to safeguard your investment, reduce risk, and minimize downtime.
- **Product Transparency:** Partner with a sustainable supplier that can provide Product Environmental Profiles (PEPs) that communicate the environmental impact and performance of the product based on Life Cycle Assessment (LCA).

Embracing the future

The rise of AI technologies presents challenges and opportunities for the data center industry. By incorporating Track Busway solutions into data center infrastructure, operators can address the challenges posed by escalating power densities while contributing to significantly reducing Scope 3 emissions. This will position data centers to meet the demands of AI-driven workloads while ensuring their facilities' continued reliability and energy efficiency.

Starline Track Busway offers an innovative solution for powering high-density deployments and adapting to the evolving needs of AI-driven workloads. Its first-of-its-kind access slot allows for flexible layout changes without service interruption, reducing electrical installation time by 90 percent.

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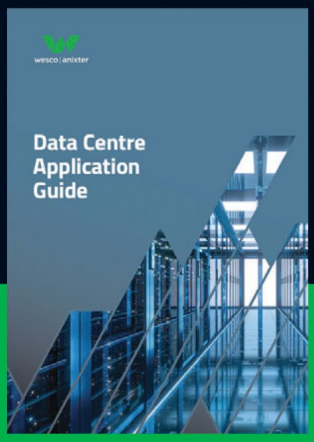
Create a Future-Ready Data Centre

Our Data Centre Application Guide is your roadmap for best practices and solution recommendations for future-ready data centres.



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Sustainable data centres in the AI era

A new wave of artificial intelligence (AI) innovation has reached Europe, and both its pace and adoption show no sign of slowing. According to a new report from JLL, an estimated 10 GW of new data centre capacity is projected to break ground across the global hyperscale and colocation landscape in 2025, and the market is expected to expand at a CAGR of 15%-20% through 2027.

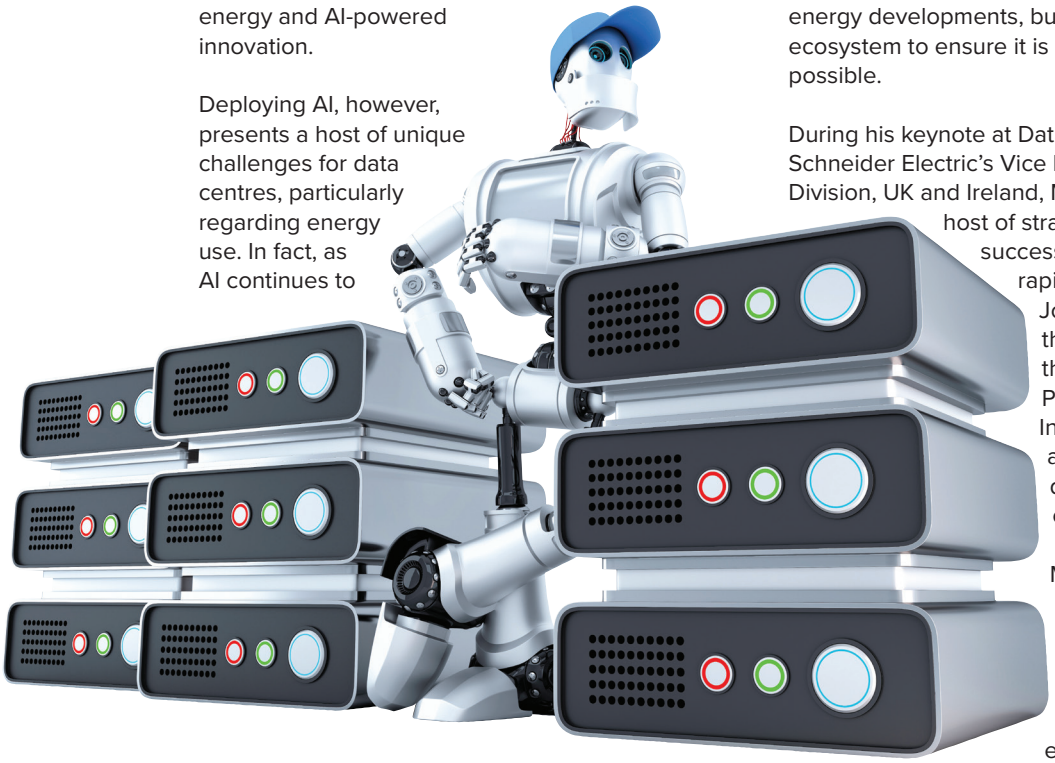
BY SCHNEIDER ELECTRIC

IN THE UK and Ireland, the digital and consumer economies are quickly changing, with data and AI fuelling a new industrial revolution. Governments, investors and businesses alike are seeking new ways to capitalise on the AI opportunity, and exploring new measures to catalyse sustainable, economic growth.

Powering data centres in the era of AI

The data centres of the future have become a critical fourth utility for our lives, and are today ushering in a new era where digital infrastructure has become a catalyst for renewable energy and AI-powered innovation.

Deploying AI, however, presents a host of unique challenges for data centres, particularly regarding energy use. In fact, as AI continues to accelerate in both adoption and use cases, organisations must now shift their focus to developing an energy strategy that optimises power consumption and usage, rather than simply increasing power supply.



This not only means finding ways to decouple AI data centre growth from energy consumption but further emphasizes the need for greater efficiency and sustainability within data centre design and buildouts. To achieve a greener future powered by AI, therefore, we must not only accelerate the build-out of digital infrastructure and renewable energy developments, but harness the power of the ecosystem to ensure it is done so as sustainably as possible.

During his keynote at Data Centre World London, Schneider Electric's Vice President, Secure Power Division, UK and Ireland, Mark Yeeles, will share a host of strategies to help businesses successfully navigate this rapidly evolving landscape. Join us at 11:05am on the 12th March 2025 on the 'Global Strategies, People, Environment & Innovation' stage to learn about the impact of AI on data centres, and how to overcome its challenges.

Mark will also share how Schneider Electric is working to 'bend the energy curve of AI' by employing a science-based approach to energy intelligence, and

demonstrate how organisations can integrate data centre infrastructure with AI-driven applications as a tool for broader decarbonisation efforts.

AI and asset management strategies

Where data centre modernisation and deployment is concerned, the exponential growth of the sector poses significant challenges on a multitude of plains.

On the one hand, designing new AI-ready facilities to meet the surge in demand is no small feat, requiring access to land, skills, components, and energy. On another, retrofitting legacy data centres for both the infrastructure hosting requirements of AI, and for greater sustainability and efficiency is another key factor, and both challenges are further compounded by a shortage of qualified technicians who have the skills necessary to perform these critical services.

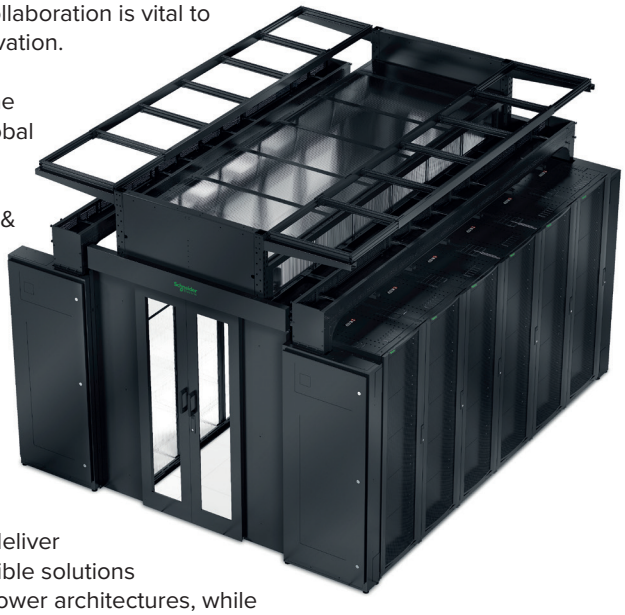
At Data Centre World 2025, Schneider Electric will introduce a new Proactive Asset Management Strategy for data centres, leveraging IoT-enabled equipment for continuous monitoring, AI-powered predictive analytics, and digital commissioning to reduce costs and downtime. Through use of machine learning, predictive analytics and Digital Twins – including the complete spectrum of electro-mechanical systems, from the grid to the chip, and from the chip to the chiller – organisations can future-proof their data centre investments and mitigate risks, becoming truly ready for AI.

Join Dr Luke Durcan, Director Innovation & Incubation, Schneider Electric, in the 'Design and Build & Physical Security Theatre' on the 12th March at 16:35pm to learn how the company is introducing conversational and visual tools for technicians – leveraging large language models (LLMs) and virtual reality (VR), for remote troubleshooting, personalised expertise, and to improve service quality and consistency. Further, Dr Durcan will share practical examples of how Digital Twins are providing instrumentation for AI-driven services and integration, regardless of the equipment supplier, and how data scientists can monitor correlations, detect risks, and identify anomalies early - enabling continuous hypothesis formulation for new components including coolant distribution units (CDUs) and liquid cooling technologies.

Empowering the ecosystem

As data centres evolve to meet the rising energy demands of AI, power and cooling systems must too evolve to accommodate their increased rack and server densities. For operators, a robust power train will ensure greater safety, efficiency, and security, providing the resilient foundations for AI-powered innovation.

During Data Centre World, Schneider Electric's Vice President – Transactional Business, UK and Ireland, David Williams, will explore the key components of a resilient power infrastructure, and share why collaboration is vital to drive AI innovation.



Join him in the 'Keynote: Global Strategies, People, Environment & Innovation' theatre at 11:30am on the 13th March, as we share why having a diverse partner ecosystem is essential to deliver scalable, flexible solutions and robust power architectures, while helping the data centres of the future to become truly AI-ready.

End-to-end solutions for AI

With organisations now accelerating measures to meet the urgent energy and sustainability challenges driven by AI systems' demand, Schneider Electric will also showcase its complete range of end-to-end, physical and digital AI-Ready infrastructure solutions, scaled to meet the needs of today's data centres during the event.

At Stand DC235, visitors can view the latest advanced infrastructure solutions helping owners, operators and end-users decarbonise their digital systems, while enabling businesses to deploy more sustainable, AI-ready solutions anywhere, at scale.

Key highlights will include Schneider Electric's recently launched Galaxy VXL UPS - the industry's most compact, high-density power protection system for AI, data centre, and large-scale electrical workloads - and its latest advancements in chiller, CDU and liquid cooling technologies. Visitors can also see Schneider Electric's new data centre reference designs, co-developed with NVIDIA and optimised for its GB200 NVL72 and Blackwell chips, which enable liquid-cooled, high-density AI clusters of up to 132 kW per rack to be deployed efficiently, at-scale.

Customers will also see live demonstrations of the complete breadth of Schneider Electric's EcoStruxureä solutions portfolio for data centres – including its Ringmaster AirSet SF6-free switchgear, high-density AI racks, and advanced power distribution units (PDUs) – and see the future of AI-powered services via the launch of Schneider Electric's EcoCare for Electrical Distribution service plans, using Augmented Reality (AR) to showcase the benefits of sustainable lifecycle optimisation.

Why choose StratusPower for AI workloads?

Dynamic load handling: Reliable uptime for unpredictable, high-intensity AI demands.

Exceptional overload capacity: Up to 150% for 60 seconds for unmatched reliability.

Grid resilience: Absorbs voltage fluctuations with extended input range.

High-temperature performance: Operates flawlessly under elevated conditions.

Scalable. Efficient. Reliable. Future-proof your AI infrastructure with StratusPower™.

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