



DATA CENTRE SOLUTIONS

DEVELOPING DIGITAL INFRASTRUCTURE IN A HYBRID WORLD

ISSUE | 2024

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VIEWPOINT

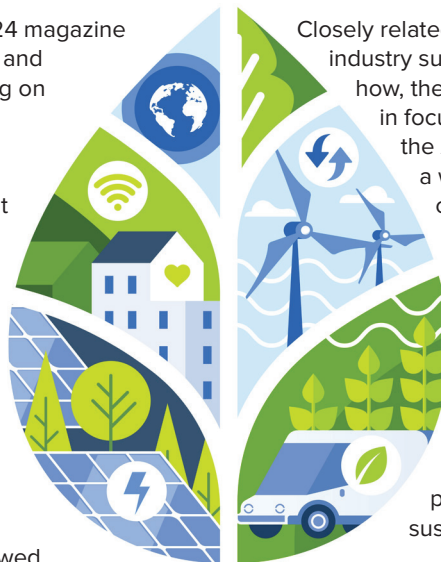
By Phil Alsop, Editor

The three S words continue to dominate

Sustainability, security and supply chain will be the major challenges for the industry in 2024.

➤ WELCOME to the first DCS 2024 magazine containing a highly informative and insightful set of articles focusing on some of the key challenges facing the industry for the foreseeable future. Sustainability is not a new or original choice maybe, but that doesn't mean it is any less important for its familiarity. Indeed, one could argue that, thanks to the Titanic deckchair moving, glacial progress of the political world when it comes to addressing climate change, the industry could be forgiven for wondering quite how important is sustainability as a business objective and differentiator. The depressing mantra that 'the environment costs money' is doing the rounds again with seemingly renewed energy in some quarters.

Thankfully, the data centre industry seems to remain committed to its Net Zero objective, although there is some suggestion that tougher environmental reporting rules will begin to help distinguish those companies who are one hundred percent committed to sustainability, and others who, shall we say, are caught somewhere between the cosmetics and actualities of addressing their carbon footprint. Add in the fact that the data centre industry enables many new, environmentally friendly ways of doing business, and achieving complete clarity as to what the industry is, or isn't contributing in terms of a reduced carbon footprint, is not an easy business.



Closely related to sustainability is the whole industry supply chain – with construction – the how, the where and the when – very much in focus. As previously commented upon, the AI explosion would appear to need a whole new type and scale of data centre, so the legacy argument – once focused almost exclusively around sustainability improvements – has now moved on to include whether or not older facilities can actually support AI workloads. Where workloads live, whether in colo or cloud environments, will receive increasing scrutiny from end users, who are wanting to address both performance issues alongside their sustainability responsibilities.

Finally, our (very) old friend cybersecurity continues to be the number one pain point for the whole IT industry, and the data centre environment is coming under increasing scrutiny in terms of its potential to be a weak link in the overall end to end security chain. I suspect we shall hear more of this over the coming months.

Happy New Year to one and all, and don't forget to visit the DCS website – in particular there are some fascinating video interviews with various industry figures providing their thoughts as to what the new year holds for the industry – and they do know what they are talking about!!



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Data centre market is expected to reach US\$ 279 Billion by 2032

Fact.MR predicts that the global data center market is expected to reach a valuation of roughly US\$ 77 billion by 2022.

BY 2032, data center revenue is expected to have grown at a 13.8% CAGR and reach US\$ 279 billion. Governments worldwide, including those of China, India, the U.S., and the U.K., are ramping up digital infrastructure investments to establish robust data centers.

The collaboration between public and private sectors is accelerating the growth of digital infrastructure, as exemplified by the U.K. government's commitment of over US\$ 1 billion for digital hub development.



The trend of green data centers has gained significant traction due to the rising need for cost-effective and energy-efficient solutions, coupled with a focus on enhanced sustainability. Driven by digitization in every industry, data centers are poised for substantial growth in both mature and emerging markets. Market leaders are capitalizing on the megatrend of digitalization, with a primary strategy of enhancing their services through value addition at every stage of their offerings.

This recently released and informative report illuminates the market insights of IT Data Centers, focusing on key dynamics and their influence throughout the entire value chain, from

suppliers to end-users. It delves into the growth trajectory of the IT Data Center Market.

As data centers pivot towards supporting advanced digital strategies, the success of their operations becomes intricately tied to the capabilities of the IT ecosystem in facilitating innovative initiatives.

Organizations undergoing a digital business transformation have recognized the imperative for a more decentralized approach to meet the requirements of a robust digital business infrastructure.

The escalating speed and volume of data accentuate inefficiencies in transporting information to the data center for processing. Revenues from new data centers are likely to surpass US\$ 104,000 Mn by 2028-end.

Although data center rebuilds currently account for a significantly lower share of the data center market, an impressive growth rate, even though slightly lower than new data center construction, has been foreseen for data center rebuilds in the upcoming years.

The growth of the data center rebuilds is primarily driven by the hyperscale service providers, who are changing ways an IT space is sold and built. In the meantime, the data center providers are revamping their construction strategies for delivering capacity faster in larger chunks.

The ongoing shift of the enterprise IT workloads, moving out of the on-premises data center to purpose-built facilities that are operated by colocation and cloud platforms providers, is the "trend behind the trend".

Data Center Market: Impressive Momentum for Consulting & Integration of Data Centers

Data center consulting and integration services are likely to record an impressive rise in light of the rising complexity pertaining to the network design requirements. This coupled with the growing need for data centers across a wide range of industrial sectors will continue to augur well for the growth of the data center market in the near future.

Revenues from data center consulting & integration are projected to exhibit an impressive 12.5% CAGR through 2028, which is greater than those from installation & construction.

Data center end-user proliferation, in combination with the rise in customizability and versatility in relevant network designs, will continue to be a key growth determinant for data center the market. With data center transformation being one of the top agendas among enterprises, demand for consulting & integration services is high as enterprises seek expertise for aiding their business strategy, planning, and implementation. "Data center service providers that invest in the consulting & integration skills, for supporting the digital initiatives of their customers, will continue to witness robust remunerativeness in the near future," says a lead Fact.MR analyst.

The data center market will continue to showcase high growth in North America, wherein majority share of the market will continue to be accounted by the U.S. The data center market in Europe will trail that of North America, in terms of revenues; however, revenues from Europe will increase at a comparatively higher rate than those from North America through 2028.

Security and compliance concerns drive upward trend in data centre investment

Telehouse's latest study reveals 61% of IT decision-makers are gearing up for higher investments in data centres.

AMIDST THE DYNAMIC and fast-evolving landscape of digital threats and regulatory necessities, a notable 61% of IT decision-makers are planning to ramp up their data centre investment in the coming decade. This strategic shift is largely due to the mounting requirements to bolster security measures and stay compliant with tightening regulatory standards.

These are the insights from a new research report titled 'Vision 2030: Identifying and navigating the emerging demands on your digital infrastructure' by Telehouse International Corporation of Europe, a leading global data centre services provider. Telehouse surveyed 250 UK IT decision-makers on digital infrastructure challenges and opportunities over the next decade.

Emerging technologies such as artificial intelligence and the Internet of Things are creating newer and broader vulnerabilities, turning cybersecurity into a priority. Notably, a third (33%) of IT decision-makers identify cyber threats as the paramount concern affecting network uptime.

Looking into the next decade, 30% believe that upholding security and

ensuring regulatory compliance will be their biggest challenge by 2030.

The escalating security concerns and the intricate tapestry of regulations are steering businesses to re-evaluate their IT deployment strategies. The need for fortified security and stringent compliance is pushing 54% of IT decision-makers towards colocation services. This marks a robust 21% surge since Telehouse's 'Vision 2030' research in 2020.

Three years ago, 33% of IT leaders leveraged colocation to bolster security and address legislative mandates.

Companies, while seeking enhanced security and compliance benefits, also perceive cost-effectiveness as a driver behind transitioning from on-premises models to colocation services. By 2030, a downward trend in on-prem deployment is expected, declining from 32% to 26%.



Mark Petridge, Executive Vice President & General Manager of Telehouse Europe, said: "Today's businesses are facing a pressing need to evolve and transition away from traditional digital infrastructures. The increasing threats in the cyber realm are a clear indicator of the financial and reputational risks at stake. This underscores the urgency to shift from potentially vulnerable on-prem setups to more robust data centre security solutions. As firms embrace technologies like AI, the ensuing demand for computational power and storage capacity will surge, making colocation data centres a logical and future-ready choice, both now and beyond 2030."

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Vertiv trends forecast sees intense focus on AI enablement and energy management

Intense, urgent demand for artificial intelligence (AI) capabilities – and the dueling pressure to reduce energy consumption, costs and greenhouse gas emissions – loom large over the data centre industry heading into 2024.

THE PROLIFERATION of AI (as Vertiv predicted two years ago) along with the infrastructure and sustainability challenges inherent in AI-capable computing can be felt across the industry and throughout the 2024 data centre trends forecast from Vertiv.



“AI and its downstream impact on data centre densities and power demands have become the dominant storylines in our industry,” said Vertiv CEO Giordano (Gio) Albertazzi. “Finding ways to help customers both support the demand for AI and reduce energy consumption and greenhouse gas emissions is a significant challenge requiring new collaborations between data centres, chip and server manufacturers, and infrastructure providers.”

These are the trends Vertiv’s experts expect to dominate the data centre ecosystem in 2024:

AI sets the terms for new builds and retrofits: Surging demand for artificial intelligence across applications is pressuring organisations to make significant changes to their operations. Legacy facilities are ill-equipped to support widespread implementation of the high-density computing required for AI, with many lacking the required infrastructure for liquid cooling. In the coming year, more and more organisations are going to realise half-measures are insufficient and opt instead for new construction – increasingly featuring prefabricated modular solutions that shorten deployment timelines – or large-scale retrofits that fundamentally alter their power and cooling infrastructure.

Such significant changes present opportunities to implement more eco-friendly technologies and practices, including liquid cooling for AI servers, applied in concert with air cooled thermal management to support the entire data centre space.

Expanding the search for energy storage alternatives: New energy storage technologies and approaches have shown the ability to intelligently integrate with the grid and deliver on a pressing objective – reducing generator starts. Battery energy storage systems (BESS) support extended runtime demands by shifting the load as necessary and for longer durations and can integrate seamlessly with alternative energy sources, such as solar or fuel cells.

This minimises generator use and reduces their environmental impact. BESS installations will be more common in 2024, eventually evolving to fit “bring your own power” (BYOP) models and delivering the capacity, reliability and cost-effectiveness needed to support AI-driven demand.

Enterprises prioritise flexibility: While cloud and colocation providers aggressively pursue new deployments to meet demand, organisations with enterprise data centres are likely to

diversify investments and deployment strategies. AI is a factor here as organisations wrestle with how best to enable and apply the technology while still meeting sustainability objectives. Businesses may start to look to on-premise capacity to support proprietary AI, and edge application deployments may be impacted by AI tailwinds. Many organisations can be expected to prioritise incremental investment – leaning heavily on prefabricated modular solutions – and service and maintenance to extend the life of legacy equipment. Such services can provide ancillary benefits, optimising operation to free up capacity in maxed-out computing environments and increasing energy efficiency in the process. Likewise, organisations can reduce Scope 3 carbon emissions by extending the life of existing servers rather than replacing and scrapping them.

The race to the cloud faces security hurdles: Gartner projects global spending on public cloud services to increase by 20.4% in 2024, and the mass migration to the cloud shows no signs of abating. This puts pressure on cloud providers to increase capacity quickly to support demand for AI and high performance compute, and they will continue to turn to colocation partners around the world to enable that expansion. For cloud customers moving more and more data offsite, security is paramount, and according to Gartner, 80% of CIOs plan to increase spending on cyber/information security in 2024. Disparate national and regional data security regulations may create complex security challenges as efforts to standardise continue.

Early AI deployments contribute to data centre physical infrastructure market

According to a recently published report from Dell'Oro Group, 3Q 2023 marks the fifth sequential quarter of double-digit year-over-year (Y/Y) growth for the Data Center Physical Infrastructure (DCPI) market, that has historically grown at mid-single digit rates for the past decade.

GROWTH from pandemic induced orders is waning, but early AI deployments are materializing as a new driver of revenue growth. Some vendors have secured orders for equipment optimized for large scale AI workloads, which are more than offsetting the decline in pandemic-related orders, and backlogs are rising.

“The generative AI infrastructure story began with the NVIDIA H100 in 1Q 2023, which has remained the industry barometer for AI adoption. End-users have utilized significant resources to obtain initial shipments of the costly and supply constrained GPU,” said Lucas Beran, Research Director at Dell'Oro Group. Due to the effort required here, many end-users are only able to address the power and thermal management infrastructure

requirements after or close to receiving those initial GPU shipments.

“Without a doubt, these AI related power and cooling investments started contributing to market growth in 3Q 2023. This was particularly prominent for rack power distribution units, where customized products with higher power ratings were notable. The next few quarters will increasingly emphasize the transition in DCPI market drivers, from broad based pandemic induced digitalization and supply chain constraints, to large scale, purpose-built AI facilities,” Beran added.

Additional highlights from the 3Q 2023 Data Center Physical Infrastructure Quarterly Report: Vertiv continued to outpace market growth and gained over 2 percentage

points of market share in 3Q 2023. North America, Asia Pacific (excluding China), Europe, and the Middle East and Africa (EMEA) were the fastest-growing regions in 3Q 2023, maintaining double-digit growth rates. Caribbean and Latin American (CALA) revenues grew at a high single-digit rate, while the China market was the only region to decline.

Product growth was broad-based, but Thermal Management and Power Distribution grew at the fastest rates. Looking ahead, we forecast worldwide DCPI market growth to moderate in 2024 as pandemic induced orders are filled. However, we predict the market growth rates will remain at higher than historic levels, as AI deployments increasingly materialize throughout the year.

DC Byte illuminates the Iberian data centre market

DC BYTE has released its monthly market spotlight – an exclusive look into the Iberian Peninsula's burgeoning landscape in the, offering valuable insights to data centre and real estate industry professionals, as well as investors.

The Iberian Market Spotlight highlights the pivotal role of Spain and Portugal in shaping the data centre landscape. The Iberian Peninsula, previously under the radar for most Europeans, has experienced remarkable growth and innovation in its data centre industry, positioning itself as an emerging hub for data centre development and investment. The report reveals a region on the cusp of significant transformation. Key findings from the Iberian Market Spotlight report include:

- **Rapid Growth:** The Iberian Peninsula is witnessing a surge in data centre supply, reflecting the strong demand from major players in the industry.
- **Hyperscale Activity:** The arrival of hyperscale giants like AWS and Microsoft has sparked growth and investment in the region, challenging traditional market dynamics.
- **Renewable Energy Initiatives:** Portugal and Spain are making impressive strides towards a greener future, with ambitious renewable energy plans that impact the data centre market's sustainability.

As the Iberian data centre market evolves, DC Byte's market spotlight raises essential questions about its capacity to support the growing

demand. Power availability and expansion sites are key considerations, underscoring the need for a strategic approach to ensure the market's ability to cater to future growth and adapt to the evolving needs of cloud providers, enterprises, and digital businesses. “The Iberian data centre market is undergoing a remarkable metamorphosis, as seen in our analysis of the region,” said William King, Managing Director for EMEA region at DC Byte. “Iberia presents exciting opportunities for data centre expansion and investment. This region, with its untapped potential, lower competition, cost-effective pricing, and abundant power supply, opens doors to new possibilities for those seeking to diversify their data centre operations.”

Less than one in ten European businesses succeeding with digital transformation initiatives

Just 7% of businesses say they are meeting or exceeding their digital transformation targets according to a report from CI&T, a global digital specialist, produced in collaboration with the Global CxO Institute.

THE RESEARCH REPORT, *'Accelerating Digital Efficiency With The AI Multiplier'*, explores the efficiency imperative based on survey responses from 100 digital business leaders across European enterprises.

The failure of many to hit their targets comes even though technology budgets are on the up. Nearly six in ten (59%) organisations say budgets increased in 2023 and more investment is coming in 2024 - two-thirds of businesses are set to increase their investments by at least 10% next year. But, whilst investment is increasing, so too is the pressure to achieve results when it comes to operational improvements and financial returns.

To maximise their budget potential, an overwhelming majority (91%) of businesses recognise they must improve efficiency across the whole of their technology operations.

The top five areas where they believe efficiencies must be made are:

1. IT and data strategies
2. Data management
3. Customer operations and service platforms
4. Cyber security
5. Ecommerce and payment platforms

The research finds that AI, including generative AI, is considered the catalyst to efficiency improvements, with 80% of respondents expecting this technology to have a positive impact on their business.

And AI is already top of the agenda for many when it comes to investment. Three-quarters of businesses (76%) are already using generative AI or expect to do so in the next 12-18 months and almost one in ten (8%) describe widescale use across their organisation.



They see generative AI as making the largest contribution to organisational efficiencies in the following areas

6. Technology architecture and platforms
7. End user product features
8. Organisational orchestration
9. Innovation development
10. Software development process

This for many is the first act of the introduction of AI into their business - looking inside the corporate walls to drive efficiency before venturing beyond to open up more opportunities. Organisations are also starting to look at accelerating the speed of innovation to bring new products and services to market to support business growth. This is an area where AI and generative AI can have a real impact.

The top five areas where businesses are looking to achieve efficiency in innovation delivery are:

11. Business case development/KPI setting
12. Proposition development
13. Service mapping and design
14. Scaling a Minimum Viable Product (MVP) to full release
15. Scaling Proof of Concept to MVP

Ross Sleight, Chief Strategy Officer EMEA at CI&T, comments: "Digital transformation and the digitising

of operations is fundamental to businesses today and requires consistent investment. It's not just about the cost savings that these programmes bring but the broader pursuit of better performance through efficiency and speed.

What's important is an alignment of the organisational priorities and a clear understanding of the value that can be achieved to set realistic goals, , combined with the right skill sets, processes and people to deliver on this transformational journey.

With many turning to AI it's important to recognise it isn't a magic bullet. Relying on AI to deliver business efficiencies is like building your castle on sand. Without solid foundations, such as organisational efficiency, it won't have a lasting impact on your organisation and any initial benefits will be quickly washed away."

With many turning to AI it's important to recognise it isn't a magic bullet. Relying on AI to deliver business efficiencies is like building your castle on sand

White paper debates microgrid sustainability suitability

A new white paper from the European Data Centre Association (EUDCA) explores whether microgrids are the ideal solution for adaptive and reliable software-defined power for next-generation data centres.

THE EUDCA Technical Committee has published a new white paper – “Is the microgrid the ideal solution for adaptive and reliable energy delivered as “software defined power for next generation data centres?” which aims to start a discussion about the feasibility of data centres joining with microgrids to supplement the Utility grid with power generated using renewable energy sources (RES).

The climate emergency together with concerns regarding the sector’s energy consumption have already provoked the need for a sea change in the way that data centres are powered if it is to meet ambitious net zero ambitions. The new paper, authored by the EUDCA Technical Committee, is available for download from our website here.

Brice Martinot-Lagarde from Schneider Electric, a key contributor to the paper says, “Microgrids have been deployed in various industries delivering renewable energy to complement the traditional utility power supply.

Such projects were initially focused on small to medium-sized sites up to x100kWe. However, more recently there has been a shift to larger capacity sites associated with solar or wind power generation reaching more than 100MW.

“The sector therefore needs to seriously consider microgrid technology as a viable solution to provide data centre primary and back-up power generation capacity, using renewable energy sources in ways that can not only meet high reliability and sustainability targets, but can also support today and tomorrow’s consumer demands.”

The new publication provides a description of microgrids and their modes of operation; the challenges for the sector in meeting sustainability and reliability targets given diverse energy profiles throughout Europe and the ongoing need to ensure uptime for IT services; the evolution of the microgrid, and, importantly how the sector can reduce its dependence on offsets by demonstrating it consumes “net-zero carbon emission” electricity in real time.

Explaining the relevance of data centre carbon reporting

THE VALUE of scope emissions reporting is its ability to not only compare like for like, but also to measure, monitor and reduce emissions, reports a new white paper published today by the EUDCA Technical Committee.

Entitled “Scope Emissions White Paper,” the new paper explains the relevance of scope emissions reporting, the origins of the term, and the relevant standards.

Furthermore, the paper provides an overview of how Scope emissions tracking can benefit a business, examines two reporting profiles within the tech industry, and finally takes a look at the relationship between Scope Emissions reporting and Whole Life Carbon Assessments (WLCAs).

Accurate reporting of Scope 1, 2 and 3 emissions provides transparency on an organisations year on year emissions. They are a vital step in enabling companies to assess and evaluate their current emissions and identify strategic areas for improvement.

Andrew Harrison, Chair of the EUDCA Technical Committee highlights: “Many companies are already reporting on their Scope 1 & 2 emissions and their sustainability efforts are becoming a part of the public record. While Scope 3 reporting is currently voluntary, it is not unlikely it will become mandatory, as sectors including the data centre industry are increasingly regulated. Our ‘Scope Emissions White Paper’, setting out standards in the GHG Protocol as well as providing some useful examples of tech company reporting as a starting point for concerned businesses.”



Gartner says Cloud will become a business necessity by 2028

By 2028, cloud computing will shift from being a technology disruptor to becoming a necessary component for maintaining business competitiveness, according to **Gartner, Inc.**

IT SPENDING on public cloud services continues to rise unabated. In 2024, worldwide end-user spending on public cloud services is forecast to total \$679 billion and projected to exceed \$1 trillion in 2027.

“Organisations are actively investing in cloud technology due to its potential to foster innovation, create market disruptions, and enhance customer retention in order to gain a competitive edge,” said Milind Govekar, Distinguished VP Analyst at Gartner. “While many organisations have started to seize the technical advantages of cloud, only a few have unlocked its full potential in supporting business transformation. As a result, organisations are using the cloud to launch a new wave of disruption driven by artificial intelligence (AI), enabling them to unlock business value at scale.”

The Role of Cloud in 2023

Most companies currently consider the cloud as a technology platform. In 2023, organisations are using cloud computing either as a technology disruptor or capability enabler. Gartner predicts that more than 50% of companies will use industry cloud platforms by 2028 to accelerate their business initiatives. In 2028, most organisations will be leveraging cloud as a business necessity.

Organisations that are utilising the cloud as a technology disruptor are harnessing its

transformative potential to revolutionise non-cloud, data-centre oriented computing styles and technologies. “As businesses navigate through digital transformation journeys, movement to the cloud becomes a key decision point,” said Govekar. Companies that are adopting cloud technology as a capability enabler are using its potential to enable new capabilities such as elasticity, rapid continuous integration/cloud delivery (CI/CD), serverless functions and AI-infused APIs and processes that were difficult to achieve pre-cloud. To exploit these new capabilities, organisations must carefully evaluate factors such as their investment in skills development, breaking down operational silos, and promoting collaboration among teams to seamlessly adopt automation.

Cloud as a Business Necessity in 2028

Over the next few years, cloud computing will continue to evolve from being an innovation facilitator to a business disruptor and, ultimately, a business necessity.

With cloud computing as an innovation facilitator, organisations can distribute platform business concepts widely by using its underlying platform technology to provide interconnections, scale, aggregation and analysis capabilities, which allows the use of technology as a fundamental component of a business model.

“By leveraging the ecosystem of cloud providers, organisations can introduce innovative products and services, such as fraud prevention solutions for second-hand cars from tire manufacturers, or rapid vaccine development through cloud-based machine learning by pharmaceutical companies,” said Govekar.

By 2028, most organisations will fully transform into digital entities capable of sensing and responding to business and market conditions. “With cloud computing becoming an integral part of business operations in 2028, CIOs and IT leaders will have to implement a highly efficient cloud operating model in order to achieve their desired business objectives,” said Govekar.





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Engineered for AI

The surge in GPU-powered computing is driving an evolution in high performance colocation

BY SPENCER LAMB, CCO, KAO DATA.

AT THE BEGINNING of 2023, hyperscale data centre builds began to slow, fuelling rumours of an impending market recession. Yet just a short time later, the launch of Generative AI platforms such as ChatGPT, DALL-E, and Bard prompted a complete shift in the market's trajectory – and the way in which the colocation data centres of the future will be designed, built, and engineered for AI.

Market demand

A report from Synergy Research predicted that hyperscale data centre requirements will near-triple in next six years, driven primarily by AI. At the same time, the capacity within said data centres is growing at a far-faster-rate due to the densely populated nature of GPU-powered computing. The number of data centres and the volume of capacity within them will, therefore, increase to unprecedented levels.

The need for high performance colocation capacity is a point further echoed by CBRE, where driven by natural language processing, Generative AI and large language models (LLM's), the use of the technology has become so widespread that it will soon impact every area of business and enterprise. The increased interest in AI has not gone unnoticed by governments, and throughout the course of 2023, the UK Prime Minister has announced a series of commitments to further establish the country as a world leader, with aims to become a superpower by 2030.



Government investment

In recent months, those investments have gathered pace, with the chancellor announcing a £500 million investment in AI compute over the next two years as part of his Autumn statement - hailed as a much-needed step to help researchers harness the power of AI to improve lives, and one which includes a raft of cutting-edge computing measures to drive new breakthroughs in drug discovery and science.

Microsoft has also diversified its UK investments, pledging £2.5 billion to build new critical infrastructure locally, bringing with it promises of next-generation AI data centres and access to a plethora of GPUs to aid UK innovation. What's clear is that AI means big business, not only for the data centre industry but for government, enterprise, and research industries alike. But a gap remains between intent and action, and one might ask if, in its current format, the UK digital infrastructure industry can truly deliver the cabinet's technological and economic ambitions?

Geographical resiliency

The UK colocation sector has long been one of the world's largest markets, second only to the USA. Yet from a geographical standpoint, the UK's digital infrastructure landscape lacks much of the resilience seen by neighbouring European countries. France and Germany, for example, have both

developed well-provisioned 'next-tier' data centre hubs, and Berlin and Marseille have quickly established themselves as key destinations for the industry. The UK, however, is underserved and yet to see the emergence of a secondary market, which is an issue further compounded by the challenges surrounding the West-London hub, including a shortage of available power and land constraints.

Now, therefore, is clearly the time to develop a new high performance infrastructure hub, and one which is truly ready to underpin the demands of AI. With a host of technology, research, and financial services organisations already based in the North West – and hyperscalers deploying nodes across the region – all trends point towards Greater Manchester as the next key location for the sector.

Indeed, Greater Manchester boasts many benefits, including a strong technology, scientific and engineering skills base, access to ex-industrial land ripe for investment and redevelopment, robust network termination points and access to renewable energy. Another crucial factor is its appetite for technological innovation – a reputation the region's long-held since the industrial era - and something which clearly positions it as a vital location that will increase both the countries technological resilience, and its readiness for AI.

Engineered for AI

At the same time as identifying new infrastructure hubs and driving the development of new availability zones, data centres must also be re-architected to become ready for AI. With today's workloads requiring power densities of anywhere between 10kW-40kW per rack, and some heading towards 100kW, the way in which we design, power and cool data centres requires a marked-step change. The unique requirements of high-density computing, and the accompanying increase in both processing power and the level of heat generated by GPUs places great pressure on the physical demands of data centres, and for many of today's operators, this brings with its several key considerations.

The first is that they meet strict design criteria, in essence, becoming NVIDIA DGX-Ready data centre

certified, which demonstrates a clear capability to support and host the latest breakthroughs in GPU technology. The second is the use of next-generation cooling methodologies, such as direct-to-chip liquid cooling. However, with so many questions still to be answered around cooling architectures, it's clear that today's data centres must be designed in such a way as to accommodate hybrid, air, or liquid-cooled solutions, at least in the interim.

Specialised networks

Another is the need for specialised, high-capacity network access, combined with super-fast on-ramps to the cloud. Where high performance computing (HPC) is concerned, the ability to deploy high density, GPU-accelerated servers, inter-connected with networking such as InfiniBand, is paramount to ensure that high-capacity networks can transmit large volumes of data at-pace. Such systems aren't typically found in legacy data centre environments, which points towards the need for both an evolution in physical infrastructure design requirements, and in the networking capabilities that accompany them.

Provisioning for the future

At Kao Data, we fundamentally believe that AI requires a new approach to data centre design, and the success of the government's technological ambitions will depend on high performance colocation capacity, capable of hosting advanced workloads. This also requires a significant level of new investment in developing advanced digital infrastructure, alongside greater collaboration between government and industry, and both are important steps to match ambition with action, and thereby sustain technological progress.

Ultimately, the growth of AI is already having a profound impact on data centre infrastructure and is changing the nature of high-density computing on an industrial-scale.

As we look to the future, the need for technically advanced data centres, designed and engineered for AI is paramount, and at Kao Data, our mission is to provide customers with a secure, scalable, and sustainable home for their compute.



Sustainable data centres and the role of technology



The last couple of years have seen a large leap in AI processing within datacentres. While this is no doubt set to continue, there is, however, the unfortunate truth that without a step-change in energy-efficiency, AI applications in the future will increasingly be limited by both the energy cost and environmental impact of AI processing.

WITHOUT a step-change in energy efficiency, the environmental impact of AI processing – including the impact on carbon, water, and energy – will be considerable. Governments, companies, and universities are therefore under increasing pressure to limit this environmental impact. Radical change is needed, and collaboration is a must.

The use of green energy and solutions in running datacentres

On the positive side, some datacentres have already appointed dedicated sustainability officers, and there are already some solutions that are being deployed. For example, evaporative cooling is already being phased out of some datacentres

due to the sheer amount of water used. Although evaporative cooling may be an attractive option when compared to traditional air conditioning (because it is typically more energy efficient and it costs less to operate and maintain), it uses a lot of water. Recycled water is one way around this, but it isn't a perfect solution. So, is there one?

The datacentre industry is aware that much more needs to be done to stop using so much energy and producing so much heat. Renewable energy is of course a must-have solution to making datacentres carbon neutral. IT companies are major purchasers of renewable energy and are leading the way in transitioning to green energy.



In a sign of the datacentre industry's ambition to not only reduce its environmental impact but set the bar for hitting Net Zero, The Climate Neutral Data Centre Pact now has over 100 datacentre signatories – its aim is for renewable energy to become the sole power source for datacentres by 2030 as part of its 'climate neutral' pledge.

Currently, solutions are being devised to position datacentres closer to renewable sources of energy. But until these sources are even more accessible and widespread, they cannot be solely relied upon. And even if these sources are used, datacentres should still be aiming to be as energy efficient as possible. Indeed, there is a view that until more of our energy comes from renewable sources, some datacentres using green energy simply prevent other users from accessing these green energy sources.

What other solutions are helping to improve datacentre sustainability and make the move away from evaporative cooling?

Some datacentres are based in countries where they can use their natural cool air climate to carry out cooling – a process known as free cooling. Innovative approaches are also attempting to capture and reuse the vast amount of heat produced by datacentres for other heating uses, systems and buildings nearby.

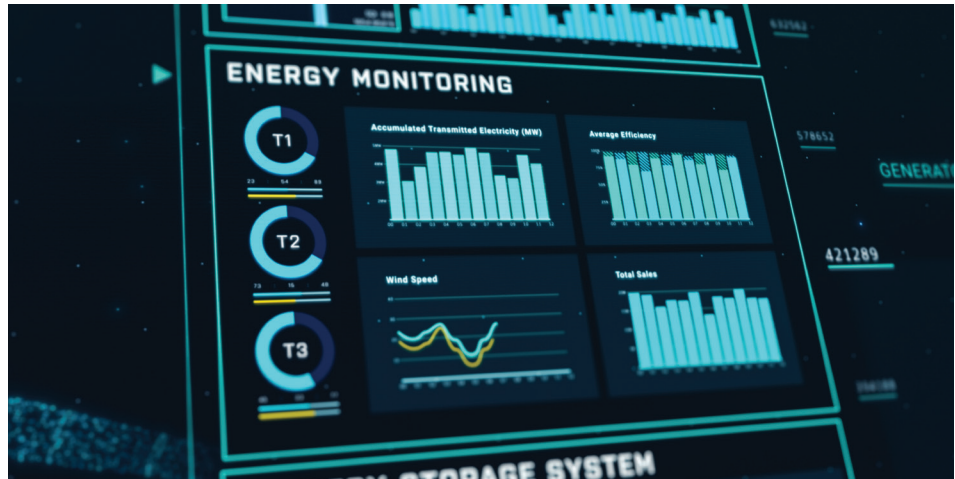
These all have potential to be viable solutions – but all are inherently inefficient. The rapid growth in the use and complexity of AI and demand for capacity requires a technical performance solution too.

The role of technology in this mission

There are some solutions providing real-time performance improvements to existing infrastructure. Asset performance management software, for example, gives an overview of the energy consumption of systems, allowing technicians to monitor devices and thereby optimise efficiency through adjusting heat and cooling levels.

However, with the use of traditional electronics in datacentres, the levels of energy consumed and the subsequent heat produced by silicon-based GPU AI accelerators means there are limits to how much AI computing performance can be delivered. An incredible increase in power consumption is needed to meet AI processing requirements, flying in the face of companies that rely on datacentres but need to meet environmental targets.

The industry is in need of a paradigm shift – and the world of 3D optical AI computing is offering this necessary transition.



3D optical computing computes with photons instead of electrons, meaning it consumes far less energy than GPU solutions and avoids the inherent limitations of traditional electronics, such as being constrained to the 2D geometry of silicon chips. The performance-per-watt achievable means datacentres can unlock compute speeds many times faster than traditional means – up to 1000x – and at greater scales, all while consuming a fraction of the energy. With the corresponding reduction in heat generated, optical compute is a sustainable solution for next-generation AI.

What 2024 (and beyond) looks like for sustainable datacentres

While governments harbour ambitions to become carbon neutral by 2050, the datacentre industry is on a much quicker track, aiming to reach this goal by 2030. This means that bigger changes will take hold quicker, and 2024 will be the start of further acceleration.

The rapid development of generative AI over the last year shows just how quickly the technology can move and the increasing compute demand that comes with this. There is widely held view that providing this level of high-performance is a significant environmental challenge, and great efforts are being put into solving it. Datacentre providers and operators, for example, are placing this priority at the heart of their purchasing criteria.

The use of renewable energy will increase further, as will ways of reusing and recirculating heat and energy. But without a fundamental change in the way AI processing is powered in datacentres, it will be hard to achieve the goals set out in the Pact and achieve a step-change in energy efficiency. This is why a paradigm shift to other ways of delivering AI processing, such as with 3D optical computing, is so crucial. This all needs to be driven by broader industry collaboration and government investment.

For sustainable datacentres to become a reality, all of these changes, innovations and technological advancements need to happen together.



The future of data centres

James Vaughan, Consultant at BCS, examines the potential impact of the recent ruling on diesel generator backups in Maryland, asking what it might mean for the sector and what can be done in the future.

The ruling

ON 2 August 2023, the State of Maryland denied Aligned Data Centres' proposal for 168 diesel generators at the Quantum Loophole campus in Adamstown to be granted an exemption from environmental requirements. While short of a total rejection, it will require the application to be approved for a Certificate of Public Convenience and Necessity (CPCN), which is a formal process requiring Judicial approval and evidence to be presented on both sides.



Technicalities of the ruling aside, the language used by the Commissioner ("I don't understand, in 2023 why you're proposing a 504-megawatt diesel generator") appears to be demonstrative of a hardening in stance toward data centres in Planning considerations and the increasing role that environmental considerations will play in developments gaining approval.

The question we must therefore ask – is this a sign of a hardening in stance towards data centres in planning, or is this an anomaly?

Data centre social contract

At a fundamental level, the authority decision making process is about balancing a range of parameters and how these support a regions wider development strategy. Data centres have sometimes been viewed unfavourably as they don't provide employment comparable to mixed use or commercial developments so after the initial investment, the return for the local area is more limited and this has less tendency to flow outwards.

When pressures on resource availability are low, data centres are a good investment for a region as they are long term, high value investments for the land use and can grant an Authority a capital injection. However, when resource competition increases, data centres are less attractive as they

often have to be selected instead of another development, not alongside. This is especially true of power as across the globe we are seeing power availability become a driving factor in data centre development, coupled with pressures on water. Last year a data centre in Holland made the news for using over 4x the amount of water it was forecast to do so, at 84 million litres. This put the data centre directly competing with residents for drinking water.

While these news stories around data centres aren't new, they are drawing greater attention to the industry and so the sector needs to look at what can be done to improve usage and allow data centres to exist more harmoniously.

Impact of this ruling:

It is unlikely that this ruling in isolation is going to cause a seismic shift in the way data centre developments are viewed at any significant scale (regional, national or international). It is more likely that this is an indicator that the initial hyperscale data centre "boom" is reaching maturity and that the coming three to five years are going to be increasingly tumultuous.

A desire to better utilise land in constrained regions, lack of power and water availability and generator emissions/ diesel consumption are going to drive the discussion and be the initial metrics that data centres are assessed on. Authorities are now in a good position to negotiate on "value adds" or set more stringent requirements, knowing that developers are desperate to bring capacity to market and that with demand high and supply low, this increase in cost can be passed to the customers.

The future

This ruling will likely result in clients being increasingly driven away from diesel generators as even those running on HVO will still produce emissions. With redundant electrical feeds not an option and solar/ wind not viable for baseline power without significant storage, it will require creative solutions or value adds to demonstrate value for local authorities in the longer term. For example, in March 2023, a development in Devon hit the news with a small data centre being used to heat a municipal swimming pool and this has reignited the well needed discussion in the sector around waste heat and district heating networks.

Economies of scale are more challenging in Europe than the USA due to land availability and while campus nuclear microgeneration or hydroelectric may be viable on 400MW + campus' the challenge remains more prevalent in Europe. This leaves less options on the table in the face of stricter legislation and planning requirements.

Fundamentally, data centre design has changed little in the last ten years. Facilities are more efficient, but wholesale innovations are few and far

A desire to better utilise land in constrained regions, lack of power and water availability and generator emissions/ diesel consumption are going to drive the discussion and be the initial metrics that data centres are assessed on

between and the industry has been conservative in innovating. This is understandable, given the need for stability and resilience as a fundamental of the service offering, but clients will increasingly have to demonstrate novel solutions to problems in order to pass planning.

Complex problems with multiple solutions:

We are working with clients to look at new solutions to these problems and see the solution as three-fold:

- **Reduce demand for backup capacity in the event of main supply failure**

This focuses on technologies which increase the operating temperatures or acceptable variances for rack temperatures, as well as business models which may allow clients to select less "backed up" rack space for a reduction in rates. This could include tiered spaces within a data centre for less critical storage, including archiving.

- **Replace diesel generators with alternative technologies**

This goes beyond looking at HVO or alternative fuels to the hard question of alternatives. Microsoft plans on eliminating diesel generators at its data centres by 2030. How will they and others achieve this?

- **Better standardisation, monitoring and comparability across data centres with a more tailored green standard to demonstrate benefits to clients.** With data centre regulation and standards still in their infancy and a drive from clients for greater information and comparability, especially where sustainability is concerned, there is a need for greater energy and supplier audits, coupled with Scope 1,2 and 3 emissions challenges.

Conclusion

The Maryland ruling is a clear indication that authorities and governments are reconsidering the status quo and environmental impact of data centres and the role that they can play in driving data centre developers to do better for their regions environmentally. It is up to us to make sure we these signs.

Considerations and modelling of on-premise hydrogen production in data centres for greenhouse gas abatement – a viable option?

With green hydrogen widely touted as the most desirable option for achieving climate change goals, the debate is heating up in the data centre sector where proponents of hydrogen believe it could well be an ideal primary power source for putting the sector on a path to net zero.

BY JOE SHEEHAN, TECHNICAL DIRECTOR, I3 SOLUTIONS GROUP



BUT IF HYDROGEN is the answer, there are important issues to address, not the least of which the necessary changes to the utility power and gas infrastructure. Additionally, we urgently need to gather data on the greenhouse gas (GHG) abatement benefits that might accrue from data centres using hydrogen.

For a data centre, the real GHG abatement value of hydrogen lies in decarbonising the electricity supply - swapping out the utility grid for primary power and using green hydrogen to fuel engines or fuel cells for continuous use. This would take the data centre's electrical consumption and replace it with a genuine source of renewable energy, since hydrogen causes no carbon emissions in use and

generated using only power from renewable sources.

But achieving such a goal brings its own challenges. While many countries have developed a strategy for hydrogen, the hydrogen economy itself – in the form of production, transport and storage - is just not here yet. In practically no location does there yet exist supply infrastructure or any piped hydrogen. It is certainly not yet possible to bring in vessels containing compressed hydrogen at a sufficient volume and rate to provide for full and continuous operation of a modern data centre.

One obvious solution to this challenge could be for data centres (and other energy-intensive users) to become both hydrogen producers and storage facilities. However, there isn't currently a viable on-site source of clean energy that would produce green hydrogen by electrolysis of water.

Where could such an energy supply come from? One possible answer is for data centres to tap into a renewable power grid and utilise such a grid's surplus energy for the production of green hydrogen. When the wind is blowing or the sun is shining and/or demand is low, taking electricity from Renewable Energy Resources (RERs) means the carbon emissions associated with each kilowatt hour of energy supply are low.

And in the opposite circumstances – when the wind is not blowing, the sun is not shining, and electrical demand is high – data centres could operate using its own reserves of locally stored green hydrogen rather than the utility grid topping up capacity using



fossil-fuelled power plants to fulfil demand. Use of hydrogen stored on-site for peak shaving at times of high demand and low renewable supply levels out demand on the grid. This is a form of carbon trade-off, since drawing less power from the grid reduces the use of fossil fuels, achieving a net gain in emissions reduction.

But is the round-trip efficiency, using this strategy good enough to achieve a meaningful advantage?

Modelling the carbon benefits

The big question is whether on-site hydrogen production is economically and spatially viable and offers affordable benefits in terms of greenhouse gas abatement.

Using carbon intensity data which is publicly available from grid networks in the UK and Ireland, i3 built a mathematical model of the process and measured what GHG abatement benefits it might bring about. It factored in the storage and technology that would be necessary, with the model using a nominal 10-megawatt data centre in different locations.

The model showed the returns are quite modest in terms of carbon emission reductions in places like Scotland where there are a lot of renewables on offer. It is possible to reduce by about 10% a data centre's energy or carbon emissions - approximately 500 tonnes of carbon per year.

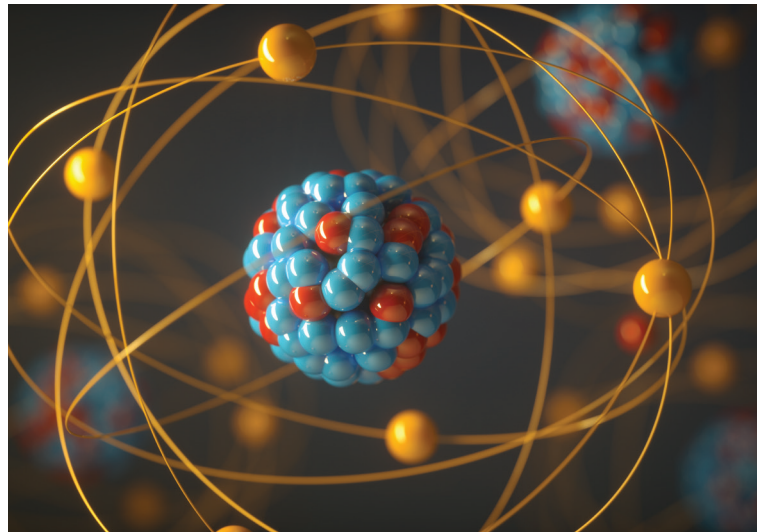
Interestingly, the percentage reduction in the south-east of the UK was smaller (only two or three percent) but that worked out to be the same carbon reduction in absolute terms because there is higher grid carbon intensity in the region. In other words, the carbon costs are higher, so a smaller percentage reduction is an equivalent saving.

These modest returns need to be weighted against the cost of applying the hydrogen technology to data centres at sufficient scale.

The i3 model provides useful insight? about the need to coordinate with grid-level facilities. It has also aided understanding of how battery energy storage (and in future, hydrogen) could be used in conjunction with the grid for a range of technologies, including various forms of energy storage and electricity demand reduction in data centres.

The tool developed can be applied to data centre designs for many types of energy storage systems and reveal what potential benefits they bring about in terms of carbon reduction.

The amount of activity in the hydrogen market, from production to transport to storage is accelerating. The biggest cost is green hydrogen production, for which excess renewable energy is required. However, it is projected that these costs will come down. Some point to conditions where because



grids are integrating increasing amounts of power generated using renewable energy sources this will lead to excess capacity at times of low user demand, making more clean energy available for electrolysis. In addition, the huge growth in the scale of electrolyser production will aid the speed at which the economics of green hydrogen production will swing in favour of the consumer. As green hydrogen becomes more available, the economies of scale will start to improve, making hydrogen a more viable fuel source for electricity for powering data centres.

Production value

Like many countries, the UK is a long way from a national hydrogen gas transport network (pipes), and therefore local production in data centres and other energy intensive industries should be considered.

Designing and developing data centres with hydrogen in mind needs to happen. We can future-proof data centres for the growth of hydrogen production and supply, for example, by specifying the use of reciprocating engines or fuel cells which can be run using hydrogen as well as other fuels in data centre designs.





If the energy crisis is over, why are companies still paying more?

Datacentre operators and owners are facing a huge challenge when it comes to energy prices as despite the so called ‘energy crisis’ being over, many are still being charged more than double the normal cost for their next electricity contract and looks at the reasons why and also what companies can do to bring these costs down.

BY MARK CALLAWAY, CONSULTANT AT NOVEUS ENERGY

THE GREATEST CONTRIBUTOR to the electricity cost increase over the last few years has been the higher wholesale electricity cost which reached record levels in 2022. Whilst it has since dropped significantly, the wholesale cost is still $\approx 10\text{p/kWh}$ higher than it was four years ago.

In addition, the UK power price has been driven up by higher European gas prices because we need gas to produce $\approx 40\%$ of our electricity and even though it's only 40%, gas sets the price of UK power. Gas prices remain inflated because the UK and Europe have lost their cheap supplies from Russian pipelines, exacerbated by the war in Ukraine. On the plus side these are fully transparent, but they are also non-negotiable.



That said, they are the place you can influence most. You can't negotiate these costs but you can choose to spread them and benefit from future purchasing. All you need is some good, trustworthy advice so you can make an informed decision. For example, smaller customers should discuss energy prices with their energy advisor and pick the best time to fix rather than waiting until their contract is about to end. For larger customers, who likely started buying in the wholesale market twenty years ago, this is the time to start to really manage energy price volatility by questioning the static approach of the past and adopting a newer dynamic approach.

Then we have what we call ‘the negotiable costs.’ This second contributor to the electricity cost

increase is the least transparent and we have estimated they have risen by $\approx 2\text{p/kWh}$ but for specific customers the increase could be significantly more. These include things like the Supplier's margin, cost risk premium and credit risk premium which are never disclosed, but we know that they rising because we can subtract all the costs that we know about, and what's left in the customer's quotation is the supplier's margin. There are a number of reasons for this rise. For example, some large suppliers (such as Scottish Power and British Gas) have exited the industrial and commercial market so there is less competition. Other suppliers are refusing to quote if they have concerns about the credit worthiness of the customer and/or their sector.

As a result, suppliers are sending fewer quotes to customers' or brokers' tenders compared with four years ago. Finally, when suppliers offer fixed prices for, say, one or two years they try to predict what those costs might be and also predict the customer's exact volume. As these costs become less predictable in 2022, suppliers have increased their risk premia within their price.

Where organisations use a Broker, in far too many cases their commissions are not disclosed meaning then the broker may be tempted to keep the same percentage commission, despite the rising prices, resulting in a pence per kWh increase or they may even increase the percentage commission to maximise their profits.

When it comes to these 'negotiable charges' – the easiest way to reduce your costs is to ask your energy broker to disclose their fees or commission before they act for you and then negotiate them if you are not happy. Never give them authority to sign supply contracts on your behalf as this opens the door to costs being artificially inflated and fees being hidden. Confirm their actual commission with the energy supplier as not every supplier shows commission in the supply contract.

Keep an eye on the cost of renewable energy being offered by suppliers which traditionally cost a tiny amount more than "brown" energy. As demand for "green" electricity has increased faster than the supply of "green" power, the generators have been able to attract a premium for the "green certificates." For the customers, this can mean paying as much as 1p/kWh extra for renewable electricity. Clearly there are other considerations about the decision around renewable energy such as ESG commitment and carbon reduction targets.

Finally, "Shape" costs that are incurred by suppliers to buy the exact number of extra kWh that the customer needs at the peak times of the day have increased. Often this peak power must be bought from a shrinking number of old fossil-fuel stations that generate when customers' demand peaks. And lastly, to the Regulated Monopoly that is all

about covering its costs, the third contributor to the electricity cost increase is the "network and balancing charges" levied by the National Grid and the local network companies which are $\approx 2\text{p/kWh}$ higher than the total four years ago. Networks charges are adjusted for inflation and the cost of network expansion. Furthermore, electricity demand has fallen by 20% since the peak in 2005 which means the networks' costs have to be recovered from fewer kWh, pushing up prices.

In addition, two specific changes occurred on 1 April 2023: OFGEM, the Regulator, said customers would have to:

1. Pay 100% of National Grid's balancing bill;

in the past the cost was shared equally with the generators. This change came on top of a huge increase in the total cost of balancing as National Grid paid fossil-fuel stations to keep-the-lights-on in the hours when wind and solar power weren't available.

2. Pay "banded" National Grid transmission charges instead of the traditional "triad" charges.

This change means standing charges rise although overall, some customers will pay more and others will pay less than they did in 2022.

The good news is that potentially there is a quick win here that you can discuss with your energy consultant about whether you paying for more electricity capacity than you need. If so, you can reduce your "per kVA" charge immediately, however you can only reduce your "banded" charge in exceptional circumstances so you may have to wait until April 2026 to see a lower "banded" charge.

Conclusion

To reduce your costs your energy consultant should advise you on timing, competitively tender your business to drive down the negotiable charges and reduce your network charges if possible. They should charge you a fair and transparent fee for these services.

When suppliers offer fixed prices for, say, one or two years they try to predict what those costs might be and also predict the customer's exact volume. As these costs become less predictable in 2022, suppliers have increased their risk premia within their price

Sustainable water use in data centres

Data centres are the linchpin of digital transformation. These critical facilities house the servers and infrastructure that power our favourite online services such as streaming, online banking, podcasts, maps, and much more. But their continued growth and usage, fuelled by applications such as artificial intelligence (AI), needs to be managed both economically and sustainably.

BY DAVID WATKINS, SOLUTIONS DIRECTOR AT VIRTUS DATA CENTRES



THE RAPID PROLIFERATION of data centres has led to many critical questions being asked about their environmental impact, not least concerning water usage in cooling technologies.

Acknowledging the environmental effect of their operations, data centre operators have already taken important steps to address sustainability concerns; ambitious targets have been set as testament to the industry's commitment to reducing its ecological footprint. These targets encompass various facets of sustainability, but a central focus is on minimising water consumption.

Cooling: the Environmental Cost

When it comes to keeping the digital infrastructure working, data centres need cooling technologies to keep the IT equipment housed within them at the optimum temperature and humidity so that they run as efficiently as possible. This makes cooling

technology critical, not only to maintain the best environment for the IT systems, but also to consume power responsibly. Data centre cooling systems include cooling towers, chillers, pumps, piping, heat exchangers / condensers and computer room air conditioner (CRAC) units. Data centres also need water for their humidification systems and facility maintenance.

Traditionally, data centre air conditioning equipment is either water or air cooled. According to research carried out by Savills, it is considered that a data centre could use up to 26 million litres of water each year, on average, per megawatt of data centre power. Although this appears to be an alarming statistic, unnecessary water leakage by water companies themselves is also a major cause for concern. According to OFWAT, in 2020-21 England and Wales leaked 51 litres of water per person per day, and in Scotland and Northern Ireland this figure was above 80 litres of water.

However, it should be recognised that many data centres use 'closed loop' chilled water systems - meaning that water is charged into the system during construction and then continually circulated within a facility, rather than needing new water consistently pumped into the building. A large-scale data centre will be filled with around 360,000 litres of water initially, or the equivalent of a 25 metre local swimming pool. This water will remain in the system for the lifespan of the data centre, typically a minimum of 15 years.

The need for continuous innovation

Water usage concerns leave data centre operators grappling with a dual challenge. On one hand, they must meet the ever-increasing demand for data processing requirements, and on the other they must navigate the intensifying effects of climate change. Compounding the situation, with each passing summer temperature peaks are becoming more severe. For example, research by the UK government finds that the country is experiencing



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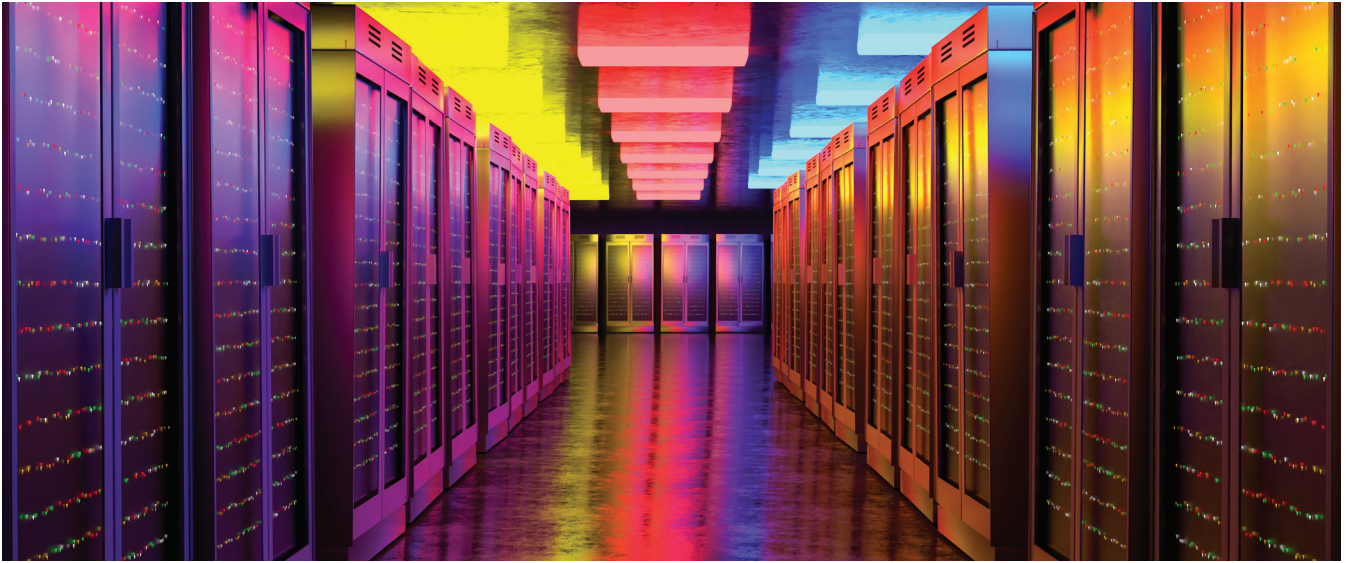


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rising temperatures which effects the availability of water; the most recent decade (2012 to 2021) has been on average 1.0°C warmer than the 1961 to 1990 average; all 10 of the warmest years in the UK have occurred since 2003; 2022 was the UK's hottest year on record, with an average year-round temperature above 10°C seen for the first time. This trend creates an ever-increasing need for innovative approaches to data centre cooling.

The data centre industry has long been committed to ensuring sustainability and efficiency, with providers working hard to use resources including power and water responsibly. In response to these challenges, data centre operators are embracing innovation as a cornerstone of their sustainability efforts. Indeed, companies in the sector are continually looking to innovative sustainability strategies that include things like alternative and renewable sources of power, rainwater harvesting, zero water cooling systems, recycling, waste management and much more.

One great example is the strategic re-evaluation of cooling equipment led by organisations like VIRTUS. By altering the point in the cooling cycle at which water is introduced, operators can make substantial reductions in water consumption. Implementing this practice, along with other efficiency initiatives can save up to 55% of water consumption, and also reduce the use of related consumables such as water filters and associated maintenance.

This is showcased at the LONDON2 data centre in Hayes, London. The mission is twofold: to enhance electrical efficiency and optimise water usage, driven by the recognition of the pivotal role data centres play in minimising their environmental impact wherever possible.

In the UK, where ambient conditions provide the ideal backdrop, VIRTUS had already harnessed adiabatic cooling technology to cool the data halls efficiently. Leveraging the day / night cycle, free

cooling was implemented to maintain the desired temperature within the facility.

What makes LONDON2 exceptional is its strategic location above a natural aquifer, enabling the use of water that is not drawn from the public supply - another example of its commitment to responsible resource management by design.

These kinds of innovative approaches help to ensure that water usage is minimised precisely when it matters most - during periods of the highest outside temperatures.

Collaborative responsibility

The data centre industry has made a great deal of progress in terms of developing and implementing innovative cooling solutions which have the potential to reduce its environmental impact. The right cooling solutions are crucial to helping providers meet their green ambitions and positively affect customer Environmental, Social and Governance (ESG) targets.

It's important to note, that achieving sustainable data centres is a goal that cannot be reached in isolation. It necessitates industry-wide collaboration and knowledge-sharing to make real change possible. Data centre operators are already coming together to share best practices, techniques, and insights, with a particular focus on water-saving strategies. This collaborative approach magnifies the impact of sustainability initiatives and accelerates progress toward shared environmental objectives.

The collective responsibility of the data centre industry to reduce its environmental impact is an inspiring model for other sectors to look to for best practice. As data centre operators unite in their commitment to sustainability, they set a powerful precedent for industries worldwide. They demonstrate that sustainability is not just a buzzword but a tangible goal that can be achieved through creativity, innovation, and concerted effort.

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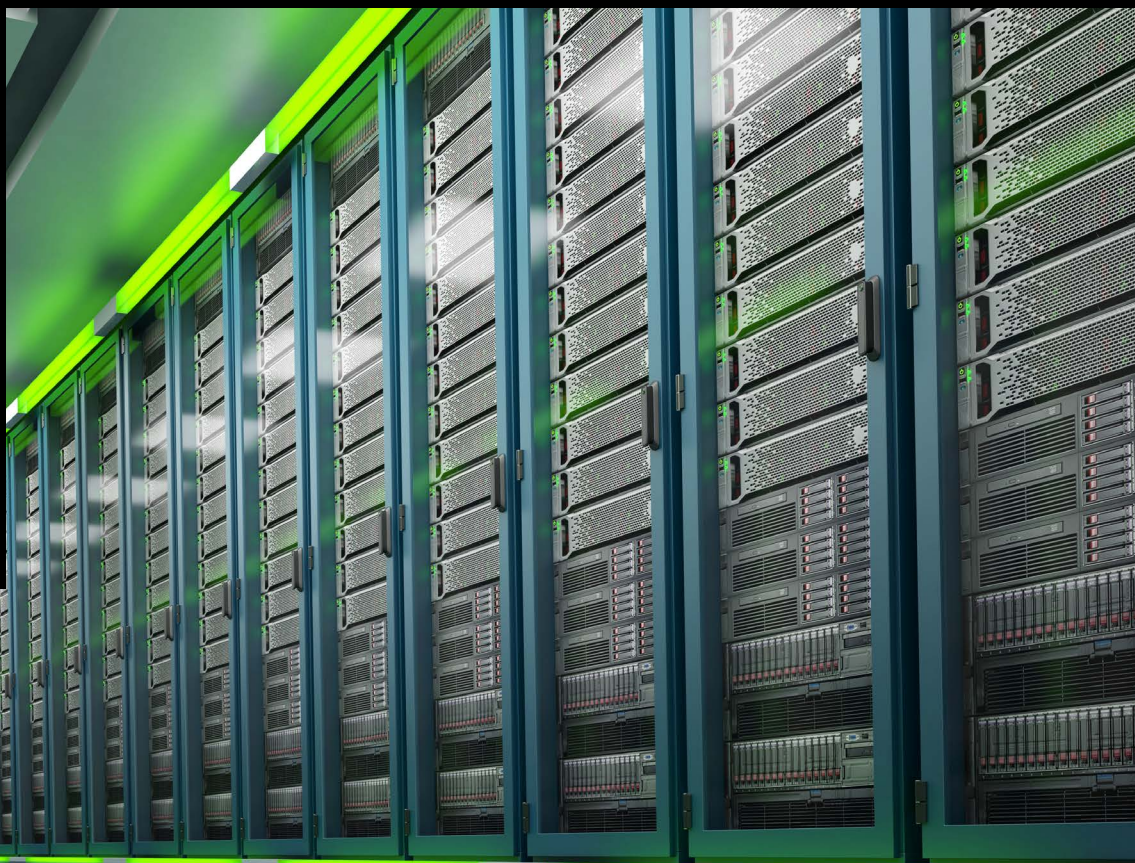
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Unlocking cooling efficiency

The next big opportunity for greater data centre sustainability, serviceability, and scalability.

**BY KELLEY MULLICK PHD, VICE PRESIDENT OF TECHNOLOGY
ADVANCEMENT AND ALLIANCES, ICEOTOPE**

DATA CENTRES are grappling with an unprecedented surge in data generation. The rise of the internet, cloud services, Internet of Things (IoT) devices, social media, and Artificial Intelligence (AI) has ushered in a data revolution. Moreover, the traditional role of data centres is rapidly evolving, transitioning from mere data storage hubs to interactive powerhouses, thanks to high-performance computing (HPC) and AI applications that propel vast data streams to the edge of networks.



Sustainability is also a critical concern within the industry, driven in part by the implementation of the Paris Agreement—an internationally binding treaty aimed at combatting climate change since 2016. Under this agreement, signatory countries have committed to cutting carbon emissions in half by 2030 and achieving Net Zero emissions by 2050.

Corporate sustainability goals are increasingly documented in environmental, social, and governance (ESG) reports, as consumers and investors favour environmentally responsible companies. This push to reduce carbon footprints and limit water consumption underscores the importance of sustainability in business considerations.

Amidst these challenges and opportunities, liquid cooling is emerging as a pivotal solution. Enterprises and data centre operators navigating their transition to liquid cooling should conscientiously weigh three pivotal factors: sustainability, serviceability, and scalability.

Sustainability

The burgeoning energy usage, surging power costs, and looming government regulations are casting a

spotlight reducing data centre energy consumption. Sustainability is no longer being viewed as a cost on business, as many companies are now using sustainability as a criterion for vendor selection.

Serviceability

Whether within the heart of a data centre or at the remote edges of networks, the clamour for simpler, cost-effective servicing of equipment reverberates. A technician capable of seamlessly swapping a module within the confines of a data centre campus should easily be able to do the same at a remote location. This becomes particularly vital for telco providers navigating the challenges and costs of service and maintenance. With a multitude of remote sites in their network, minimizing on-site maintenance emerges as a key cost-saving strategy.

Scalability

The traditional data centre is no longer the centre of our data. Today, workloads must scale from the cloud to the edge, adapting to diverse environments, from single servers at cellular base stations to ruggedized edge solutions to enterprise-grade data centres. Repackaging conventional IT solutions fall short in addressing the demands of harsh IT landscapes and nor the sustainability demands to reduce power consumption. Purpose-built solutions are needed to address these concerns.

The Landscape of Liquid Cooling

Liquid cooling stands at the forefront of solutions capable of efficiently and cost-effectively accommodating modern compute requirements. However, not all liquid cooling solutions are the same.

Direct-to-chip, or cold plate cooling, allows for a heat transfer of fluid to be delivered to specific IT components requiring cooling. This technology offers peak cooling performance at the chip level but still necessitates auxiliary air cooling. It serves as an interim solution to cool the hottest chips but falls short of addressing long-term sustainability goals. Tank immersion, on the other hand, provides a more sustainable alternative, as nearly 100% of the heat can be recaptured and reused and the use of fans in the data centre may be eliminated.

However, new facility designs, and structural requirements mean that using brownfield data centre space is nearly impossible. New construction buildings with reinforced flooring are required. Moreover, specialized training is requisite to service the equipment, adding to operational complexities. Precision Liquid Cooling combines the best of both technologies and effectively addresses their inherent limitations.

Precision Liquid Cooling removes nearly 100% of the heat generated by the electronic components of a server, while reducing energy use by up to 40% and water consumption by up to 100%. It does



this by using a small amount of dielectric coolant to precisely target and remove heat from the hottest components of the server, ensuring maximum efficiency and reliability. This eliminates the need for traditional air-cooling systems and allows for greater flexibility in designing IT solutions. There are no hotspots to slow down performance, no wasted physical space on unnecessary cooling infrastructure, and minimal need for water consumption.

Beyond these environmental and efficiency gains, Precision Liquid Cooling also reduces stress on chassis components, slashing component failures by 30% and extending server lifecycles. The ability to hot-swap servers both within data centres and remote locations streamlines service calls, eliminating exposure to inclement environmental elements and substantially reducing the risks associated with service operations.

Understanding the advantages of liquid cooling technologies, especially in the context of rising IT equipment demands and evolving sustainability requirements, becomes crucial for making informed decisions about the future of our data centres. By embracing liquid cooling solutions, we can strategically position our organization for enhanced operational efficiency, reduced energy consumption, and adherence to emerging sustainability standards.

Precision Liquid Cooling technology stands out as a superior choice. As we make strategic decisions for the future of our data centres, adopting this innovative technology will empower us to navigate the ever-changing landscape of data centre requirements, while also fulfilling our commitment to a sustainable and environmentally conscious future.

2024 trends and predictions: RES, AI, data centres and beyond

The true role of data centres in our digital future is becoming apparent, as environmental and commercial demands increase. Schneider Electric explores the new trends set to impact the sector in 2024 and beyond.

**BY STEVEN CARLINI, VICE PRESIDENT OF INNOVATION AND DATA CENTER,
FOR SCHNEIDER ELECTRIC'S SECURE POWER DIVISION**



AS WE LOOK OUT into a future that appears to have more variables by the minute, making any kind of prediction is hard. However, there are two things that seem pretty certain, and those are that we will have to do more to combat climate change, and we will have to change the way we do, and support, business because of the increasing impact of artificial intelligence (AI).

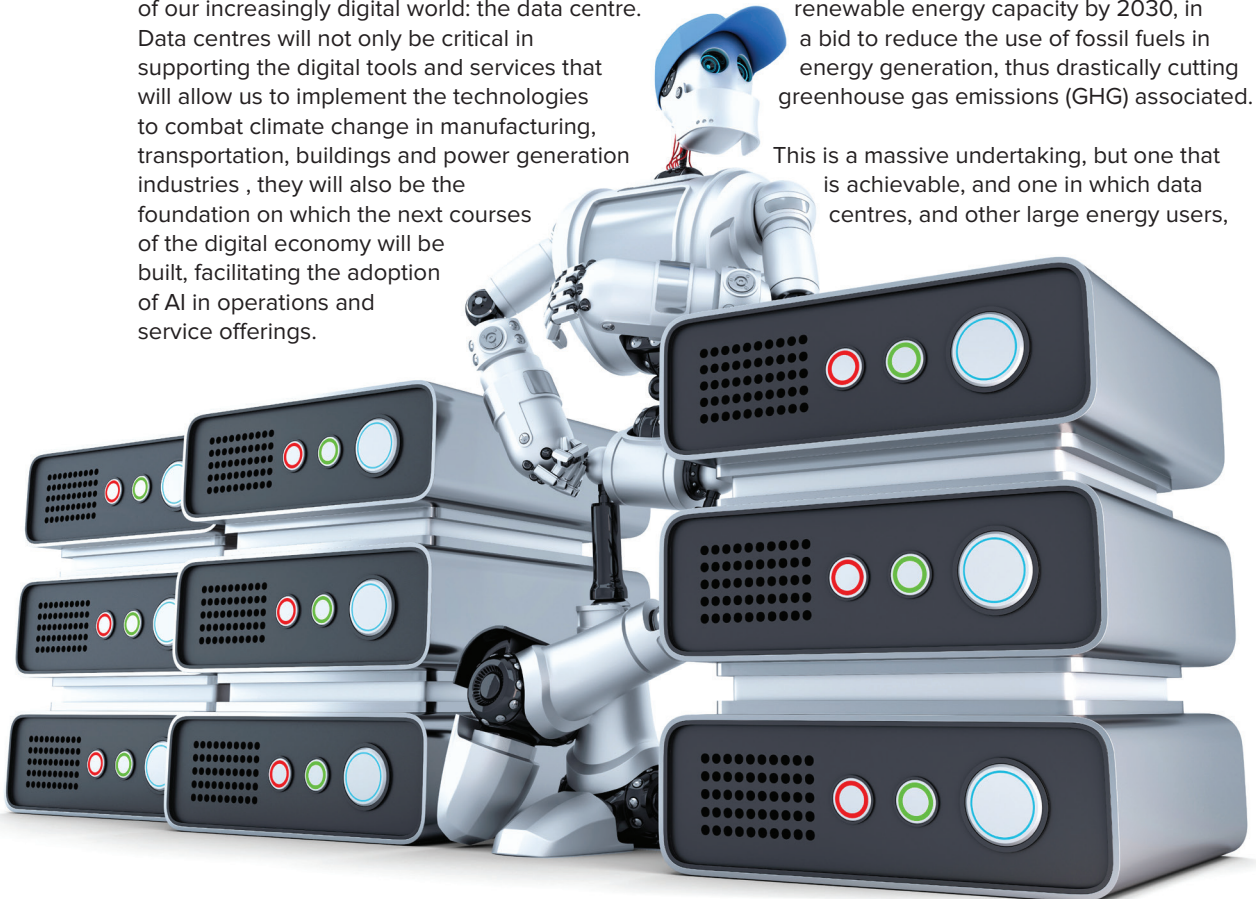
The common thread between these two apparently divergent, but pressing, priorities is the unsung hero of our increasingly digital world: the data centre. Data centres will not only be critical in supporting the digital tools and services that will allow us to implement the technologies to combat climate change in manufacturing, transportation, buildings and power generation industries, they will also be the foundation on which the next courses of the digital economy will be built, facilitating the adoption of AI in operations and service offerings.

COP pledges

Few could have failed to notice the noise and heat (no pun intended) generated from the recent COP28 summit. Many have expressed dismay that this is the 28th such conference on something that should have been comprehensively addressed by now, but I digress.

A key commitment made at this year's conference was reported by Reuters. The governments of 118 countries have pledged to triple the world's renewable energy capacity by 2030, in a bid to reduce the use of fossil fuels in energy generation, thus drastically cutting greenhouse gas emissions (GHG) associated.

This is a massive undertaking, but one that is achievable, and one in which data centres, and other large energy users,



can make a significant contribution. In recent years, various trends have driven data centre designers and operators to develop their facilities to be more energy self-sufficient. This has sometimes been due to constrained energy supply, particularly in urban areas, and sometimes due to rising costs of connections. In fact, there is mounting evidence to suggest that planned developments that were viable just a couple of years ago, are being reconsidered due to stubbornly high interest rates and attendant costs.

Demand side management

All of these drivers have meant that many data centre designers and operators are moving more toward the capability of operating at a severely reduced demand side energy consumption rate, or being entirely self-sufficient for sustained periods. This can be achieved through various means, but sometimes it can be as simple as using a greener alternative to diesel in existing generators, such as hydrotreated vegetable oil (HVO), but extending to full microgrid operation.

A key characteristic of microgrids is that they can operate either independently of a wider, national grid, or collaboratively with it and other microgrids. When operating collaboratively under an electricity trading scheme often governed by smart contracts, data centres can leverage their critical power infrastructure to provide grid balancing services which are essential when high levels of variable renewable energy (VER) sources are employed. If the world is to achieve the tripling of RES used in grids globally, then the speed of incorporation of such sources will be ramped up significantly towards 2030. The digital management systems, such as DCIM, critical power infrastructure, and the ability to function as a microgrid with energy flows in both directions, will allow data centre designers, owners, and operators, to facilitate a an accelerated transition to renewables, and particularly VERs, that will see those ambitions achieved.

AI impact

The other major trend that is foreseeable, if not fully predictable, is the impact of AI on business, consumers, and the ICT industry as a whole. Data centres are already changing under the demands of AI, and we at Schneider Electric have done a lot of work to understand those changes and provide insights as to how to optimise facilities. Our White Paper 110 entitled “The AI Disruption: Challenges and Guidance for Data Center Design” explains relevant attributes and trends of AI workloads, describing the resulting data centre challenges and provides guidance on addressing the challenges for each physical infrastructure category including power, cooling, racks, and software management. However, the impact of AI is far greater than just infrastructure or management. There has been a growing realisation that moving resources closer to where they are needed is a sound approach to many of today’s digital challenges. Compute

power, data processing, and analysis and now AI are being moved to the edge. Distributed IT or Edge computing has been implemented in sectors such as retail and finance, and manufacturing will increasingly deploy edge computing to enable increasing use of industrial internet of things (IIoT), as well as automation and more. The next 12 months or so will be when everyone starts talking about the need for edge AI. This AI at the edge will support not just optimisation of infrastructure and operations, it will also be key in supporting enterprise applications.

Moving to the edge

In many cases, but already seen in the likes of retail, the day to day data is not as important as the insights it contains, which must be extracted quickly to be of value. Data processing has arguably been moving from the core to the edge of networks over the last decade or so, and especially for big data applications for which the result is the key and raw data less so. A raft of developments, from processor technologies to 5G and Wi-Fi 6 high-capacity networks, have enabled more and more applications to be placed at the edge, providing vital speed and capability where it is needed.

When these edge implementations run AI algorithms in a neural network, they can be referred to as Edge AI. Additionally, with video as a central edge AI component, a vision processing unit microprocessor is preferred in many of these applications to accelerate machine learning and AI algorithms, to better support image processing (or computer vision) by using less power with higher speed. This kind of edge AI has numerous benefits, not just to reduce data traffic to centralised infrastructure, which is in danger of experiencing the concept of data gravity, but in providing intelligence from data faster than previously. This in turn can feed into AI optimisation of operations with better quality inferences from fresh data direct from where it is produced. Edge AI has the potential to hark back to one of the early benefits of the internet in decentralisation. Building on trends such as blockchain, Web3 and the metaverse, edge AI can enable architectures which are inherently resilient, self-optimising and highly efficient.

Central role for data centres

Data centres have a central role to play in future demands of the digital world. Not only can they host AI-enhanced applications and services that can increase efficiency and provide the transparency to enable other industries and sectors to decarbonise, they can directly contribute to the acceleration of renewable energy adoption to achieve the pledges made by 118 governments at COP28. Additionally, data centres are evolving to be able to provide an optimised foundation for the increasing AI workload demand from businesses of all sizes.

Data centres truly are the unsung heroes of our digital future.



Addressing the critical importance of cybersecurity

As a global leader providing hyperscale and large enterprise data centre solutions, a robust, scalable and efficient cybersecurity solution is of critical importance to Colt Data Centre Services (Colt DCS). When looking for a partner to bolster its threat detection and response capabilities, Colt DCS turned to Armor to provide a uniform cybersecurity platform across all its multi-national sites; implementing Armor's XDR + SOC solution as well as its VAPT programme to continually identify potential flaws.

OPERATING 16 state-of-the-art data centres in seven cities across Europe and Asia Pacific, Colt DCS has been designing, building and operating hyperscale and large enterprise data centres for more than 25 years.

Like all hyperscale data centre solution providers, Colt DCS' business model is dependent on customer confidence and being able to convince potential customers that their confidential data, and the data of their own customers, is in the safest of hands.

The vast amounts of sensitive and valuable information stored, processed and transmitted

by Colt DCS for some of the world's largest organisations make it a potentially attractive target for cyberattacks. Therefore, effecting a robust and highly assured cybersecurity platform is essential to its operations and ongoing success.

Challenge

As part of its commitment to delivering a sustainable hyperscale future for its clients, Colt DCS undertook a thorough evaluation of its cybersecurity posture.

The business found itself reliant on a multitude of disparate solutions, making threat monitoring and response less efficient. This fragmentation also meant that Colt DCS' IT teams did not have a single view of the threat landscape and associated vulnerabilities, instead having to sift through data from various vendors, which reduced response efficiency.

Guy Gibson, IT Infrastructure Manager at Colt DCS says: "What we realised is that we were often 'reactive' to threats. We had access to a huge amount of data, but no single view. It felt disjointed and that our current approach lacked structure and control."

Greater vulnerability assessment and penetration testing (VAPT) was also an area Colt DCS identified for improvement, requiring continuous monitoring and testing of the environment in order to expose

potential faults and security weaknesses.

Guy Gibson explains: “At the heart of what we were trying to achieve was more efficient threat detection and response; seeking a single source of truth solution that would provide us with greater global threat intelligence, control, testing and guidance whilst also facilitating large scale growth when required.

“We needed to work with someone who really understood the threat detection landscape and who could provide a solution that offered zero downtime to facilitate business continuity. The solution would also have to be compliant to data storage regulations across every country we are located in and, crucially, allow us to retain ownership and control of all data. In essence we needed security delivered in an unobtrusive way.”

The cybersecurity team at Colt DCS was also looking for the reassurance of 24/7, 365 days a year platform security, as well as a trusted supplier and subject matter expert who could provide guidance, training and knowledge to their teams, helping them to grow.

“We wanted to learn and improve, so trust, communication and seamless integration between the new provider and our Incident Management Team (IMT) was also a must,” Guy continues, “focusing on detecting and resolving Priority 2 (P2) incidents or higher with a well-defined process for incident resolution.”

The Solution

With all challenges and concerns identified, Colt DCS initiated a search for a cyber security partner who could provide an effective solution across its multinational sites.

Armor immediately impressed with its delivery capabilities, technical expertise and the comprehensive solution it proposed to simplify the detection and remediation of cybersecurity-based threats.

Guy explains: “We were highly impressed with the solution proposed by Armor. Other vendors/ platforms were considered, but Armor came out top in terms of the technical solution, delivery and the flexible capabilities it offered.”

Armor project managed the implementation of Microsoft Sentinel, Azure’s cloud-native security information and event management (SIEM) system, as part of its Extended Threat Detection and Response (XDR) function to correlate logs and telemetry data from all sources, providing a complete view for threat identification.

A 24/7 Security Operation Centre (SOC) added an additional layer of cybersecurity expertise to Colt DCS’ defence, enabling swift threat response and

guiding remediation efforts effectively.

As part of the XDR+SOC deployment, Armor configured each of the following custom and native log sources:

- **Azure AD** – which provides insights into audit and sign-in logs.
- **Azure Activity** – which provides an overview of subscription level events.
- **Azure WAF** – which provides Web Application Firewall logs.
- **Azure Firewall** – which provides network security and application rule logs.
- **Azure SQL Database** – which provides audit and diagnostic logs.
- **Azure Storage Account** – which provides audited and diagnostic logs.
- **Microsoft 365 Defender** – which monitors and logs logons, file, process and registry events.
- **Microsoft Defender for Endpoint** – which provides security alerts on network endpoints e.g. laptops, tablets, routers etc.

Additionally included in the solution were Armor’s advanced:

- **Analytics Rule Library** – including correlation alerting and threat-hunting rules.
- **Security dashboards and widgets.**
- **Configuration of Open Source & Commercial Threat Intelligence Feeds.**

An ongoing VAPT programme was also deployed to identify any potential security flaws and enhance Colt DCS’ DPS’ overall security position.

As a second stage to this project, Colt DCS is now ingesting a new telemetry as part of its XDR solution – Microsoft’s Defender for IOT. This will enhance its security further by protecting and monitoring internet-connected devices and endpoints within the data centre infrastructure to prevent cyber threats and vulnerabilities.

Guy explains: “The implementation of the solutions was well-managed and required minimal input from our internal teams. Not only was it straightforward,





but the benefits were felt almost instantly. The solution from Armor has allowed us to have a better oversight of our global operations and assess the cyber landscape more efficiently.

“I haven’t received a single complaint from my team. Everyone sees Armor as a force for good. Armor’s solution has allowed us to shift our mindset internally, we are more proactive and focused. We can spend more time on access control rather than trying to process and understand vast quantities of data, which had become the norm.

“There have been numerous threats and vulnerabilities picked up since the implementation of Armor’s system. Issues that I think could have posed a real risk had our teams not been able to detect and remediate them. One example was the detection of a compromised email account which had the potential to be used for malicious means if not resolved swiftly. With this new solution we were

able to be informed accordingly and take immediate remediation steps.”

Shortly after the implementation of the Armor solution, Colt DCS expanded capacity across ten of its sites. Guy adds: “Having implemented the XDR solution ahead of this expansion undeniably meant that this process was much swifter. It was far less concerning to all involved than it would’ve been using our previous approach.

“Overall, the entire solution has helped us to achieve every single objective we set out to achieve on this journey; making the assessment of the cyber landscape a lot simpler for our team, threat detection and response quicker and more efficient, whilst continually facilitating our expansion.”

The Wins

- **Unified cybersecurity provision**
- **Greater threat visibility.**
- **Minimized false positives and reduced alert fatigue.**
- **Simplified and faster incident response.**
- **Reduction in people hours to detect and manage threats.**
- **Elimination of threats before they cause damage.**
- **Improved global oversight across Colt DCS’ locations.**
- **Implemented with zero downtime and full business continuity experienced.**
- **Enhanced access control.**
- **Compliant with data storage regulations across every location.**
- **Retained ownership and control of all data.**
- **Accessible guidance, training and knowledge support.**

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AI and sustainability - challenges or opportunities for the data centre?

The opening of Legrand's latest Experience Center in Reading, UK, last year is just one of many technology and corporate strategy developments focused on optimizing the company's data center products and services portfolio, as well as the overall customer experience.

BY PAUL ROBERTS, PRODUCT SPECIALIST AND MTDC ACCOUNT MANAGER FOR LEGRAND DATA CENTER SOLUTIONS, TALKS TO DCS

THE PURPOSE of the Experience Center is to showcase the complete range of products that fall within the scope of the Legrand Data Center Solutions Portfolio. This incorporates many of Legrand's already well-established brands into a complete, joined-up solution that can be readily applied to any commercial or enterprise data center. Hence, this is an opportunity for partners, industry leaders and experts and end users to experience what the Legrand Data Center Solution looks and feels like.

Paul Roberts explains: "The Experience Center is also a place where we share ideas, strategies, concepts, and educate each other in an ever changing and constantly evolving industry. We like to share our own ideas, but we can only achieve the product innovation that we showcase through listening to our peers and, most importantly, our customers."

So, the Experience Center not only acts as a Legrand Data Center Solutions portfolio showcase, but it also provides visitors with an opportunity to share their views and thoughts and ultimately contribute to the company's ongoing innovation process.

The main focus of Legrand Data Center Solutions is to distribute the power through the building, from grey space, into the white space and finally to

the equipment, in the most efficient way possible whilst minimizing power loss at every stage. Paul emphasizes that 'it is important to note we also distribute the data through the same stages from POP room through to the IT equipment'.

As demonstrated at the Experience Center, Legrand achieves this by providing energy efficient solutions throughout the power supply chain and indirectly through energy efficient passive and active cooling technologies.

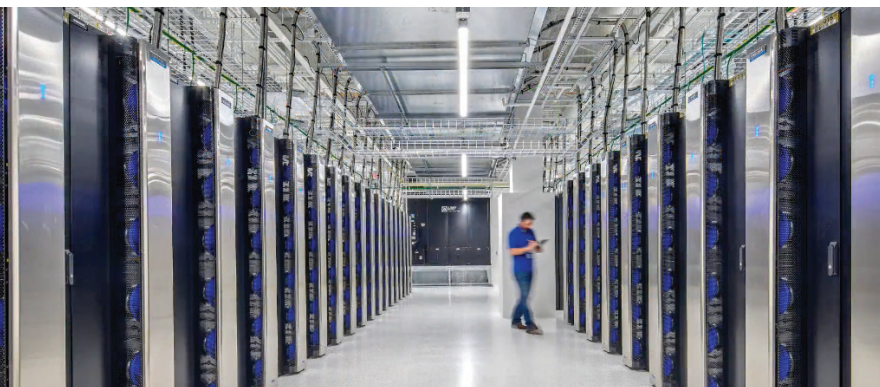
Paul takes up the story: "We endeavour to minimize power loss throughout this journey, but the IT equipment itself will of course be generating heat directly proportional with the amount of kW's of power it uses, and this heat must be rejected, which inevitably involves additional power consumption, and from a PUE perspective this should be considered as power lost.

"This happens within the white space and so that's where we can achieve the greatest levels of efficiency through passive cooling solutions such as our air optimization kits, aisle containment and energy efficient active cooling solutions like the innovative Coldlogik range of products from USystems, with the ultimate objective of minimizing the power required to reject the heat generated by the IT equipment."

AI on the horizon

With the impending AI explosion, there are some significant challenges facing Legrand's customers from a power and efficiency perspective. As Jensen Huang, the Co-Founder and President of NVIDIA, puts it, the amount of power required by data centers to support the AI boom "is an issue for the world."

Paul comments: "I recently attended an AI seminar hosted by a leading co-location retailer whose chairman suggested that AI, with its high-density power and cooling demands, will eventually drive



the industry towards a crisis point, as we struggle to support this technology from existing power budgets.

“For instance, Dublin has no more power for new data center deployments and Amsterdam has very strict guidelines around energy efficiency. “So, the pressure to find further capacity out of the existing power budgets will become more intense if we are to accommodate this emerging technology.” Not surprisingly, Legrand is already focused on addressing the challenges arising from these new, AI-driven workloads. This means adding technology innovations to the company’s existing suite of data center solutions as well as working with customers to implement this technology.

Harnessing the AI boom

Legrand has the capability to deliver the power at the density required for AI applications. This includes solutions such as the Starline Track Busway and the new generation of intelligent rack PDUs – the Raritan PX4 PDU and the Server Technology PRO4X PDU.

The company also has the necessary expertise to understand and address the importance of optimizing both the space and airflow within the rack. Additionally, the issue of how to reject significant kW of heat generated by the IT equipment is addressed with Legrand’s highly efficient Coldlogik cooling solutions.

Paul comments: “We are already working with a number of customers in helping them deliver AI projects using our extensive solutions portfolio – helping them to harness the AI boom. One of these projects was recently referenced at the AI Safety Summit and was also featured within an accompanying BBC news item at the time.

Sustainability front and center

Alongside the impending AI challenge, Legrand continues to help its customers reduce their carbon footprint by providing innovative, energy efficient and sustainable solutions - a primary objective at the company and an important part of its Corporate Social Responsibility Program.

Probably the biggest challenge for the data center operators who are already on this path of improved energy efficiency is maintaining an upward trajectory of further improvement, with the ultimate goal of achieving Net Zero.

However, what is sometimes overlooked is not just the reduction in carbon emissions and operational expenditure, but the increase in the kW power capacity through reclaiming energy lost through inefficient cooling coupled with the increase in the cooling potential of the data center. Paul explains: “Put it another way, a retail colocation provider, or a multi-tenant data center sells kW’s not space. In this scenario think of the energy provider or power station as the wholesaler and the colocation



provider as the retailer. Imagine that the colocation provider is selling cans of kW’s and these are displayed on a shelf and let’s assume that the facilities kW budget is shared amongst six equally sized cans. If the facility has a PUE of 2.0 (I choose this value as this was originally considered to be average), then half of the stock on the shelves is effectively spoilt, whereas if the same facility improves its PUE to 1.2 then only one out of the six cans is spoilt.”

Such an improvement means the facility has more product to sell so can improve its revenue as well as its operational expenditure. This reclaimed energy also goes at least some way to address the challenges that AI presents to the industry in terms of a dearth of power capacity.

Final thoughts

Legrand is committed to continuing to enhance its product offering both organically through investment in R&D - the PX4 PDU and PRO4X PDU being an excellent example of this - but also through best-in-class acquisitions.

Paul takes up the story: “I think we have already demonstrated that Legrand Data Center Solutions is AI ready, but we will be pushing this message further throughout 2024 with additional content. “Our organization will further develop the customer experience with plans for more Experience Centers throughout Europe, including Germany, Czech Republic, Serbia, Poland, and Spain.

“This year you can access the complete Legrand Data Center Solutions range via a single website, bringing together all our brands into one location.” We all have mixed thoughts about what the future holds, and how new technologies like AI will impact our lives. As another quote from the AI Safety Summit stated: “AI has the potential to transform and enhance human wellbeing, peace and prosperity”; but there also need to be the recognition that safeguards need to be built into its DNA. Some of these concerns will be around safety and security, others around its sustainability.



Navigating the obstacles of data centre delivery - at scale and at speed

Exploring the change in mindset required to engineer ever more flexible and future-fit facilities.

BY CIVIL INFRASTRUCTURE ENGINEER, MARK BARRELL AT JUBB

CIVIL INFRASTRUCTURE ENGINEER, Mark Barrell, has been heavily involved in data centre projects over the last decade. Since joining Jubb - a UK consultancy working on numerous hyperscale projects across Europe - he has helped spearhead projects from end-to-end, assessing site viability and then supporting asset owners across projects totalling over 550MW of new capacity. In this article, he delves into various approaches and challenges encountered in the context of rapid data centre delivery across the continent, emphasising the importance of flexibility and collaboration in meeting the industry's surging demands.

Understanding the challenges of data centre expansion

Savills' recent report has cast a stark light on a pressing issue: there is an urgent need to more than double the number of data centres in Europe by the year 2025. While this situation clearly opens substantial commercial opportunities, it also presents distinct challenges as the demand for rapid expansion intensifies. Especially for newer entrants that may be naive to the pressures of working on complex projects at an unprecedented pace.

Rising supply chain costs and a shortage of materials and skilled labour, alongside ongoing

power availability problems, are impacting schedules and need to be mitigated. Consequently, designers and contractors are under immense pressure to prepare facilities quickly. This is precisely why effective, real-time collaboration among multi-disciplinary partners is absolutely essential. In the data centre world, where timing is of the essence, collective problem-solving is the key to meeting critical milestones and delivering high-performing, resilient structures within sizable but finite budgets.

This shift in priorities can be a hurdle in itself for those uninitiated in the specific demands of data centre delivery. Accommodating the need for speed, over and above all else, requires extraordinary agility and resourcefulness. For teams that are used to more conservative ways of working; adopting this mindset means implementing not just alternative thinking, but more novel approaches.

Championing a modular approach

We've learned that adaptability is vital every step of the way. The ability to consider expansion in an evolving market is key, as is an understanding of project requirements and emerging industry trends. Additionally, each locality will also have specific parameters to consider, further reinforcing the



importance of bringing in on-the-ground expertise and a somewhat tailored approach to covering all bases.

Embracing modularity has proven transformative for major players in the data centre industry. And despite its 'one size fits all' connotations, the biggest benefit is swift - and flexible - deployment. This is because of the time, monetary, and expert resources ploughed into configuring well-tested models, purposely designed to suit a wide variety of sites, as well as addressing the client's evolving future needs.

The benefit of this rigour and upfront investment in templating for every eventuality is that, while some adjustments may be needed to optimise a specific location, these are only minimal and can be implemented by local design team partners. Therefore, less designer input is required throughout the early stages - keeping costs down and making owners' and developers' ambitious timescales actually achievable. Indeed, many iterations are explored to ensure enough flex is in-built and facilities are fit for the foreseeable.

From the ultimate client's standpoint, focussing their spend and efforts on perfecting a specific template, allowing for a certain amount of flex, is well worth the ability to expedite projects once planning consents have been secured - especially given the stop-start nature of development in the current climate.

Considering the detail that must be explored in order to refine these models in readiness for all the knowns - and potential unknowns - this approach could offer the most value where the end-user has an expansive global footprint and can leverage the value of template design when planning and delivering these mammoth complexes. However, whilst the advantages of this approach for asset owners/operators on a macro scale are clear, this can also benefit those developers focussing on more speculative development to lease facilities to the data centre market. In this case, collaborative, agile teamwork is still required but needs to be applied in a different way to develop a flexible response that can be quickly and easily adjusted to suit a variety of end users.

Balancing risk and reward

Generally speaking, when schedule is king, multinational clients can be more accepting of risk. Given that there is a willingness to adopt the best solutions from around the world, technology emerges as a great enabler. The brilliance of deploying a comprehensive BIM strategy is that any issues can be flagged much sooner to facilitate the coordination required to combat delays and mitigate any immediate and future risks. This provides greater assurance for all parties and keeps teams on a positive and progressive track. It also means that all parties can remain deeply

involved throughout the process, in the locale or from afar, and ensures that the client understands the rationale behind any proposed design changes. Most importantly, it helps to foster a unified "one team" mentality that translates into better efficiency. In a highly technical, competitive environment, it can be easy to disregard these softer measures that deliver hard results. However, negotiating country-specific environmental challenges - from both a physical and cultural perspective - is another potential hurdle that can often be overlooked.

Regional adaptations for diverse landscapes

Regional disparities in terms of culture and working practices, as well as identifying and securing prime sites, play a huge role in successful completion. This often stems from variations in ground conditions, climate, regulatory requirements, and historical development - take the difference between the UK and The Netherlands as a case in point.

The Netherlands is renowned for its extensive network of canals, polders, and reclaimed land, which is mostly situated below sea level. Therefore, much of the Dutch landscape consists of soft, waterlogged ground. In response to this, the Dutch accept that the ground will move and subsequently have developed pragmatic solutions including polder engineering and flexible infrastructure to compensate. In contrast, the UK adopts a more preventative approach to ground settlement given its varied geology - with regions of firm rock right through to soft clays and silts. Typically, ground stabilisation methods are used here to mitigate settlement - such as soil improvement and piling. The industry is consequently conditioned to be cautious, and so when sourcing engineering expertise further afield, consultants need to be prepared for a certain amount of 'give and take.'

Accepting tolerable ground movement ultimately enables a quicker and more cost-effective route, but for local design teams, this can be quite an alien





concept. While this stance benefits the schedule, negotiations could be a potential stumbling block – particularly if delivery partners resent embracing new ideas or alternative ways of working.

Flex is vital to meet our future needs

In an era of surging data demands across Europe, speed is everything, and the adaptability and resilience of the project teams behind the delivery are as important as the facility itself. Being open, transparent, and taking collective responsibility may sound like a given, but when multidisciplinary teams, often from different companies and countries, must

come together to make things happen, one of the biggest barriers can be human nature. Modular and agnostic design strategies are helping to change the face of data centre delivery. With rapid deployment possible in diverse settings - be they urban, near-urban, or rural - ultimately, this approach is addressing the world's capacity demands for output and end-user expectations of streamlining already tight schedules. Hyperscale success depends on a meeting of minds to hit all-important milestones, and it's only when this happens that project teams can collaboratively engineer ever more flexible and future-fit facilities.



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Retail infrastructure transformation: An evolution and revolution

In the ever-changing world of retail, shifting consumer demand is driving businesses to make seismic changes. The changing way that people buy “things”, influenced by the unrelenting growth of the digital world and events like the unforgettable COVID-19 pandemic, means that retailers need to seriously rethink their digital ecosystems.

BY HENK IJSPEERD, SALES DIRECTOR EMEA STRATEGIC SEGMENT RETAIL, AT VERTIV



THE LINE BETWEEN online and offline experiences continues to blur, necessitating a seamless transition between virtual and physical interactions with brands. And, the optimisation of systems, streamlined logistics and maintaining the right levels of stock all emerge as integral components of ensuring a positive and consistent customer experience. Consumers are no longer satisfied with good customer service, they expect to be delighted.

The unremitting pace of technological advancements - such as Artificial Intelligence (AI), Virtual Reality (VR) and Augmented Reality (AR) - add another layer of complexity, requiring retailers to be agile and innovative in adopting technologies that enhance the customer experience and enable operational excellence. It is clear that retail is a complicated world full of challenges. Adapting IT systems shouldn't just be a quick fix for current problems. Businesses need to think ahead, consider future trends, and be ready for change with smart planning.

Navigating the challenges

In this digital era, staying ahead of competitors requires a proactive approach. Retailers must continually invest in technology, remain attuned to

emerging trends, and be agile in their responses to an ever-evolving market. Those who embrace the digital shift not only navigate the current challenges effectively but position themselves as industry leaders poised for sustained success in the dynamic world of retail.

However, the journey of keeping the retail infrastructure fit for purpose is marked with regulatory challenges, especially in regions facing power scarcity such as Ireland, and the Netherlands. Compliance with local and international environmental regulations further amplifies the intricacies of this process. Retailers must navigate a complex landscape of rules and standards whilst striving to build an efficient and resilient infrastructure. Ongoing success for retailers demands not only an acute understanding of the current regulatory landscape but also an ability to strategically position infrastructure in alignment with emerging environmental standards and the latest technology innovations. This dual focus enables not just compliance but a resilient and forward-looking foundation capable of withstanding the regulatory changes that lie ahead.

Exploring the challenges

The rapid evolution of the retail landscape in the digital era imposes multifaceted pressures on retail infrastructure. The surge in digital transactions and the ever-growing reliance on technology introduce many considerations that demand careful planning. Managing escalating storage demands, particularly for vast amounts of data like CCTV images, while simultaneously addressing the intricacies of delivering personalised customer experiences, necessitates a nuanced and delicate balancing act. Achieving standardisation across diverse regions becomes a linchpin for operational efficiency, yet predicting infrastructure requirements in an era marked by constant technological evolution presents an ongoing and formidable challenge. And as we delve beyond the confines of the digital sphere, the physical spaces of warehouses and stores unveil additional layers of complexity. Safeguarding the physical security of warehouses,



mitigating temperature variations in different store locations, and adapting to diverse environmental conditions all require infrastructure solutions that are not just adaptable but inherently resilient. The dynamic interplay between the digital and physical realms accentuates the need for comprehensive, flexible technology solutions that can seamlessly integrate both aspects.

Against this backdrop, the foresight to understand and anticipate customer expectations in the years ahead becomes paramount. Building infrastructure that not only caters to immediate needs but stands resilient against the test of time requires a deep understanding of the evolving nature of both technology and consumer behaviour. As the retail landscape continues to transform, the ability to proactively address these challenges positions retailers and their infrastructure partners for sustained success in an environment characterised by continual change and technological advancement.

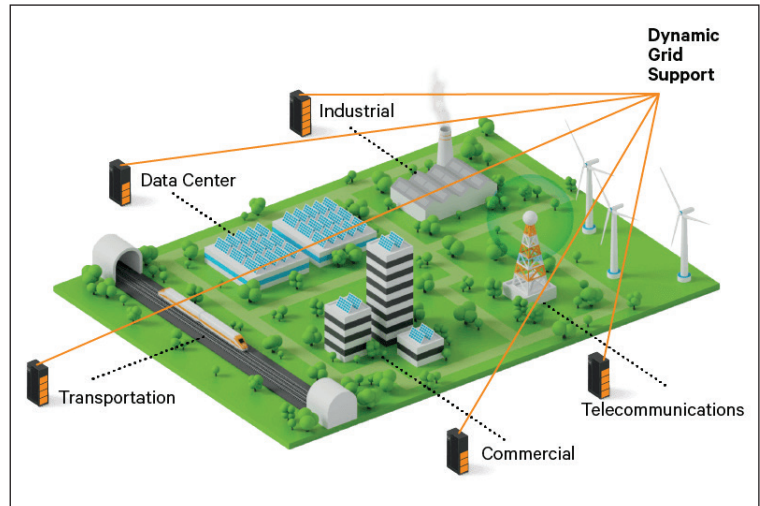
The issue of grid stability

In the face of escalating pressure on energy grids, retailers may also assume a crucial role beyond consumption - they become potential contributors to grid stability. The implementation of scalable Uninterruptible Power Supply (UPS) solutions with dynamic grid support features, the integration of renewable energy sources like solar panels and wind turbines, and the strategic storage of energy in batteries (Battery Energy Storage Solutions; BESS) extend beyond business continuity measures. These initiatives play a pivotal role in mitigating the strain on the grid, transforming retailers into active participants in the broader energy ecosystem. By embracing more sustainable energy practices and acting as responsible contributors to grid stability, retailers not only fortify their own infrastructure against disruptions but also contribute to the overall resilience and help to reduce the carbon footprint of the energy infrastructure that underpins modern commerce. This dual impact underscores the integral role retailers play in shaping a more robust and sustainable future.

A focus on long-term resilience

At the core of future-proofing retail infrastructure lies strategic, long-term planning. The evolving retail landscape demands not just adaptability to current challenges but a proactive stance towards emerging trends. Scalable solutions that flexibly accommodate requirements to come, coupled with a comprehensive understanding of regional and global dynamics, are essential for resilience in the face of uncertainty and change.

Providers of critical infrastructure solutions play a pivotal role in empowering retailers for the digital age. Going beyond being solution providers, they must also be strategic partners committed to delivering the continuous availability, reliability and efficiency of essential elements in evolving retail



settings. Partners with a comprehensive approach - from innovation and design to manufacturing and ongoing support - will provide a seamless and efficient experience throughout the infrastructure life cycle.

Close collaboration with retailers to craft bespoke strategies that align with their unique requirements, such as the meticulous creation of comprehensive data profiles for each customer type, will make the critical difference. This empowers retailers to gain invaluable insights and make informed, data-driven decisions to propel their businesses forward. One element that will help is if your partner has proven expertise in the realm of Artificial Intelligence (AI). This invaluable knowledge will strategically place organisations at the forefront of the imminent retail revolution where AI is poised to thrive and realise its full potential.

Prepared for the future

Ultimately, when we look at the dynamic interplay of consumer expectations, technological evolution and regulatory landscapes, the evolution of retail infrastructure stands as a strategic imperative. The retail landscape, characterised by perpetual change, demands a proactive approach from retailers. It's not enough to react to current challenges; retailers must envision and enact an infrastructure capable of navigating the uncertainties that lie ahead. The journey towards implementing the right infrastructure is not a one-time event; it's an enduring commitment. It involves creating a resilient and adaptable IT infrastructure that can not only withstand disruptions but also leverage emerging opportunities, harnessing the power of digital infrastructure partners.

Through this ongoing commitment, retailers can position themselves as architects shaping a brighter, more sustainable future for the entire industry. In embracing this continuous journey of evolution, retailers strengthen their relevance, ensuring that their infrastructure is not only responsive to current needs but also anticipatory of the transformative trends shaping the retail industry of tomorrow.



Efficient and flexible: the power of modular construction in data centres

Driven by the need for increased efficiency, flexibility, and sustainability, the data center industry is pivoting to modular data centers. As modular construction becomes the new standard, facilities are under pressure to take full advantage of the benefits offered by this paradigm shift. Those who are late to embrace these advantages risk losing their edge to competitors in attracting customers, investors, and employees.

BY TOD HIGINBOTHAM, COO, ZINC FIVE

Modular vs. Traditional data centers: understanding the differences

Modular data centers are pre-fabricated, scalable units that can be easily assembled, modified, and reconfigured as needed. These units consist of standardized modules including power, cooling, and IT systems, which allow quick deployment and hassle-free expansion.

In contrast, traditional data centers are custom-built, fixed structures that require significant time, resources, and planning for construction and expansion. A recent survey of 228 data center executives found that over half had already deployed modular facilities, while 99% shared that they have plans to use modular data center designs in the coming years.



The key advantages: Efficiency and scalability:

Modular data centers' inherent efficiency is one of their primary benefits. By using standardized components, operators can optimize modular data centers for specific power, cooling, and space requirements. These adaptations lower both operational costs and the amount of waste. From the beginning, modular data centers are easier to work with: they can be built off-site in a controlled, indoor environment, which reduces delays and eliminates weather concerns.

Modular data centers also offer unparalleled scalability. As a company's IT needs grow, it can rapidly deploy additional modules without disrupting

existing operations. This flexibility not only saves time and money, but also ensures that businesses can adapt to changing demands with minimal downtime.

Upgrading UPS systems and alternative battery chemistries

A critical component of any data center is the Uninterruptible Power Supply (UPS) system, which ensures continuous operation during power outages or fluctuations. Modular data centers provide a significant advantage when it comes to upgrading UPS systems, as they can easily accommodate alternative battery chemistries such as lithium-ion and nickel-zinc. These alternative chemistries offer higher power density, smaller footprints, lower weight, and faster recharge times compared to traditional lead-acid batteries.

For instance, nickel-zinc battery chemistries' high power density allows operators to reduce the space (and associated costs) needed for backup power supplies. Some nickel-zinc UPS battery cabinets can deliver the same power as lead-acid battery cabinets twice their size and weight, which significantly reduces the number of cabinets required and the linear size of the overall container. Nickel-zinc batteries can also operate at higher temperatures, which enables a lower-capacity cooling system with lower up-front and operating costs. Since they can't go into thermal runaway, nickel-zinc batteries don't need the additional safety infrastructure that lithium-ion batteries require – making them ideal for modular data centers.

Environmental Impact and sustainability: The green benefits of modular data centers

Increased demands for scope 3 emissions transparency are gaining momentum, driven by pressure from investors, regulators and the general public. Data centers that stay ahead of the competition in reporting and addressing scope 3 emissions will attract customers and investors who are seeking comprehensive disclosure and commitments to sustainability. This applies to the climate impact of both the data center companies



and their customers (as happens with colocation facilities).

Modular data centers have a significantly smaller environmental footprint compared to traditional data centers. Due to their scalable nature, modular data centers can be tailored to meet specific energy requirements, resulting in reduced energy consumption and lower greenhouse gas emissions. They can be also easily upgraded to incorporate technologies with lower environmental footprints, such as the previously discussed sustainable batteries for UPS systems.

The bottom line: Embracing the future of data center infrastructure

With greater efficiency, scalability, flexibility, and sustainability, modular data centers are the new norm for data center infrastructure. As the demand for data storage and processing grows, savvy enterprises will recognize and act on the benefits of adopting modular data center solutions to remain competitive, reduce costs, and minimize their environmental impact. By not only adopting modular construction, but fully embracing its advantages, businesses can ensure that they are well-equipped to adapt to the ever-changing technological landscape while contributing to a greener, more sustainable future.

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How to choose a UPS

Uninterruptible Power Supplies (UPS) are essential but complicated items of equipment. There is a multitude of brands, architectures, configurations and supporting infrastructure to consider and the choice can be overwhelming. To confuse matters further, each manufacturer claims their UPS is the best thing since sliced bread!

BY LOUIS MCGARRY, SALES & MARKETING DIRECTOR, CENTIEL



SO HOW do datacentre managers make the right decision for their facility? Here's my 'buyer's guide' about how to approach selection of a new UPS system.

Think of the future

Firstly, I fully appreciate needing to minimise expenditure on UPS solutions. Buying a cheaper system may seem like a money saving option in the short term, however, poor quality components inevitably used in 'cheap and cheerful' UPS are less reliable, require more frequent repair and replacement and may result in untold costs to the organisation if the UPS suddenly becomes unable to support the load. Remember the adage "buy cheap, buy twice" and think of the future when purchasing. Believe me when I say; quality counts.

Stay agile

In my many years of experience, most legacy UPS systems are oversized. Oversized systems cost more to purchase, install, run and ultimately more

to maintain. Therefore, it is necessary to accurately size the UPS to the actual load requirement. This is where a scalable modular UPS offers advantages over standalone systems. A modular critical power solution can be right-sized, flexible and futureproof. Modules can be added on a pay-as-you-grow basis ensuring the system is always right-sized to the actual load.

Having the right infrastructure in place from the outset will also save costs over time. The metal cabinets (infrastructure) needed to house UPS modules are inexpensive and with a flexible, well specified, modular UPS installation, any growth in power protection requirements can be accommodated easily. For example, by installing a cabinet which can take up to five UPS modules but only initially houses two, the UPS power rating can be increased by simply adding another UPS module in a matter of minutes. Furthermore, UPS modules can even be removed, put in the boot of a car to be transported and redeployed to another site just as safely and rapidly!

Calculate costs

Minimising operational costs is understandably a significant driver within any datacentre. Careful management of electricity consumption to minimise costs is initiated at the design and layout stage. For example, if UPS and batteries are located together, more air conditioning is needed because while a UPS can happily operate in an ambient temperature of 40°C the VRLA (valve regulated lead acid) batteries must be kept at around 20°C to optimise their useful working life. Locating the batteries away from any heat source in a well-ventilated environment will reduce or even negate the need for expensive cooling.

If it is not possible to separate the batteries physically from the UPS consideration could be



given to using Li-ion (actually LiFePO₄) batteries which are oxygen free and as safe as VRLA batteries and will happily operate at higher ambient temperatures.

The key to any product selection is to calculate Total Cost of Ownership (TCO) over time – in other words, the cost to buy and run the system over its entire lifetime. It's influenced by numerous factors including the initial purchase price plus the maintenance and warranty and the energy required to run the system including the cooling of batteries, which can be significant. Establishing TCO offers a tangible, realistic method of comparison between systems.

Keep sustainability in mind

Up until now, datacentres have needed to install a UPS and replace it at the end of a typical design life of around ten years, causing considerable disruption.

In the past, despite such disruption, upgrading the UPS meant upgrading to better technology. Like buying a mobile phone, you tend to replace it regularly to take advantage of the latest advancements in tech. However, with modular UPS this no longer needs to happen. Modern UPS systems like Centiel's StratusPower™ offers 97.6% efficiency meaning we have now pretty much reached the physical limit of technological advancement. Silicon carbide (SiC) components may offer small operating efficiency gains in the future but their present unreliability makes them unsuitable for use in a UPS whose primary role is guaranteeing power availability.

So, just like installing cabling, cable trays, switchgear, generators and other electrical infrastructure and expecting it to last for the entire 30-year design life of the datacentre, why not install a 30-year design life UPS too?

Quite simply, a UPS designed to last 30 years hasn't been available until now! Market forces were centred around driving prices down and not to driving sustainable options up so it was not created as an option, but now it is.

The good news is that due to the rise in energy prices, sustainability and energy efficiency (with the aim of moving towards net zero), go hand-in-hand with reducing costs, possibly for the first time in history.

The only way to reduce energy consumption is to take a long-term view. Previously, purchase price (CAPEX) considerations would greatly influence decision making when it came to purchasing new equipment. However, we are experiencing a paradigm shift, where now the operational costs (OPEX) of a wrong decision will far outweigh the small sum saved on buying a slightly less expensive but vastly less efficient UPS system.



Total Cost of Ownership (TCO) calculations therefore now need to be made over ten, fifteen and ideally 30 years – the whole life cycle of the datacentre - to make informed choices about facility design and the right choice of UPS and associated equipment.

Consider service costs

Warranties and maintenance should be considered as part of the initial supply and installation contract. Warranties can vary and this could impact your maintenance contract and therefore the cost to run the system on an ongoing basis. A typical two-year warranty should include parts and labour, providing manufacturers' recommendations are followed. Therefore, you could receive a fully comprehensive maintenance contract for the price of a standard one for the first two years.

A UPS will also require regular maintenance by product trained specialists to continue to operate optimally. When it comes to maintenance, a cheaper contract may appear to reduce the upfront costs but may cost more in the long-term if the UPS is not properly maintained and/or warranties are invalidated.

I would also advise working with a team of experts that you like and trust, who will be able to provide advice with the best interests of your facility in mind.

At CENTIEL our goal is to achieve the ultimate availability of power possible for our client base while helping them keep a careful eye on expenditure. The team has been at the forefront of UPS development over several decades bringing to market the most available and efficient UPS systems. We always act as trusted advisors and are happy to make evaluations and calculations on potential savings on TCO. We work closely with clients, consultants and contractors to ensure UPS systems are all configured optimally and as a result, the critical load always remains protected.

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 6 x 2U servers, therefore each system can hold up to 12 x 2U servers. LiquidRack™ has been designed to provide a cooling capacity of up to 50kW. 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.

www.air-sys.uk

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

DCA News and Updates

By DCA CEO Steve Hone



Sustainability – Views from DCA Partners

IN THIS ISSUE of Data Centre Solutions one of the topics of focus is Sustainability. This subject is of huge importance to the Data Centre Sector and absolutely central to many decisions that DC owners and operators now need to make.

In this compilation of DCA News and Updates we include comments related to various different areas of sustainability; these comments are from senior executives from three very proactive DCA Corporate Partners.

Jeff Safovich, Chief Technology Officer - RIT Tech updates us on the European CSRD (Corporate Sustainability Reporting Directive) and although this is not (at this time) applicable to DC's operating in the UK, a similar directive is likely to be introduced. We'd advise all Data Centre Owners and Operators in the UK to take note!

Mark Gallacher, Global ITAD Director –Tech Buyer provides us with an informative piece explaining why in the past, data security has come at the expense of sustainability. Mark goes on to tell us more about the impact this is having, the current situation and how companies need to start to manage their e-waste responsibly.

Matt Edgley, Chief Operating Officer – Datum Group details steps that Data Centres can take towards sustainability. Matt comments on responsible

energy sourcing and management, intelligent and efficient cooling and environmental accreditations. Datum Group as a Data Centre operator provide knowledge, thoughts and insights that are invaluable.

I'd like to thank Jeff, Mark and Matt for taking the time to compile these informative pieces which we hope you will find interesting.

DCA Special Interest Groups

As the Trade Association to the Data Centre sector The DCA understands that it is imperative that key issues affecting the sector have a point of focus. The DCA SIG's (Special Interest Groups) / Working Groups regularly come together over shared interests to discuss issues, resolve problems and make recommendations.

Our Sustainability Special Interest Group does 'what is says on the tin' – the group meet regularly to discuss and provide workable and justifiable recommendations.

This group work very closely with the Energy Efficiency SIG to provide DCA members with an entire overview of data centre energy efficiency and sustainability.

To find out more or request information to join DCA SIG's please click here or email us - mss@dca-global.org



Solving the CSRD Puzzle



Navigating Sustainability in the Data Center Landscape

By Jeff Safovich, Chief Technology Officer, RiT Tech



THE EUROPEAN DATA CENTER sustainability puzzle is a complex one, with some pieces crystal clear and others faded or deceptive. We're here to help you piece it all together.

Let's start with the European CSRD (Corporate Sustainability Reporting Directive), a cornerstone of this puzzle. CSRD is all about transparency and can be thought of as the "financial reports" of sustainability goals.

An update on the Non-Financial Reporting Directive (NFRD), the directive includes sustainability reporting requirements based on the EU Taxonomy.

From 2025, qualifying organizations will need to disclose their sustainability efforts based on 2024 data.

If your data center meets at least two of the following criteria, reporting will be a mandatory requirement: a balance sheet over €20 million, a net turnover greater than €40 million, or a team of over 250 employees for EU operations. For those outside this circle, voluntarily aligning with CSRD will be seen as a declaration of dedication to environmental stewardship.

The sustainability reporting journey brings various challenges – from disparate data sets to the report itself. Gathering diverse data from different sources, such as power utilization, carbon emissions, supply chain carbon imprints, and equipment lifecycle processes, is central to this process.

This data must be rigorously validated for completeness, integrity, consistency, and relevance. Compliance with industry standards, like the ISO/IEC 30134 series and EN50600 series, is also crucial. This data isn't just collected, it is a canvas for a compelling story, in line with the European Code of Conduct on Data Centre Energy Efficiency and the CSRD.

Universal Intelligent Infrastructure Management (UIIM) practices and platforms like RiT Tech's XpediTe play pivotal roles in this journey. They can provide a holistic oversight, identify gaps, suggest optimizations, and ensure each piece of the sustainability puzzle fits precisely.

Not all sustainability metrics are equal or symmetrical. Power Usage Effectiveness (PUE) is like a deceptively handsome puzzle piece that may not fit where you expect it to. PUE, along with Carbon Usage Effectiveness (CUE), IT Equipment Energy Efficiency (ITEE), IT Equipment Utilization (ITEU), Water Usage Effectiveness (WUE), Renewable Energy Factor (REF), and Energy Reuse Factor (ERF), collectively offer a complete snapshot of a data center's sustainability.

Standards like ISO/IEC 30134 and EN 50600 guide our puzzle-solving. Staying aligned with the evolving European Code of Conduct on Data Centre Energy Efficiency ensures that every metric finds its rightful place, with platforms like XpediTe providing valuable insights.

Rooted in the aspirational European Green Deal, the CSRD is more than a directive; it's a clarion call for a sustainable European landscape by 2050.

Every metric, every guideline, every innovative tool and platform isn't just a solitary piece but a cog in the larger machinery driving the green metamorphosis. Leveraging the intelligence and insights of platforms within the realm of UIIM, isn't a distant dream but an attainable and evolving masterpiece.



How to pair sustainability and security for effective IT disposal



Up to 90% of hard drives are destroyed when removed and the US alone dispose of between 20-70 million hard drives every year, meaning that redundant storage makes up a substantial proportion of e-waste. The BBC recently reported that millions of usable HDDs are being shredded every year rather than entering the secondary market.

By Global ITAD Director, Mark Gallacher, Techbuyer

TRADITIONALLY, data security has come at the expense of sustainability within the data centre industry, with the impact of e-waste and current technology practices being discounted.

However, the impact of e-waste on our environment is devastating. With the data centre industry growing – expected to reach US\$ 279 billion by 2032 as reported by Data Centre Solutions Magazine – reducing the effects of e-waste, including HDD shredding, on our environment, whilst also retaining the same security levels, is crucial.



The Impacts of E-waste

Developing countries receive the majority of our disposed of technology – Agbogbloshie, highlighted as the largest e-waste landfill in the world by the Guardian, is located near the centre of Accra, the capital city of Ghana. Within this community, locals are seriously affected by the harsh and dangerous chemicals found within e-waste. These chemicals are exposed during illegal mining practices and leak into the soil and water, causing health issues for the local community.

Furthermore, the valuable resources found within technology go to waste as we continuously mine for virgin materials. 5% of all our planet's gold is found in e-waste and shortages are being experienced for core resources needed to keep up with the demand for new technology, such as gallium and germanium. The BBC also recently identified circuit boards as a component that needs to be handled better at end of life to recover some of the most valuable resources we have, including silver, gold and palladium.

While the effects of the e-waste crisis are being felt around the world and the situation continues to worsen, we are seeing solutions that ensure both sustainability and data security becoming more prevalent in the IT sector.

Sustainable technology practices: the challenges and the opportunities

When making technology decisions with sustainability in mind, focusing on the downstream flow of hardware is an easier option for many companies than exploring environmental best practice in IT procurement.

The regulations, practices and traditions of purchasing IT hardware can be difficult to manoeuvre – however, as long as data security is guaranteed, disposing of IT hardware in a sustainable manner is a simpler task, particularly for large organisations and data centres.

As reported by the Financial Times, large companies, including banks, government departments and police services look to shred millions of data bearing devices every year for security protection. However, there is another option that combines sustainability with the security of data and information.

Partnering with an ITAD (IT Asset Disposition) company capable of guaranteeing data erasure and a secure chain of custody allows data centres to manage the impact of their technology downstream. Companies that hold stringent accreditations and certifications, such as the ADISA DIAL 3 rating, are



capable of handling the assets of even the most risk averse clients, including banks, Government organisations and hospitals.

Guaranteed data erasure allows companies that have traditionally shredded or destroyed data bearing devices and components, to explore a more sustainable option without endangering their reputation or business through data leakages.

The Growth of ITAD

The ITAD industry is growing in importance and relevance, with more and more companies and data centres turning towards sustainable IT disposal. The ITAD sector was valued at \$16.8 billion in 2022, however this figure is expected to skyrocket to \$34 billion by 2030 due to the large demand for secure and sustainable IT disposal.

Sustainability is becoming a concern for companies globally, with legislation being introduced by governments around the world to protect the environment and slow global warming. As pressures for governmental bodies rise, as will the demand for ITAD and sustainable IT habits.

ITAD and sustainability: Spurring the circular economy

Within a circular economy model, we must aim to slow the use of technology, keeping hardware in use for longer; ITAD companies work to refurbish and reuse technology, extending the lifespan of the hardware.

Recycling IT equipment allows materials to re-enter the manufacturing process, however it marks the end of life for the product recycled. This means that recycling relies heavily on manufacturing to extend the lifespan of resources, a much more energy extensive process than refurbishment.

Certain ITAD vendors can guarantee sustainable disposal through accreditations and certifications. The R2v3 accreditation ensures that ITAD companies recycle IT hardware with full transparency to their customers, ensuring that the impact of downstream technology is managed. Similarly, many practice a zero-to-landfill policy where any hardware that cannot be refurbished, is properly recycled.

ITAD services provide both a sustainable and secure solution for data centres and risk averse companies to dispose of their IT hardware, minimising the impact of their hardware on the environment at end of life.

ITAD for smaller organisations

ITAD is a solution for companies of all sizes; as the industry grows, more options are becoming available to large and small organisations alike. SMEs can explore local ITAD solutions to sustainably dispose of their IT hardware, however choosing the best provider for you is essential.

To protect companies from data breaches, choosing a provider that uses industry-standard erasure technology, and offers adequate security measures, is essential.

Many erasure software solutions, such as Blancco, are trusted by leading security bodies; ADISA is the leading body for ITAD standardisation and so look for their approval on software used by companies you want to work with.

Looking for companies that also hold accreditations is a safe way to determine the level of trust you can place in an ITAD supplier; accreditations, including ADISA, R2v3 and ISOs, mean that a company must follow strict procedures and has been vetted to do so. These companies will be able to provide a higher level of service and protect your business data effectively.

Furthermore, a company's focus on sustainability is a good signpost to how your technology will be handled; if an ITAD provider has committed to a zero-to-landfill policy, a net zero pledge or is striving to achieve other sustainability orientated goals, you get more peace of mind that your technology will be handled in an environmental manner.

These companies may also hold sustainability accreditations, such as ISO 14001, that focuses on minimising environmental impact and putting in place rigid processes to build and maintain effective environmental management practices.

Developing circular habits

In order to create a sustainable and secure business, both now and for the future, companies must handle their e-waste responsibly. Businesses have a responsibility to address the environmental impact of their redundant equipment, alongside their security needs. ITAD suppliers, such as Techbuyer, deliver a secure, sustainable, and hassle-free solution for IT disposal for companies of all sizes.

In a world in which the environment is playing an increasingly significant role in business decisions, finding viable sustainability-centred solutions is essential.

Sustainability is becoming a concern for companies globally, with legislation being introduced by governments around the world to protect the environment and slow global warming. As pressures for governmental bodies rise, as will the demand for ITAD and sustainable IT habits

What steps should your data centre provider be taking towards sustainability?



A combination of remote working trends, the rise of AI, an ever-growing Internet of Things (IOT) and an increasingly tech-savvy society is resulting in data centre growth.

By Matt Edgley, Chief Operating Officer – Datum Group



DATA CENTRES are at the very heart of the digital transformation movement and as the demand for digital access, processing and storage increases, so does the requirement for data centres.

Global IT data centre spend is expected to reach \$222 billion in 2023, an increase from \$212 billion in 2021 (Statista) and there are now almost 8000 data centres across our planet (Usitc). This number is growing. Currently the data centre sector has 4.1 gigawatts under construction to meet the global demand (Cushman & Wakefield). By 2025, data centres are expected to consume 20% of the world's energy supply (Danfoss). So it's crucial that data centre providers address environmental concerns by implementing processes and procedures and embracing technologies, that reduce their impact on the environment in line with stringent decarbonisation strategies that support environmental, social and corporate governance (ESG) targets.

What is ESG?

ESG (Environmental, Social and corporate Governance) is a set of standards used to measure an organisation's impact on the environment and on society. It encourages businesses to implement more sustainable, ethical practices and it is used by investors focused on sustainable and ethical investments as a measure of how transparent and accountable a business is. As consumer behaviour changes and shifts towards a desire to engage with more ethical and sustainable companies, ESG becomes important across the board as a means for businesses to grow, responsibly.

What should your data centre provider be doing to create a more sustainable facility that reduces its impact on the environment?

Responsible energy sourcing and management

Your data centre provider should be striving to reduce energy consumption and carbon emissions, while maintaining the quality and reliability of its centre data services. Sourcing power from renewable sources to reduce reliance on fossil fuels is obviously an important first step here. You should look for a provider that has a carbon offsetting agreement in place too. These agreements allow

providers to offset carbon emissions through investment in carbon-saving projects. But the buck doesn't stop there. Effective energy monitoring and management can ensure that any energy wastage is minimised. Often, it is what happens behind the meter that makes the real difference.

With an effective energy management strategy and monitoring system in place, data centres can ensure optimum performance whilst minimising environmental impact. Building Management Systems (BMS) can help organisations to carefully monitor energy usage – from the data halls to the offices. Even making a simple change such as ensuring that office lights are switched off at night or having heating and air conditioning running on timers can all add up to create a sizable annual carbon saving.

Look into how your data centre provider is powering its backup generators. HVO (Hydrotreated Vegetable Oil) used in place of red diesel can reduce and/or eliminate carbon dioxide, nitrogen oxide (NOx), particulate matter and carbon monoxide emissions.

Does your data centre know its PUE (Power Usage Effectiveness)? How confident are they in talking about this and can they measure it in real time – rather than just working towards a target PUE that never gets achieved? Are they registered for CCA (Climate Change Agreement) for data centres and is their PUE reported in appropriately?

Intelligent and efficient cooling

Cooling is one of a data centre's biggest challenges. It's a crucial component in maintaining the performance and reliability of a facility, but it is also one of the biggest areas of energy consumption. According to the EU Commission, cooling accounts for up to 40% of data centre power consumption.

That said, there are many steps that a data centre provider can take to improve the efficiency of its air conditioning systems. This could be something as simple as turning the data hall temperature up a couple of degrees or something more sophisticated, like harnessing one of the latest innovative cooling techniques such as liquid cooling, direct evaporative cooling or adiabatic cooling.



Moving to more intelligent methods of cooling can drastically reduce energy usage while maintaining optimal temperature levels. In fact, it's a bit of a myth that data halls need to be cold. The recommended run temperature for a data centre is anywhere between 18-27°C as per the ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers) guidelines and environmental best practice. Turning the air-con down a degree or two can significantly reduce energy consumption without any detrimental effects on the equipment.

Some further steps that your data centre provider could be taking include:

- Cold aisle containment or blanking. This keeps energy usage to a minimum by only cooling the areas of the data halls that house the servers.
- Under-floor cold air channelling to minimise wastage.
- Variable fans within condenser units.
- Free air-cooling systems.
- Highly efficient cooling pumps.
- Office space air conditioning controls to minimise wastage out of hours.

Environmental accreditations

There are several environmental certifications that demonstrate a data centre's commitment to reducing its carbon footprint and working towards a more sustainable future. These certifications can also show that the provider is operating in compliance with environmental regulations and in alignment with industry best practices:

- ISO 14001:2015 for Environmental Management
- EU Code of Conduct for Data Centres
- ISO 27001:2013 Information Management
- ISO 50001:2018 accreditation for Energy Management

It's in your best interest to check the scope of any accreditations and ensure that they come from reputable bodies. There should also be evidence that the facility's environmental and sustainability

policies are being followed correctly. Most data centres, and certainly those worth their salt, should have no problem with your business auditing their premises.

Reduce, reuse, recycle

A growing data centre industry means that there is not only a growing amount of energy required to power it, but also a growing volume of electronic waste, which poses a significant threat to the environment. Not only does e-waste take up a lot of space in landfills, but it can also release hazardous chemicals into the environment. For this reason, data centres must advocate and advise clients on recycling and reusing electronic devices at the end of their life cycles or donating them to organisations that can repurpose them.

Waste heat can also be recycled. Usually, any excess heat produced by a data centre's servers would be released into the atmosphere, but data centre providers have started exploring ways to recycle this waste heat for other purposes, such as heating nearby buildings or providing hot water. Water can also be re-used by deploying liquid cooling systems and then recirculating the same water through the cooling systems multiple times.

When selecting a data centre, it's vital that you do enough research to make a sound decision on the provider that is right for your business. With increasing pressure on companies to hit environmental targets, finding a provider that helps you to achieve those ESG goals could make a real difference not only to the planet, but to your business's reputation and brand. ESG considerations are forcing companies to be accountable for their contribution to carbon emissions and climate change and can present an additional burden for organisations as they face a whole host of other business pressures in a challenging economic climate. Find a data centre provider that can actually help you to realise your ESG ambitions, and you're halfway there.

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