DCS

DATACENTRE SOLUTIONS

DEVELOPING DIGITAL INFRASTRUCTURE IN A HYBRID WORLD

ISSUE IV 2024

HTTPS://DATACENTRE.SOLUTIONS

ULTRA-LOW HARMONIC DRIVES: THE SUSTAINABLE SOLUTION TO DATA CENTER COOLING?

Cloud | Design + Optimisation | Energy Management | Infrastructure + Asset Management
Hosting + Colocation | Infrastructure + Hardware | Power & Cooling

AN ANGEL BUSINESS COMMUNICATIONS PUBLICATION

Power protection

that's out of this world.

Galaxy VS UPS

Huge power in a small footprint…

The Galaxy™ VS from Schneider Electric is the best-in-class power protection that innovates against downtime. It is an efficient, modular, simple-to-deploy 3-phase UPS that delivers intelligent power protection to edge, small, and medium data centres, as well as other business-critical applications

- 99% efficient in ECOnversion™ mode
- Compact design, optimised footprint architecture
- Battery flexibility, including Lithium-ion batteries
- New patented hybrid technology

Discover the Galaxy VS UPS

www.se.com/uk

Life Is On | Schneider Electric

VIEWPOINT

By Phil Alsop, Editor

Digital or sustainable – can we have both?

IN THIS ISSUE OF DCS there's a fascinating article examining the potential of hydrogen as a fuel of use to the data centre industry as it seeks to put itself on the path to true sustainability. The conclusion:

'Will hydrogen production, storage and use be used to offset carbon in data centres? As more advantages and benefits need to be demonstrated today the answer is perhaps, but not yet. However, given the nature and scale of the challenges to cut data centre carbon intensity it doesn't mean not ever, and could be sooner than one thinks.'

On the DCS website there's a video interview discussing the potential of micro-scale nuclear: 'Michael Crabb, SVP Commercial, Last Energy, talks through the energy start-up's micro-scale nuclear power plant – a central component of the company's 20 MW modular power plant, which can be developed within 24 months and provide clean energy direct to data centres. Last Energy's innovation is designed to provide the fastest, most affordable, least resource-intensive path to 24x7 clean baseload power, along with siting flexibility and also addresses the problem of grid price volatility'.

The company is already working on several projects, more details of which will emerge over time.

In both of these cases, there's no doubt that more work needs to be done, by more organisations, to speed up the R&D aspect and/or to bring solutions to the market at a scale whereby the price is not prohibitive and the technology is widely available.

I am sure we all have our own ideas as to how much the fossil fuel companies do or don't facilitate the development of renewable and/or sustainable energy sources, but there's no doubt that an increase in the speed of work on alternative energy sources is required urgently to help not just the data centre industry, but all energy users, when it comes to sustainable power consumption.

Sadly, political right-wing extremists seem to have decided that climate change is a great culture wars topic – exaggerating the expense of going green while spectacularly ignoring the true cost of not going green. Hence, many governments across the globe are seemingly too frightened to nail their colours firmly to the sustainability mast.

Add in the credible uncertainties as to whether or not electric vehicles really are the future of transport, and we have a somewhat chaotic environmental landscape. It is to the great credit of the data centre industry (and most other sectors) that they are demonstrating a very real commitment to sustainability, no matter what the politicians do or don't require of them.

However, while the direction of travel may be in the right direction, the speed of travel is not. If memory serves, the average data centre PUE is about 1.5, and has remained more or less at this level for the past decade. That suggests there's an awful lot of work been put in to just keep standing still. Certainly, better than going backwards, but with AI looming large, how optimistic can we be about the industry's sustainable future, unless credible technology innovations are developed faster and on a much larger scale?

Or, at some stage in the near future, are we going to have to acknowledge that digital and sustainable are simply not compatible?

CONTENTS

ISSUE IV 2024

DCS DATACENTRE SOLUTIONS

The data centre trade association

DCA News

NEWS

DCS DATACENTRE SOLUTIONS

Editor
Philip Alsop
+44 (0)7786 084559
philip.alsop@angelbc.com

Senior B2B Event & Media Executive
Mark Hinds
+44 (0)2476 7189701
mark.hinds@angelbc.com

Sales Manager
Peter Davies
+44 (0)2476 718970
peter.davies@angelbc.com

Director of Logistics
Sharon Cowley
+44 (0)1923 690200
sharon.cowley@angelbc.com

Design & Production Manager
Mitch Gaynor
+44 (0)1923 690214
mitch.gaynor@angelbc.com

Marketing & Logistics Executive
Eve O'Sullivan
+44 (0)2476 823 123
eve.osullivan@angelbc.com

Publisher
Jackie Cannon
+44 (0)1923 690215
jackie.cannon@angelbc.com

Circulation & Subscriptions
+44 (0)2476 718970 circ@angelbc.com

Directors
Sukhi Bhadal: Chief Executive Officer
Scott Adams: Chief Technical Officer
E: info@angelbc.com

Published by: Angel Business Communications Ltd, 6 Bow Court, Burnsall Road, Coventry CV5 6SP. UK
T: +44 (0)2476 718970 E: info@angelbc.com

Angel BUSINESS COMMUNICATIONS

Datacentre Solutions is published 6 times a year on a controlled circulation basis in Europe, Middle East and Africa only. Subscription rates on request. All information herein is believed to be correct at time of going to press. The publisher does not accept responsibility for any errors and omissions. The views expressed in this publication are not necessarily those of the publisher. Every effort has been made to obtain copyright permission for the material contained in this publication. Angel Business Communications Ltd will be happy to acknowledge any copyright oversights in a subsequent issue of the publication. Angel Business Communications Ltd. ©

ISSN 2756-1143 (Online)

Sustainability regulation propelling transformation in corporate reporting

Survey finds companies planning to voluntarily comply with the CSRD; practitioners believe integrated reporting has positive impact on performance.

THE MAJORITY (81%) of companies not subject to the European Union's Corporate Sustainability Reporting Directive (CSRD) intend to partially or fully align their sustainability disclosures with its requirements, according to an independent survey commissioned by Workiva Inc. The third annual 2024 ESG Practitioner Survey polled more than 2,000 people involved in corporate reporting, including finance and accounting, sustainability, risk, and internal audit professionals across North America, Europe, and Asia.

"The adoption of the CSRD was a pivotal moment, marking the first major regulation calling for integrated financial and sustainability disclosures with third-party assurance. Now, as companies around the world gear up for their first mandated CSRD reports in 2025, we're seeing CSRD's impact extend far beyond those subject to the regulation," said Paul Volpe, Senior Vice President of Growth Solutions at Workiva. "The CSRD has initiated a global shift toward assured integrating reporting, with business leaders recognising the market demand for contextual, transparent, and credible data that aligns with stakeholder expectations."
Practitioners embracing change despite challenges

Across disciplines, respondents nearly unanimously cite complying with new mandates as the most pressing challenge facing reporting teams and the volume of requirements they must contend with as their top compliance concern. Still, the majority of practitioners also attest to the value in reporting, with 88% agreeing that having a strong ESG reporting programme will give their organisation a competitive advantage.

Likewise, 84% of respondents say integrated financial and sustainability data enables better decision-making that can improve a company's financial performance, and 88% believe integrated reporting will have a positive impact on a company's long-term value creation, mirroring similar sentiments expressed by institutional investors in Workiva's 2024 Executive Benchmark on Integrated Reporting. Additionally, 88% of practitioners agree that obtaining assurance over ESG data increases the likelihood that a company will achieve its goals.

"What struck me from the 2024 ESG Practitioner Survey is that regulation is serving as a catalyst for innovation. Companies are seizing the opportunity to improve their sustainability disclosures, effectively making assured integrated reporting the gold standard in corporate reporting," said Paul Dickinson, a member of Workiva's ESG Advisory Council and the Founder Chair of CDP. "It's a testament to practitioners' adaptability as we navigate a new era in corporate transparency. However, the survey also revealed that while the majority of respondents have confidence in their data, regulation poses significant hurdles for their teams."

An overwhelmingly 83% of survey respondents agreed that collecting accurate data to fulfill the CSRD requirements will be a challenge for their organisation. This data suggests practitioners expect regulation to increase the complexity of sustainability reporting and that reporting processes must mature to satisfy new regulatory requirements.

Transformation of reporting processes underway

Practitioners are looking to technology to simplify reporting processes,

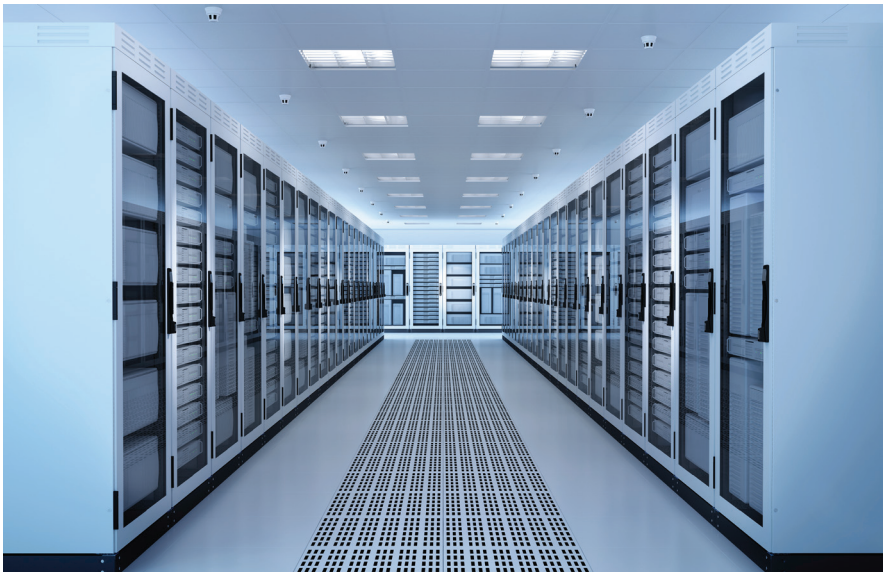
including embracing solutions that leverage generative AI. More than eight in 10 agree generative AI will make it easier for them to do their jobs (82%) and make sustainability reporting more efficient (85%) in the next five years. In the near term, roughly nine in 10 practitioners say their companies are planning to allocate more budget to technology for sustainability initiatives in the next three years (89%) and that they are investing in technology to improve collaboration among reporting teams (92%). This makes sense, given that 78% of respondents now say three or more internal teams are involved in their company's ESG reporting processes, up from 71% in the 2023 ESG Practitioner Survey, and that 85% agree integrating finance, sustainability, and compliance processes enables individuals to focus more time on value-added work.

Volpe continued, "Assured integrated reporting is about more than compliance, it is a necessity for demonstrating performance and value in a competitive landscape. Business leaders and their teams understand this is a transformational opportunity that demands serious commitment, and they are preparing to invest in reporting that is integrated across business lines, accessible to all stakeholders, and powered by innovation."

Secondary markets to drive data centre growth in Europe in 2024

Securing sizeable, sustainable sources of power remains number one challenge for the industry.

JLL's NEW EMEA Data Centre report shows strong data centre demand shifting focus to new markets. In 2024, there will be a 16% increase in data centre supply with 467MW added to Europe's core markets of Frankfurt, London, Amsterdam, Paris, and Dublin (FLAPD). Secondary markets will also see significant growth in 2024, with Madrid, Berlin and Warsaw set to see an average 49% increase to their market size. Madrid alone is expected to have 58MW of new supply added.



According to JLL's Data Centre report, 2023 was an exceptional year, with record take up for data centres across the FLAPD markets, which reached 352MW, a 19% YoY increase. A total of 391MW of new supply came online, with 161MW added in the last quarter alone – the biggest yearly increase seen with the core market size growing by 16 %. Frankfurt dominated 2023 both by market growth and take up, which saw 119MW of take up (20% up YoY) and 134MW of new supply (51% up YoY). This will continue to be the case in 2024, however we will see London make a comeback after a year of comparatively low market growth.

Pre-leasing activity also remained high, with a total of 511MW of pre-lets in 2023, a 6% YoY increase. Falling vacancy rates led to average colocation rents rising between 9% and 13%. Investment in the sector more than doubled in 2023, reaching $2.34bn in Europe up from $0.76bn in 2022. Tom Glover, Head of Data Centre Transactions, EMEA, JLL, said: "In a world increasingly fuelled by the internet, data, and artificial intelligence, demand will continue to rise for the real estate to make it all happen. We saw record levels of take up, demand and preleasing for data centres in 2023, and expect 2024 to be another staggering year for activity in the sector. Data centre demand shows no sign of deceleration. Power availability and increasingly tough sustainability performance regulations and reporting requirements are beginning to drive activity in Europe's secondary markets."

Secondary and emerging markets gain ground

Berlin, Madrid, and Warsaw are forecast to grow by 39%, 54% and 59% respectively. In 2023 alone, 23MW of new supply was added in Madrid, a 27% increase in market size. Tertiary or emerging markets are also expected to grow by an average of 17%. In Southern Europe and the Nordics, markets are set to grow between 30-55% over the year ahead.

Daniel Thorpe, Data Centre Research Lead, EMEA, JLL, added: "While we saw additional supply come to market, it's still struggling to keep pace with the staggering levels of demand for data centre capacity, creating an ongoing imbalance. We expect demand for space in 2024 will continue to be incredibly high, particularly in core markets, leading to low vacancy rates for new space and upward pressure on rents.

We predict that data centre developments will expand to locations where there is available power and land, meaning secondary and emerging markets, particularly in Southern Europe and the Nordics, will be critical in countering supply challenges."

We predict that data centre developments will expand to locations where there is available power and land, meaning secondary and emerging markets, particularly in Southern Europe and the Nordics

HireHigher and CyrusOne unlock secrets of data centre careers

As part of its campaign to address the ongoing skills shortage in the data centre industry, HireHigher and CyrusOne, a leading global data centre developer and operator, have brought together 60 sixth-form students from Gunnersbury Catholic School and Isleworth & Syon School for a full day of workshops and data centre tours.

THIS IS the second event under CyrusOne and HireHigher's partnership and is part of CyrusOne's commitment to ensure that the brightest minds consider a career in the data centre industry.

During the day, the students learnt about the role that data centres play in our digital lives and discovered more about the varied job opportunities offered by the sector. As part of the day's agenda, the students heard from a panel of graduates and apprentices from CyrusOne and HireHigher's Rising Star Programme who talked about their jobs and their route into the industry.

The day also included two practical workshops, one of which was led by The Young People Index®, which helped them identify where they have impact and how this translates into not only roles, but teams in the future. The day also included an enlightening session on Artificial Intelligence by CyrusOne's Aashna Puri, Director of Strategy & Sustainability, followed by a mock assessment centre exercise focusing on how and what the technology could change in our personal and professional lives.

Adelle Desouza, Founder, HireHigher comments, "I'm delighted that CyrusOne has joined us once again to host an event for sixth formers. The data centre tour was eye-opening for so many students. Watching their reactions and hearing their follow-up questions when it came to power consumption, green solutions and financial investment showed them how important the industry is and the crucial role they play in everyday life.

"If the industry is serious about hiring the best talent, it needs to light a fire in more bellies and these events do that. We have several more events planned for this year and hope to have demonstrated to hundreds of students the huge opportunities awaiting them in the industry," says Desouza.

Steve Hayward, VP Operations Europe at CyrusOne said, "Following the success of last year's event, we wanted to open our data centres once again to students who would otherwise not know about the many career opportunities available to them in our industry. We're often seen as a 'secretive' industry, but there are so many rewarding careers it's important we demonstrate that.

Also, we need to show young people that we are listening to them and that they understand how important they are to the future of the industry.

We're often seen as a 'secretive' industry, but there are so many rewarding careers it's important we demonstrate that. Also, we need to show young people that we are listening to them and that they understand how important they are to the future of the industry

A new design approach to data centres is needed, claims new research by RLB

The way in which future data centres are designed and built must be substantially rethought to accommodate supply chain constraints and sustainability measures, according to new research by leading construction and property management consultant, Rider Levett Bucknall (RLB).

THE RESEARCH surveyed 475 executives from data centre operators and contractors across the UK and Europe and included qualitative interviews with Mercury Engineering, Ada Infrastructure, Mace Technology and Manufacturing and Equinix found that:

- **63%** of operators surveyed say the efficiency of power consumption is in their top five priorities for data centre design
- **57%** of respondents selected 'minimising cost' as a priority for data centre design this year
- **62%** of operators rank 'meeting the needs of AI computing infrastructure' among their top five data centre design priorities for 2024.

Supply chain risk's impact on planned activity

Operators are expected to commission 65% more data centre capacity in 2024, with the likely use of Cloud as the top driver of demand for data centres (54%), followed closely by AI (53%). However, supply chain risk has placed the sector under strain. 70% of the respondents agree that supply chain shortages and disruptions will limit digitalisation in Europe in the next five years and 35% of operators have reduced the number of planned data centres and 57% of contractors have turned down projects due to supply chain risk. With the most likely disruptions, with the most impact expected to the data centre construction supply chain, expected to be:

- Increased environmental regulation – **60%**
- Disruptions from physical climate risk – **57%**
- Geopolitical disruption – **56%**
- Supply chain labour shortages – **49%**
- Exchange rate fluctuations – **46%**
- Armed conflict – **34%.**

Liquid cooling to support sustainability targets

The research shows that by 2030, 58% of data centres are predicted to be using liquid cooling, with immersion liquid cooling the most likely adopted solution.

This move to liquid cooling could help many data centre clients meet their sustainability targets which presently only half of respondents admit to having put plans into effect. Only four in 10 respondents have adopted on-site renewable generation to date and fewer still presently scrutinise the environmental performance of suppliers (37%), measure and reduce the embodied carbon of material (31%) or select materials that boost energy efficiency (25%).

Investor impact

56% of respondents agree that investors in data centre projects will lose out unless the construction supply chain is improved. This is leading to 66% of contractors and 47% of operators using contractual measures to share supply chain risk with their counterparties.

Location, location, location

42% of respondents also noted that they or their customers are more likely to choose 'new and alternative' destinations as a result of supply chain constraints with Italy (65%), Germany (58%) and France (54%) the most likely destinations. But the main constraint to growth is the availability of power with very few countries within the EU and the UK actively aligning the data centre industry growth and national infrastructure development. Constraints on electrical networks have been further compounded by a shift from energy deriving fossil fuels (such as natural gas, diesels and gasoline) and exponential increased demand on the electrical networks.

Andrew Fettes-Brown, RLB Global Board Director, Head of Data Centres at RLB UK and Europe, comments, "The results of our research show a sector that is growing at an exponential rate and one which the supply chain needs to keep up with. Add this to the governance around sustainability and pressure from investors around ESG measures, we need to look at a flexible design approach that allows operators to maintain construction in face of uncertainty in the market with modular design and prefabricated components supporting this agility."

Warning that carbon offsets market foster greenwashing, not sustainability

Energy efficiency experts from Exergio expose the pitfalls of the carbon offsets market, showcasing how it allows greenwashing rather than sustainability. They propose that independent entities should be able to certify companies' sustainability efforts and emission reductions according to set standards.

IN A WORLD increasingly concerned with environmental impact, the carbon offsets market - which allows companies to compensate for their carbon emissions by investing in projects that reduce or remove greenhouse gases elsewhere - has seemingly emerged as a pivotal player in mitigating climate change. However, recent developments indicate a troubling trend: the potential for greenwashing, rather than genuine sustainability, to dominate the landscape.

For instance, according to some energy and sustainability experts, when companies fail to address their own CO2 emissions from producing cosmetics or cars and instead opt to plant trees, it does not render them or their products truly "climate neutral" or "eco-friendly. With the EU's directive to ban misleading environmental claims on the horizon, experts are sounding the alarm on the urgent need for independent sustainability certification in the carbon offsets market.

"While we appreciate the forthcoming directive, sustainability advocates are facing a pressing dilemma. The current trajectory suggests that waiting for two more years is a luxury we cannot afford. Originally intended to advocate for nature and sustainability, carbon emission offsets have instead become a tool for creating a false facade of corporate sustainability, often without substantive action. The unregulated nature of the market only exacerbates these concerns, leaving many frustrated with its misleading results in terms of reducing CO2 emissions," explains Donatas Karčiauskas, CEO of Exergio, a company dedicated to providing sustainable solutions for commercial buildings to combat energy waste. The carbon offsets market, once seen as a symbol of environmental sustainability, is also under scrutiny for becoming more profit-oriented. With its current valuation surpassing $2 billion and growing rapidly, concerns arise that this expansion prioritizes financial gain over genuine environmental stewardship. Initially designed to offset greenhouse gas emissions by investing in projects such as reforestation and renewable energy, the market has failed to significantly impact the environment as intended. Reports indicate that up to 90% of rainforest carbon offsets may be ineffective, highlighting the urgent need for standardized parameters to quantify reductions in CO2 emissions accurately.

"The solution is to have independent entities that could certify a business's sustainability efforts and emission reductions based on preset rules or parameters. At Exergio, we address this challenge by installing an AI-based solution in commercial buildings. These systems continuously monitor various building systems and devices, providing real-time data analysis. With this approach, we can accurately quantify energy savings and demonstrate tangible contributions to sustainability," elaborated Karčiauskas.

There is no universally recognized official certification for carbon emissions in the real estate sector. The market remains largely unregulated, leading to concerns about the effectiveness and reliability of some offset projects. As a result, there is an ongoing debate and calls for more stringent regulation and oversight to address issues such as double-counting and the effectiveness of offset projects.

"Unfortunately, the current state of affairs allows anyone to obtain a certification document from an unregulated market, claiming they are climate neutral. For a building to become a green asset, a self-bought BREEAM certificate is enough. This loophole may persist in the EU for at least the next two years. This approach fails to address the global challenge, as comprehensive regulations are not yet in place worldwide," Karčiauskas concluded.

Sales of containment solutions are projected to reach US$ 3.17 billion by 2034

According to Fact.MR, global revenue generated from sales of data center containment solutions is estimated to reach US$ 820.7 million in 2024, with a projected compound annual growth rate (CAGR) of 14.5%. By the conclusion of 2034, this figure is expected to soar to US$ 3.17 billion. This growth presents lucrative opportunities for market players, particularly with increased investments in data centers by large enterprises.

DATA CENTER containment solutions encompass strategies and technologies utilized within data center settings to regulate airflow and temperature, thereby optimizing efficiency.

Their main objective is to establish a controlled environment that improves cooling effectiveness, minimizes energy usage, and maintains the smooth operation of IT equipment. These solutions commonly entail physical barriers like aisle containment systems, along with airflow management methods.

By 2034, it is anticipated that North America will account for 31.5% of the global market share for data center containment solutions.
The market size for data center containment solutions in East Asia is estimated to be US$ 192.9 million in 2024.

Moreover, the escalating demand for big data and analytics across various sectors such as BFSI, telecom, IT, and healthcare is projected to drive sales of data center containment solutions.

Furthermore, the surge in online presence of small and major retail businesses, spurred by the expansion of the e-commerce sector, necessitates highly efficient data centers, thus fueling the demand for containment solutions throughout the forecast period.

The data center containment solution market is notably strong in developed regions like North America and Europe, benefitting from widespread adoption of internet of things (IoT) and cloud and edge computing technologies, which offer promising growth prospects. Additionally, global governmental initiatives aimed at bolstering digital infrastructure further contribute to the market's upward trajectory.

Key drivers of the data center containment market include continuous technological advancements enabling businesses to store vast volumes of data in limited spaces.

This presents opportunities for small businesses to embrace online data storage affordably, aligning with the evolving industry demands. Enhanced efficiency in data storage translates to increased customer base and business advantages, fostering mutual benefits for both consumers and enterprises.

Key Takeaways from Market Study

- The global data centre containment solution market is projected to grow 14.5% and reach US$ 3.17 billion by 2034.
- The market witnessed 10.4% CAGR between 2017 and 2021.
- Under data centre type segment, the large enterprise dominates the market with US$ 820.7 million valuations in 2024.
- North America's market share was 53.2% in 2021.
- Aisle containment is going to dominate the market in 2022 with market value of US$ 361.3 million.
- Based on region, demand is expected to increase at Y-O-Y growth of 12.9% and 13.5%, respectively, in North America and Europe in 2022.

Global report finds organisations overlook huge blind spots in their AI overconfidence

Despite belief in plans, businesses' AI strategies, execution for end-to-end lifecycles will not deliver successful outcomes.

IN A RESEARCH REPORT commissioned by Hewlett Packard Enterprise, nearly half (44%) of IT leaders surveyed believe their organizations are fully set up to realize the benefits of AI. The report reveals critical gaps in their strategies, such as lack of alignment between processes and metrics, resulting in consequential fragmentation in approach, which will further exacerbate delivery issues.

The report, 'Architect an AI Advantage', which surveyed more than 2,000 IT leaders from 14 countries, found that while global commitment to AI shows growing investments, businesses are overlooking key areas that will have a bearing on their ability to deliver successful AI outcomes – including low data maturity levels, possible deficiencies in their networking and compute provisioning, and vital ethics and compliance considerations.

The report also uncovered significant disconnects in both strategy and understanding that could adversely affect future return on investment (ROI). "There's no doubt AI adoption is picking up pace, with nearly all IT leaders planning to increase their AI spend over the next 12 months," said Sylvia Hooks, VP, HPE Aruba Networking.

"These findings clearly demonstrate the appetite for AI, but they also highlight very real blind spots that could see progress stagnate if a more holistic approach is not followed. Misalignment on strategy and department involvement – for example – can impede organizations from leveraging critical areas of expertise, making effective and efficient decisions, and ensuring a holistic AI roadmap benefits all areas of the business congruently."
Acknowledging Low Data Maturity
Strong AI performance that impacts business outcomes depends on quality data input, but the research shows that while organizations clearly understand this – labelling data management as one of the most critical elements for AI success – their data maturity levels remain low. Only a small percentage (7%) of organizations can run real-time data pushes/pulls to enable innovation and external data monetization, while just 26% have set up data governance models and can run advanced analytics.

Of greater concern, fewer than 6 in 10 respondents said their organization is completely capable of handling any of the key stages of data preparation for use in AI models – from accessing (59%) and storing (57%), to processing (55%) and recovering (51%). This discrepancy not only risks slowing down the AI model creation process, but also increases the probability the model will deliver inaccurate insights and a negative ROI.

Provisioning for the end-to-end lifecycle

A similar gap appeared when respondents were asked about the compute and networking requirements across the end-to-end AI lifecycle. On the surface, confidence levels look high in this regard: 93% of IT leaders believe their network infrastructure is set up to support AI traffic, while 84% agree their systems have enough flexibility in compute capacity to support the unique demands across different stages of the AI lifecycle.

Gartner® expects "GenAI will play a role in 70% of text- and data-heavy tasks by 2025, up from less than 10% in 2023," * yet less than half of IT leaders admitted to having a full understanding of what the demands of the various AI workloads across training, tuning and inferencing might be – calling into serious question how accurately they can provision for them.

Ignoring cross-business connections, compliance, and ethics

Organizations are failing to connect the dots between key areas of business, with over a quarter (28%) of IT leaders describing their organization's overall AI approach as "fragmented." As evidence of this, over a third (35%) of organizations have chosen to create separate AI strategies for individual functions, while 32% are creating different sets of goals altogether.

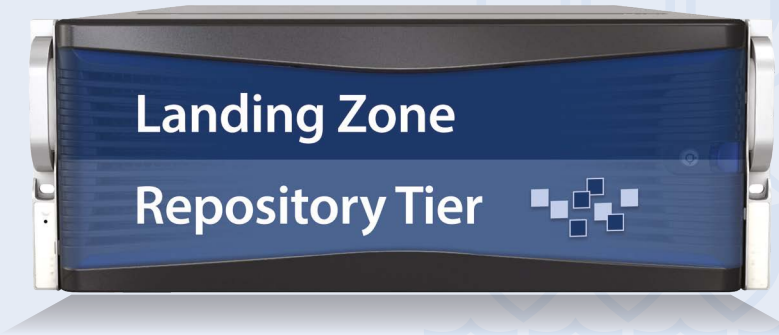
More dangerous still, it appears that ethics and compliance are being completely overlooked, despite growing scrutiny around ethics and compliance from both consumers and regulatory bodies. The research shows that legal/compliance (13%) and ethics (11%) were deemed by IT leaders to be the least critical for AI success. In addition, the results showed that almost 1 in 4 organizations (22%) aren't involving legal teams in their business's AI strategy conversations at all.

The fear of missing out on AI and the business risk of over confidence
As businesses move quickly to understand the hype around AI, without proper AI ethics and compliance, businesses run the risk of exposing their proprietary data – a cornerstone for retaining their competitive edge and maintaining their brand reputation.

Among the issues, businesses lacking an AI ethics policy risk developing models that lack proper compliance and diversity standards, resulting in negative impacts to the company's brand, loss in sales or costly fines and legal battles.

EXAGRID®

The future is here.
Tiered Backup Storage



- Fastest backups
- Fastest restores
- Scalability for fixed-length backup window
- Comprehensive security with ransomware recovery
- Low cost up front and over time

WINNER
SDC AWARDS 2023

- **Storage Company** of the Year
- **Backup/Archive Innovation** of the Year

Thank you so much to all who voted, and congratulations to our fellow SDC Awards 2023 winners!

Visit our website to learn more about ExaGrid's award-winning Tiered Backup Storage.

LEARN MORE >

Generative AI is most frequently deployed AI solution

Generative artificial intelligence (GenAI) is the No. 1 type of AI solution deployed in organizations, according to a new survey

BY GARTNER, INC.

ACCORDING TO the survey conducted in the fourth quarter of 2023, 29% of the 644 respondents from organizations in the U.S., Germany and the U.K. said that they have deployed and are using GenAI, making GenAI the most frequently deployed AI solution. GenAI was found to be more common than other solutions like graph techniques, optimization algorithms, rule-based systems, natural language processing and other types of machine learning.

The survey also found that utilizing GenAI embedded in existing applications (such as Microsoft's Copilot for 365 or Adobe Firefly) is the top way to fulfill GenAI use cases, with 34% of respondents saying this is their primary method of using GenAI. This was found to be more common than other options such as customizing GenAI models with prompt engineering (25%), training or fine-tuning bespoke GenAI models (21%), or using standalone GenAI tools, like ChatGPT or Gemini (19%).

"GenAI is acting as a catalyst for the expansion of AI in the enterprise," said Leinar Ramos, Sr Director Analyst at Gartner. "This creates a window of opportunity for AI leaders, but also a test on whether they will be able to capitalize on this moment and deliver value at scale."

Demonstrating AI value is top barrier to adoption

The primary obstacle to AI adoption, as reported by 49% of survey participants, is the difficulty in estimating and demonstrating the value of AI projects. This issue surpasses other barriers such as talent shortages, technical difficulties, data-related problems, lack of business alignment and trust in AI (see Figure 1).

"Business value continues to be a challenge for organizations when it comes to AI," said Ramos. "As organizations scale AI, they need to consider the total cost of ownership of their projects, as well as the wide spectrum of benefits beyond productivity improvement."

"GenAI has increased the degree of AI adoption throughout the business and made topics like AI upskilling and AI governance much more

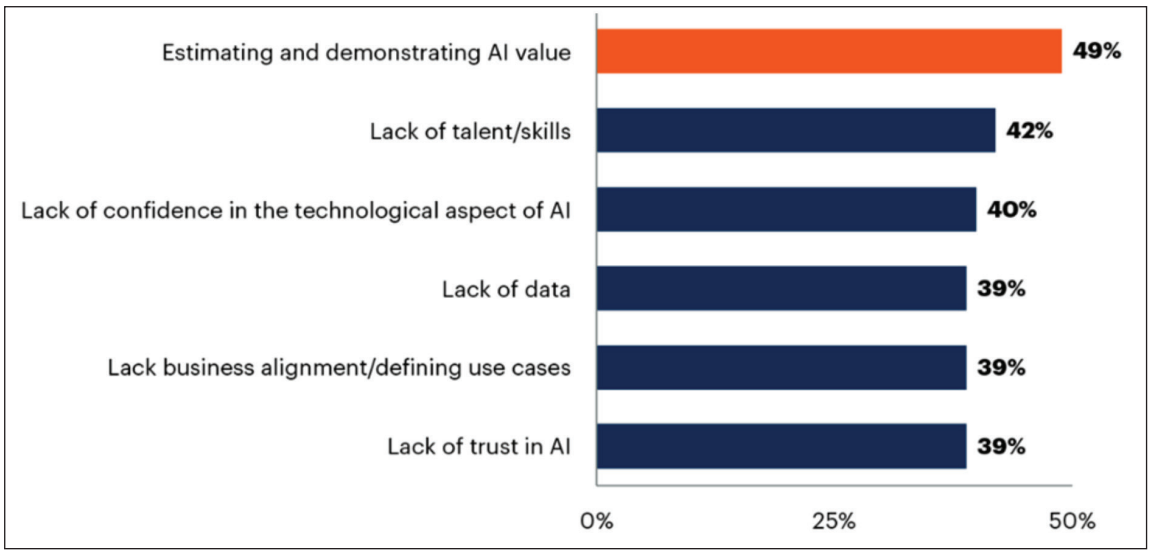


Figure 1: Top Barriers to Implement AI Techniques (Sum of Top 3 Ranks). Source: Gartner (May 2024)

important," said Ramos. "GenAI is forcing organizations to mature their AI capabilities."
Learnings from AI-Mature Organizations
"Organizations who are struggling to derive business value from AI can learn from mature AI organizations," said Ramos. "These are organizations that are applying AI more widely across different business units and processes, deploying many more use cases that stay longer in production."

The survey found 9% of organizations are currently AI-mature and found that what makes these organizations different is that they focus on four foundational capabilities:
* A scalable AI operating model, balancing centralized and distributed capabilities.
* A focus on AI engineering, designing a systematic way of building and deploying AI projects into production.
* An investment on upskilling and change management across the wider organization.
* A focus on trust, risk and security management (TRiSM) capabilities to mitigate the risks that come from AI implementations and drive better business outcomes.
"AI-mature organizations invest in foundational capabilities that will remain relevant regardless of what happens tomorrow in the world of AI, and that allows them to scale their AI deployments efficiently and safely," said Ramos.
Focusing on these foundational capabilities can help organizations mature and alleviate the current challenge of bringing AI projects to production. The survey found that, on average, only 48% of AI projects make it into production, and it takes 8 months to go from AI prototype to production.

Worldwide IT spending to grow 8% in 2024

Worldwide IT spending is expected to total $5.06 trillion in 2024, an increase of 8% from 2023, according to the latest forecast by Gartner, Inc. This is an increase from the previous quarter's forecast of 6.8% growth and puts worldwide IT spending on track to surpass $8 trillion well before the end of the decade.

"With spending on IT services on track to grow by 9.7% to eclipse $1.52 trillion, this category is on pace to become the largest market that Gartner tracks," said John-David Lovelock, Distinguished VP Analyst at Gartner. "Enterprises are quickly falling behind IT service firms in terms of attracting talent with key IT skill sets. This creates a greater need for investment in consulting spend compared to internal staff. We are at an inflection year for this trend, with more money being spent on consulting than internal staff for the first time."

Data center systems investment illustrates shift in focus to GenAI spending

Spending on data center systems is expected to see a notable jump in growth from 2023 (4%) to 2024 (10%), in large part due to planning for generative AI (GenAI) (See Table 1).

"We are seeing a cycle of story, plan, execution when it comes to GenAI. In 2023, enterprises were telling the story of GenAI and in 2024 we are seeing most of them planning for eventual execution in 2025," said Lovelock. "Technology providers are required to be a step ahead of this cycle and are already in the execution phase. They are bringing GenAI capabilities to existing products and services, as well as to use cases being identified by their enterprise clients.

"There is also gold rush level spending by service providers in markets supporting large scale GenAI projects, such as servers and semiconductors," said Lovelock. "In 2024, AI servers will account for close to 60% of hyperscalers total server spending."

Devices Expected to Bounce Back in 2024
The average lifespan for mobile phones is shortening and consumers and enterprises are replacing mobile phones earlier. This change allows device spending to achieve $688 billion during 2024, up from 2023 spending lows of $664 billion, which will represent a 3.6% growth rate. The integration of GenAI capabilities in premium and basic phones sustains, more than drives, this change.

Worldwide IT Spending Forecast (Millions of U.S. Dollars)

	2023 Spending	2023 Growth (%)	2024 Spending	2024 Growth (%)
Data Center Systems	236,179	4.0	259,680	10.0
Devices	664,028	-9.1	687,943	3.6
Software	914,689	12.6	1,042,174	13.9
IT Services	1,385,120	6.1	1,519,928	9.7
Communications Services	1,487,161	3.3	1,551,288	4.3
Overall IT	4,687,177	3.8	5,061,013	8.0

Source: Gartner (April 2024)

Ultra-low harmonic drives: the sustainable solution to data center cooling?

In the face of escalating global energy consumption and the resultant climate crisis, the need to optimize data center efficiency has become a concern. The carbon footprint of data centers has reached unprecedented levels, currently contributing to 3.5 percent of global greenhouse gas emissions, according to the International Energy Agency (IEA). Without decisive action, this figure is only set to rise.

BY CARL TURBITT, HVAC DRIVES UK SALES MANAGER, ABB

ADDRESSING data center efficiency, particularly in the context of cooling systems, is paramount. Such cooling systems, essential for managing the heat generated by continuously operational servers and electronic components, can easily account for over 30 percent of a data center's total power usage. The choice between different cooling technologies and components in such systems becomes crucial.

In this article, we'll specifically address speed control solutions for cooling – electronically commutated (EC) fans, that integrate a motor, drive and speed controller as a single assembly, versus systems that combine a discrete drive, motor and fan, to show the effect on cooling system performance.

The challenge of sustainable data center cooling
Given the energy demands of densely packed data centers, selecting the right components and configuration for cooling systems is essential for energy savings. When it comes to air movement solutions, the question then arises: which is the greener choice, EC fans, or discrete drive and motor systems?

While both technologies aim to enhance energy efficiency, they operate differently, with their suitability depending on specific data center needs and operational characteristics. What's more, a combination of technologies may be necessary for the most efficient and sustainable cooling solution.

The benefits of EC fans

EC fans, known for their energy efficiency through brushless direct current (DC) motor technology and integrated control electronics, offer a considerable reduction in energy consumption. Their integrated design for easier installation, precise speed control and reduced noise levels make them favored in various industries, not least data centers. EC fans contribute to optimized airflow and temperature management, aligning with the need for energy efficiency.

But EC fans have limitations at part loads – the realm in which data center cooling systems tend to operate – where their efficiency drops significantly. Maintenance and replacement also pose challenges, as the entire EC fan unit often needs replacement, impacting cost, operational continuity, and sustainability.

Optimizing systems with drives

Variable speed drives are an alternative, usually standalone speed control solution for fan, pump and compressor motors. These drives prove a great option for achieving optimal energy efficiency and performance in data center cooling systems, especially when paired with highly efficient fan motors. Ultra-low harmonic (ULH) drives specifically offer advanced design that sets them apart from common nowadays EC fans, offering unique features that make them a sound choice.

Partial load efficiency

Data centers operate at partial loads most of the time. This is why it is crucial to select equipment based on its partial load efficiency.

Fans equipped with highly efficient IE5 SynRM motors and variable speed drives typically achieve greater energy efficiency than EC fans, especially at partial loads—often showing at least a 3% to 5% improvement in efficiency under these conditions.

Power quality

It's important to know that variable speed solutions, including EC fans and variable speed drives, can generate electromagnetic disturbances in the power network called harmonics which affect the network efficiency and reliability of connected equipment. Furthermore, due to increased current, they impose an extra load on transformers and other power network components, resulting in their overload, unless they are oversized.

Thanks to their advanced design, ULH drives produce minimal harmonics under various load conditions, keeping the Total Harmonic Distortion of the input current (THDi) below 3%, thereby meeting the strictest power quality standards.

The ULH design not only safeguards data center equipment from the adverse effects of harmonics, but also contributes to a more stable, reliable, and efficient power supply for critical cooling systems.

And there is no need to oversize power network equipment to manage harmonic currents, which means direct improvements to the facility's capital expenditure and carbon footprint.

Operational reliability

Reliability is key to successful data center operations. Atlassian reports that the estimated cost of data center downtime ranges from $100,000 per hour to over $540,000 per hour. And the potential reputational damage can have even more severe financial implications.

Let's evaluate the resilience of the speed control solution to externally-generated power quality issues. It's essential for these systems to be immune to potential power disturbances, which can unexpectedly occur even in mission-critical facilities like data centers. These disturbances can take the form of voltage sags, brownouts, and other forms of undervoltage conditions.

The ability of a speed control solution to maintain operation during power loss (ride-through) and automatically restart is vital for managing cooling systems in data centers. If the supply voltage is off, variable speed drives can continue to operate using the kinetic energy of the rotating motor they control. The drive will stay operational as long as the motor rotates and generates energy that is then fed to the drive. This helps to in avoid the need to restart cooling equipment, which can take several minutes. This feature is particularly crucial in the energy-dense environment of data centers, where the temperature in computer rooms can rise by approximately 2-3 degrees Celsius per minute without active cooling. Such rapid temperature increases can lead to the quick shutdown of IT servers. Therefore, variable speed solutions that are resilient to power quality issues are highly recommended to ensure continuous and reliable cooling.

Running multiple fan motors

An important advantage of using standalone drive technology is that a single drive can synchronize the operation of multiple drive motors.
This configuration reduces the need for individual drives for each motor, as one drive can efficiently control, for example, every three fans. This streamlining lowers system complexity, cost, and power losses. Additionally, synchronizing multiple fans under a single drive ensures even airflow and temperature distribution across the data center, enhancing the cooling efficiency. For redundancy, a standby drive can be on hand to take over immediately should the primary drive fail.

System integration and control

HVACR drives commonly include the popular building automation protocol BACnet as a standard feature, streamlining the integration of fan installations into most data center control systems. In contrast, BACnet is only sometimes provided with

EC fans, which more frequently rely on Modbus and require an intermediary controller or gateway to enable communication with the data center's BACnet-based system.

Even in cases where EC fans are equipped with BACnet, there is often still a need for an intermediary controller to facilitate general control or to provide manual (hand) control functionality, which is a standard expectation for air handlers and fan walls. However, this additional controller introduces a potential single point of failure risk that could take an entire fan array offline—ironically counteracting the very purpose of having a manual mode. Manual control is designed to be a fallback when the automated controls fail, and it is typically included as a standard feature with most variable speed drives.

Ease of maintenance and replacement

When selecting technologies for cooling systems, it's also important to consider how easy they are to repair or replace. Although packaged EC fan solutions might appear appealing in terms of installation convenience, given that most components come pre-assembled, they have a drawback in the event of a malfunction. Typically, if failure occurs, it's necessary to replace the entire unit, even if only a single component such as a fan bearing or control electronics is defective. From a sustainability standpoint, this approach is not ideal because it results in excessive material use and waste when smaller-scale repairs could be more resource-efficient.

With fans that are operated by standalone drives, maintenance becomes more manageable as you can simply replace a faulty motor or drive, rather than the entire unit. This approach offers a strategic benefit as well, since it prevents data center owners from being tied to a single supplier. Different manufacturers' EC fans lack standardized dimensions, making it challenging to fit a replacement into an array built with fans from another provider.

Adopting a long-term perspective

In the context of the escalating climate crisis and increasing energy consumption by data centers, the choice of cooling technology becomes a strategic decision. Balancing immediate savings with long-term sustainability objectives is paramount. While EC fans may seem initially cost-effective, drives, especially ULH ones, present a more economical long-term solution. Besides mitigating harmonic distortion, they enable running multiple fan motors from a single drive, and offer easier system integration, control and maintenance. The comprehensive part load efficiency and minimized failure risk make ULH drives not only a technological leap, but a strategic investment in the sustainable evolution of data center operations, offering unmatched energy savings and reliability in cooling systems.

Product Launch:

One-Click® Cleaner MMC

Ideal on-the-go cleaning solution for field technicians

Introducing the One-Click® Cleaner MMC from AFL. The user-friendly design incorporates auto-advancing tape to clean gently and eliminate wrist twist, with 500+ USES PER UNIT.

> ***"The One-Click simplifies the fiber cleaning process, delivering exceptional results and maximizing productivity."***
>
> *Arun Jain, Director of Product and Marketing, AFL*

Why you need the One-Click® Cleaner MMC | Network disruption by numbers

Fortune 1,000 companies report potential downtime costs of around $1 million per hour. Mid-sized businesses spend $1 million resolving connectivity incidents annually. Where downtime correlates with monetary loss, you need preventative measures.

Cost- and time-saving benefits | Efficient one-click maintenance

- **Cost-efficient:** 500+ cleans per unit
- **Enhance productivity:** Free up valuable technician time
- **Versatile:** 16F and 24F versions

Free demo | Let's talk

For more information, and to discover how the One-Click® Cleaner MMC can help you maintain your connectors while minimizing downtime across your fiber network, contact AFL today.

Scan the QR code or search MMC Cleaner AFL >>

Danger, danger, high voltage!

Cooling the data centre in the AI era

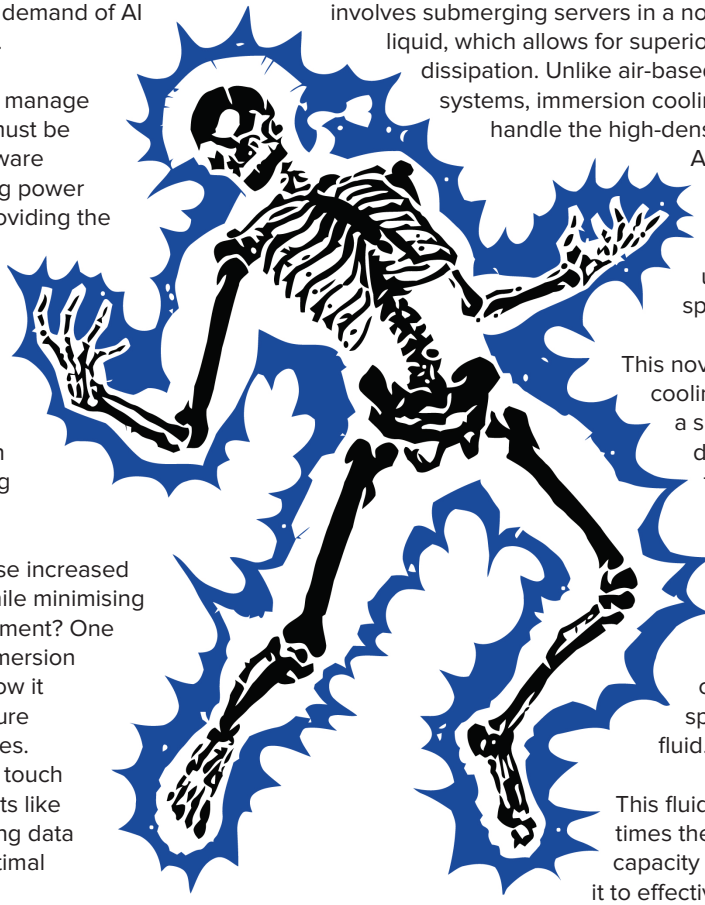
As we approach the era of artificial intelligence (AI), the data centre industry faces an unprecedented challenge. The question on every data centre operator's mind: How massive will the AI wave be, and will we have the energy and resource to manage it?

BY CHRIS CARREIRO, CTO, PARK PLACE TECHNOLOGIES

MCKINSEY projects that by 2030, data centres will consume a staggering 35 gigawatts of power annually, more than double the 17 gigawatts they're expected to use in 2022. These startling figures underscore the urgent need for more efficient cooling solutions to manage the energy consumption of our data-driven world. And just this month, the National Grid CEO warned that bold action is needed to create a network that can cope with the growing energy demand of AI and quantum computing.

As operators design and manage data centres, the focus must be on energy-efficient hardware and software. Diversifying power sources is also key to providing the secure and plentiful power AI needs to thrive. The future of data centres in the AI era may be high voltage, but with careful planning and innovative cooling solutions, we can adapt to manage growing workloads.

So, how do we meet these increased power demands of AI while minimising its impact on the environment? One innovative solution is immersion cooling - and explores how it could help shape the future of sustainable data centres. Alongside this, we'll also touch upon other crucial aspects like upgrading and maintaining data centre equipment for optimal energy efficiency.



Cooling reimagined

With the number of internet users doubling in the last decade, and global internet traffic increasing 25-fold, the data centre industry is working hard to reduce the energy footprint in a number of areas. This includes cooling.

Immersion cooling is a revolutionary technology that's making waves in the data centre industry. It involves submerging servers in a non-conductive liquid, which allows for superior heat dissipation. Unlike air-based cooling systems, immersion cooling can handle the high-density loads of AI workloads without guzzling excessive energy or taking up valuable space.

This novel approach to cooling represents a significant departure from traditional methods.

Instead of relying on air to cool servers, immersion cooling uses a special dielectric fluid.

This fluid has 1,200 times the heat removal capacity of air, enabling it to effectively manage

the extreme heat generated by today's high-performance servers.

But this technology isn't just about keeping things cool, it also offers substantial energy savings and environmental benefits. By eliminating the need for air conditioning units, immersion cooling can slash energy consumption by up to 90% compared to traditional air-conditioning. This reduction in energy use lowers operating costs and reduces carbon emissions, contributing to global efforts to combat climate change.

Making the transition

Despite its many advantages, transitioning to immersion cooling isn't a walk in the park. Data centre operators are challenged by several factors, including compatibility with existing infrastructure, cost implications, and the need for specialised maintenance.

Compatibility issues can pose significant challenges. Not all equipment is designed to be submerged in liquid, and modifications are necessary to make sure that servers and other components can withstand the immersion process.

The introduction of a new cooling method can also disrupt established workflows and require additional training for staff to understand and manage the new system effectively. Employees must become proficient in managing and troubleshooting the new systems, as well as understanding the intricacies of how immersion cooling impacts server performance and longevity.

Cost is another critical factor. While immersion cooling can lead to significant savings in the long run, the initial investment can be substantial. Operators must consider the cost of purchasing and installing the necessary equipment, as well as ongoing maintenance expenses.

Maintenance of immersion cooling systems also requires specialised knowledge and skills. Regular checks are necessary to ensure the dielectric fluid remains clean and effective, and any leaks or spills must be promptly addressed to prevent damage to equipment.

The future of cooling

As we sail into the uncharted waters of the AI era, it's becoming increasingly clear that traditional cooling methods are no longer cutting it. Immersion cooling stands out as a promising solution, offering the potential to meet our escalating data needs while minimising environmental impact.

However, realising the full potential of this technology will require more than just plugging in and switching on. It calls for meticulous planning and strategic implementation. But with the right approach, immersion cooling could be the key to unlocking a cooler, greener future for data centres in the AI era.

Upgrading and maintaining for efficiency, beyond cooling

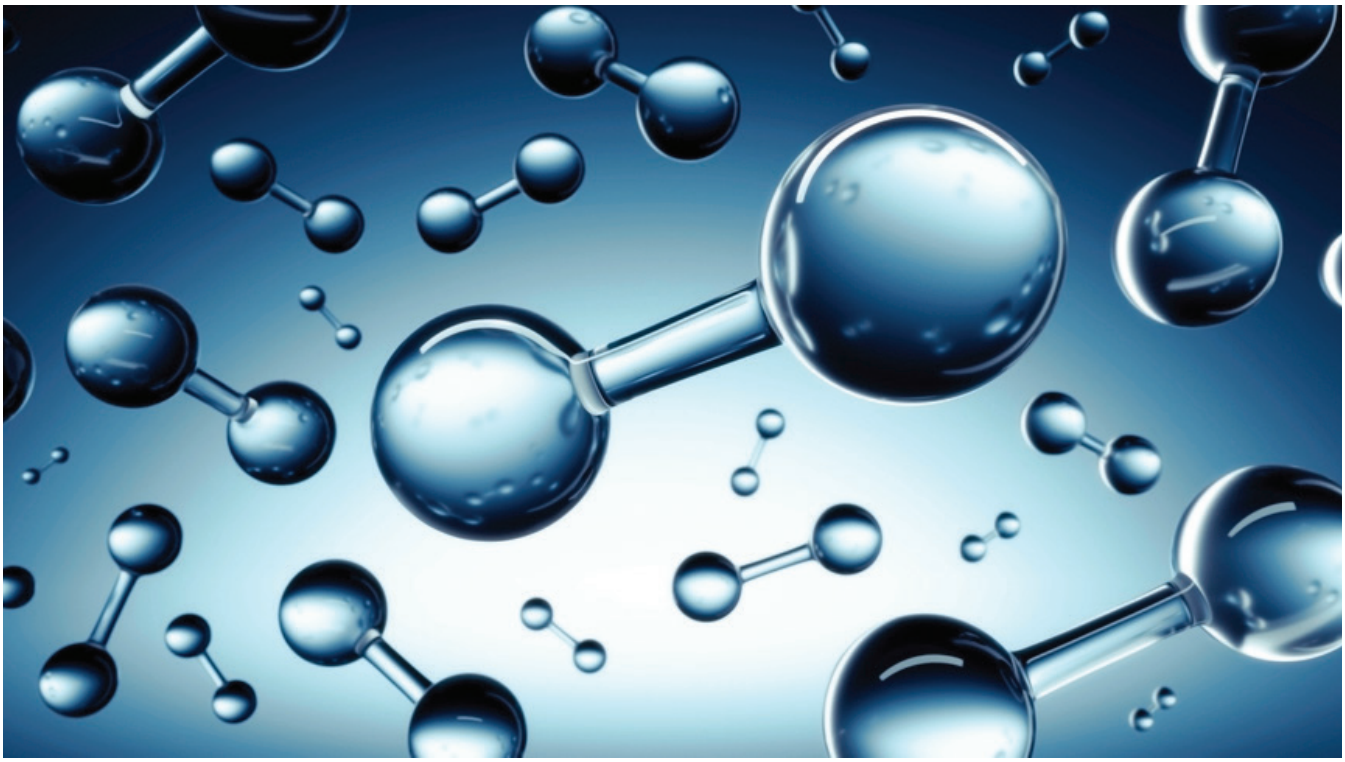
While cooling solutions are crucial in managing the power demands of AI, it's equally important to consider other aspects of data centre operations. Regularly updating hardware and software ensures that data centres are running at peak performance, reducing unnecessary energy consumption. For instance, older servers tend to consume more power than newer models designed with energy efficiency in mind. Replacing outdated equipment with modern, energy-efficient alternatives can lead to substantial energy savings.

Maintenance also plays a vital role in keeping data centres energy efficient. Routine checks can help identify potential issues before they become significant problems, saving both energy and costs in the long run. Regular maintenance ensures that all components are functioning optimally, preventing wastage of energy due to malfunctioning parts or systems.

Moreover, using energy management software can provide valuable insights into energy usage patterns, helping operators make informed decisions about where to focus their energy-saving efforts. Such software can identify areas of inefficiency, allowing operators to address these issues promptly.

The journey may be met with challenges, but the rewards promise to be well worth the effort. As we continue to push the boundaries of what's possible, one thing is certain: the future of sustainable data centres looking cooler than ever. By embracing innovative solutions like immersion cooling, we can ensure that our data centres are equipped to handle the demands of the AI era, while also doing our part to protect the planet.

Cost is another critical factor. While immersion cooling can lead to significant savings in the long run, the initial investment can be substantial. Operators must consider the cost of purchasing and installing the necessary equipment, as well as ongoing maintenance expenses



Is on-site hydrogen production, storage and use as a fuel, a viable carbon-cutting energy option for data centres?

Using hydrogen as a fuel has mostly been discussed as a combustible solution for grid energy needs. Much press coverage has been devoted to its potential to provide zero-carbon energy where excess variable renewable power from wind or solar runs electrolysers to produce green hydrogen using clean energy that would otherwise go to waste.

BY JOE SHEEHAN, TECHNICAL DIRECTOR, I3 SOLUTIONS GROUP

COULD HYDROGEN be produced effectively at a data centre scale to achieve carbon savings? What is the potential for on-site production of low-carbon hydrogen (hydrogen produced without associated carbon emissions) for use as an energy carrier in data centres? Could fuel cells powered with clean on-site produced hydrogen replace batteries for back-up or even additional power?

Could the principles of developing such energy storage solutions assist Variable Renewable Energy (VRE) developments in proximity to new data centres and in turn drive greater consumption of low-carbon renewable energy within those facilities?

The fundamental characteristics of a medium to large data centre are high energy demand, energy storage, and power generation. This can be combined with an urgent need to cut Green House Gas (GHG) emissions and a need to use more VRE as primary power sources.

The components of a hydrogen producing system, an energy generation source and an energy storage system already exist within conventional data centres. What are the possible synergies of converting these systems to hydrogen production to achieve carbon savings and drive-up use of VRE?

Where to start?

A new whitepaper from i3 Solutions Group [“The Case for On Premise Hydrogen Production in Data Centres for Greenhouse Gas Abatement Benefits”] considers an energy regime of the continuous operation of hydrogen-powered generation equipment during periods of high grid

carbon intensity. In such a scenario the principal purpose of on-site hydrogen production and power delivery equipment is to operate as the prime source continuously for extended periods. This is a departure from the current situation where data centre power generation is operated as the prime source of electricity and the grid reverts to a standby source.

Of the many ways to produce hydrogen, the electrolytic splitting of water is the focus of the paper.

Due to the low-temperature operation and the established and commercialized status of the technology, alkaline electrolysis is considered for the concept. The VRE energy storage regime studied in the paper requires a method for storage of generated hydrogen between periods of low grid carbon intensity when hydrogen would be produced on-site and periods of high grid carbon intensity when hydrogen would be consumed.

Having produced and stored the hydrogen through electrolysis the focus of the paper then turns to turning hydrogen into electricity. The paper says: "The use of fuel cells to achieve... energy extraction is more efficient and avoids due to the combination of any fuel with heat in the presence of air which includes both nitrogen and oxygen. The results show that carbon emissions saving can be achieved by employing on-site hydrogen production coupled with additional consumption of grid energy at times of low carbon intensity. However, the reductions achieved are very low."

Location, location, location

The concept examines the viability of utilizing additional grid electricity during periods of low grid carbon intensity to produce and store hydrogen. And using that stored on-site hydrogen to offset grid electricity consumption during periods of high carbon intensity.

To explore the possible merits or deficiencies of such a concept a mathematical model has been created to consider the application of this concept to grid carbon variations in a series of different geographical locations that calculates the potential carbon reduction benefits.

The model has used a notional data centre and a selection of applicable hydrogen technologies for hydrogen production, storage, and power generation.

Locations modelled include UK (Nationally), Scotland, Ireland, England (South East) which calculate the "Simulated Results for Model of 10MW DC with Matched Hydrogen Production & Power Generation Facilities – 2021 UK National Grid Carbon Intensity."

The report says: "The optimal solution to maximise electrolyser utilization for green hydrogen production is to site the installation in the geographical location of renewable power generation, with ample hydrogen storage capacity and ability to export surplus hydrogen. In this way, every available hour of surplus renewable energy production can be exploited using electrolyser plant operation."

The paper states: "The merits of full-scale on-site hydrogen production range from low to medium depending on location."

The myriad commercial and technical considerations and calculations of the viability of hydrogen production, storage and its use to cut carbon in data centres are explored. Analysis of the simulation results examines the challenges and opportunities of current shortfalls and how they can be overcome.

If not how, then when?

Will hydrogen production, storage and use be used to offset carbon in data centres? As more advantages and benefits need to be demonstrated today the answer is perhaps, but not yet. However, given the nature and scale of the challenges to cut data centre carbon intensity it doesn't mean not ever, and could be sooner than one thinks.

The optimal solution to maximise electrolyser utilization for green hydrogen production is to site the installation in the geographical location of renewable power generation, with ample hydrogen storage capacity and ability to export surplus hydrogen

Data centres and the future of low carbon heat in the UK

There is huge potential for data centres to adopt heat recovery solutions and become part of the UK's drive to decarbonise heating.

BY SHAHID RAHMAN, EMEA – DATA CENTRE STRATEGIC ACCOUNT LEAD (ENGINEERED IT COOLING SOLUTIONS) AT MITSUBISHI ELECTRIC

DATA CENTRES are essential in a world where we rely on a substantial flow of information for almost every part of our lives, including commerce, government, education and even entertainment. But they are significant energy users, and their impact on the global energy supply and the environment is a major challenge. In fact, increasing regulation has slowed or halted some data centre development – the Dutch government banned new hyperscale projects for 9 months, and the Irish government has introduced policies to scrutinize data centres more closely.

All of this means that decarbonising these spaces is a top priority for the country to reach net zero by 2050.

What's more, data centre users are increasingly concerned with their carbon footprint. This has created increasing pressure for data centre developers and operators to provide robust, fault-free services while reducing energy use and emissions – a difficult balancing act. Thankfully, solutions already exist that are able to make data centres more energy efficient and minimise their impact on the environment, including adopting a more sustainable way to generate and use heat.

Reusing heat from data centres

One way that data centres can cut the carbon impact of heat is by reusing it. There has been a great deal of focus on using cooling technologies that meet energy-reduction targets, but shifting the focus onto the reuse of heat energy actually gives data centres the potential to decarbonise further and build a greener future. In fact, excess heat from data centres can be used to heat other nearby buildings – including homes – and provide them a more sustainable heating source.

A great example of this in action is taking place in

Germany. The new German Energy Efficiency Act has made the reuse of 'waste' heat a requirement, and data centres in particular will have to achieve 10% heat reuse from 2026, and 20% by 2028.

Several approaches to heat recovery can be applied, depending on a data centre's heat output and location. One heat recovery model is district heating and cooling as a service: a heat pump recycles the water from the district heat network to cool the data centre. The waste heat from the cooling activity is then collected by the heat pump and pushed to the city network. The reheated hot water from the data centre mixes with the water in the general heat network, increasing the return temperature. Overall, energy consumption across the whole heat network is reduced, and so are energy costs and carbon footprint.

Many leading data centre developers and owners are embracing the benefits of heat reuse. For example, Amazon's Tallaght data centre located in Dublin uses a system where heat generated by servers is transferred to an air-handling unit and then recycled to warm water.

The water is then directed to an energy centre outside the warehouse, where heat pumps further increase the water temperature. This innovative approach not only results in an estimated annual reduction of 1500 tons of carbon dioxide emissions but also provides heating for over 505,000 square feet of local public buildings, 32,800 square feet of commercial buildings, and 133 apartments.

Heat pumps and heat networks to improve energy efficiency in data centres

Embracing technology like heat pumps and heat networks is also critical for reducing the carbon footprint of data centres, and providing heating and hot water more efficiently.

Heat pumps are particularly useful for making the most of waste heat. Data centre output heat is around 30oC to 35oC. Heat pumps can use water at this temperature as a heat source, topping up the temperature to 70oC or even 80oC. This heat energy can be used in the data centre (or nearby buildings) to meet domestic hot water (DHW) demand in washrooms and showers, for example.

Alternatively, it can be used on a wider scale in heat networks connected to buildings and homes located further from the data centre. Households can then be provided with heat and hot water via a large network of pipes. The Climate Change Committee (CCC) estimates that 18% of UK heat could come from heat networks by 2050 (up from 2% today).

Making the right choices for heat reuse

When considering heat reuse as an option for a data centre, there are a number of considerations to make from the earliest stages of design and specification. When looking at linking the data centre to a new or existing heat network, the first step is to ensure that there is an outlet for the waste heat a reasonable distance from the data centre – or that there is an existing heat network that can use extra capacity – through heat mapping.

It is then vital to understand what the cooling demand of the data centre is across the year, and to size and specify cooling equipment. The ideal solution is a water-to-water heat pump, or a heat pump chiller. The heat output of the heat pump can then be calculated to establish the annual heat output profile.

A successful match of data centre heat output and local heating requirements is what designers will look for when setting out these projects. Buildings that are close to the data centre, such as nearby offices or public buildings, may not have high heat requirements. However, heat networks which supply domestic customers have higher and more predictable heat demand profiles. Buildings such as hospitals, schools and leisure centres are also sources of heat demand that must be considered.

Energy efficient data centres will lead the way to net zero

There is huge potential for data centres to adopt heat recovery solutions and become part of the UK's drive to decarbonise heating. Approaches like district heating and cooling allow society to reuse the excess heat from data centres using a heat pump.

This kind of process not only enhances energy efficiency in data centres but also contributes to providing neighbourhoods with heat and hot water in a more sustainable way.

As such, framing the data centre sector as part of the solution for our decarbonised future, rather than simply an energy user, has clear benefits for future development and growth.

Data centres and augmented reality:
a blueprint for industry transformation

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

BY JAB JEBRA, PRESIDENT AND CEO OF HYPERVIEW

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

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

The infusion of AR and Data Centres

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

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

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

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

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

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

Sustainability: A shared responsibility

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

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

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

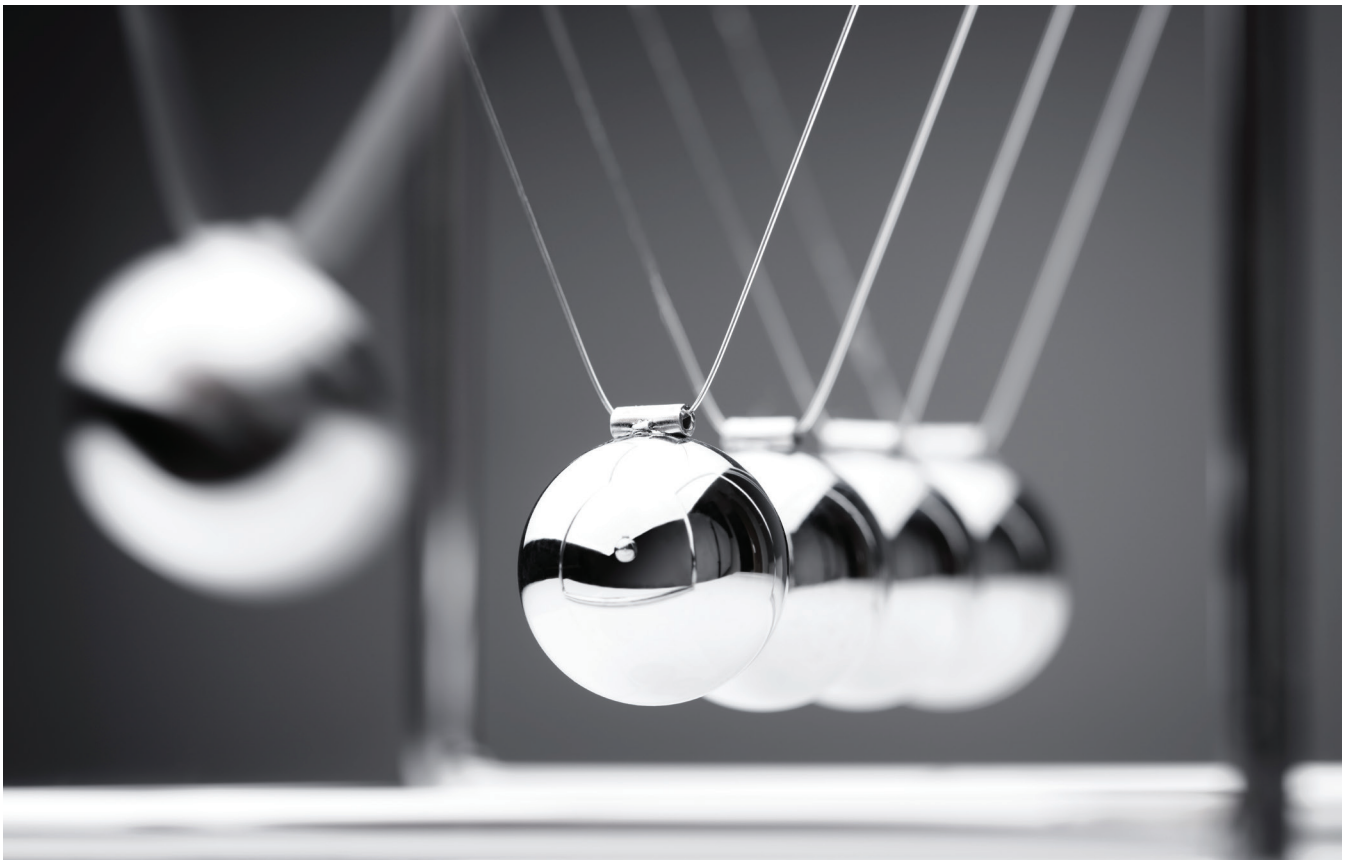
Furthermore, the insights gained through AR data play an important role in identifying energy inefficiencies within the data centre. This information allows operators to optimise operations and reduce energy consumption, making the data centre a more sustainable and responsible part of our digital infrastructure.

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

Time to turn the tide with AR

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

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



The pendulum swings back:

colocation as a cost control strategy

The evolution of public cloud over the past few years has been remarkable. Digital transformation, remote work, and AI have created breakneck growth.

BY MARK TURNER, CHIEF COMMERCIAL OFFICER, PULSANT

BACK IN 2018, before anyone uttered the words COVID or ChatGPT, there were already big drivers for public cloud. The global digital transformation market size was valued at $320 billion, and set for 18% annual growth, to reach a projected $695 billion by 2025.[1]

The global pandemic lockdowns then put a jet engine on the bullet train. More than two-thirds of boards accelerated digital business initiatives because of COVID[2]. 63% of leaders said the pandemic prompted them to embrace digital transformation sooner than originally planned. Research from IBM found that for 93% of businesses, COVID accelerated their digital transformation by an average of 5.3 years[3].

The world had barely drawn breath from this impact when artificial intelligence (AI) went mainstream, creating a market potentially able to sustain annual growth in excess of 40% to reach $1.3 trillion by 2033[4]. And that was on top of a global Internet of Things (IoT) sector well on its way to an estimated $336bn[5].

Against the backdrop of these relentless forces, businesses have scrambled for infrastructure resources. It is hardly surprising that the global public cloud computing market is estimated to reach $679bn in 2024.[6]

A new context

But the economic outlook has shifted. Even amidst the incredible growth of AI and rapidly maturing IoT use cases, organisations have reconsidered their approach. As the threats of recession loom, businesses have re-prioritised profitability.
The subsequent investigations into infrastructure have exposed hidden risks – and costs. The incredible urgency caused by digital transformation, COVID and AI, led to poor procurement decisions. The lessons of avoiding vendor lock-in – learnt

DATACLOUD GLOBAL CONGRESS 2024

5 – 6 June Cannes, France

4 June - Pre Event Reception

Driving Connectivity, Empowering Growth

The premier leadership gathering for senior executives across the data centre, cloud, edge, digital infrastructure and AI industries

PATRON SPONSORS

HUAWEI VERTIV

PLATINUM SPONSORS

CBRE MERCURY NTT DATA

riello ups SIEMENS Winthrop Technologies

DIAMOND SPONSORS

ada Infrastructure | CyrusOne | DIGITALBRIDGE | EATON Powering Business Worldwide | EQUANS DATA CENTERS

EQUINIX xSCALE | kirby engineering & construction | NALCO Water An Ecolab Company | RITTAL | TotalEnergies

SUSTAINABILITY SPONSORS

ada Infrastructure | JLL

GOLD SPONSORS

ELAND CABLES | ENGIE | GLOBAL COMMISSIONING | Hitachi Energy | Host In Ireland | legrand | NAUTILUS DATA TECHNOLOGIES | PANDUIT | Princeton Digital Group

RED | Life Is On Schneider Electric | Shell ENERGY | SIEMENS energy | STACK INFRASTRUCTURE | STULZ | submer | TRANE

SILVER SPONSORS

AFL | AMS AIR MOVEMENT SUPPLIES | Apto | AQ COMPUTE | atnorth | Bird&Bird | CapitaLand | Chubb POWERED BY API GROUP | CEL | console connect | CtrlS Asia's Largest Rated 4 Datacenter | DATA CASTLE

DATALEC PRECISION INSTALLATIONS | DataVita | DCByte | EAE | EIFFAGE | exyte | GreenbergTraurig | GRUNDFOS | i3 solutions | ING | Trium GREEN & CLOUD | KAO DATA

Kelvion THERMAL SOLUTIONS | KEVLINX DATA CENTERS | Locke Lord | LOCKTON | NOKIA | RAMBOLL | RBC Capital Markets | RiT XpediTe | 跨境数科 International Data Port | simmons+simmons | uptime INSTITUTE | VID FIREKILL

#DatacloudGlobalCongress | #KeepingTheWorldConnected

www.datacloudcongress.com

DATACLOUD a techoraco brand

One of the crucial issues with centralised, hyperscale cloud facilities has been that businesses do not have control and access to their technology. Regional data centres, such as our twelve locations across the UK, put businesses closer to their data

so painfully around issues such as Y2K - were forgotten.

Businesses now face the consequences of these 'all-in' pushes to the public cloud or fully on-premise data centres. Being locked into public cloud can expose a business to costs around excessive consumption, expensive and scarce management talent, data egress and increased security.

By comparison, the recent years have been an abject lesson that unpredictable energy prices, difficulties in scaling and increased costs of security can threaten the returns of a proprietary data centre.

Colocation resurgent

It is these sobering realisations that have led to an increased interest in colocation. Businesses want to combine the flexibility and scalability from cloud, with the cost control of owned infrastructure. This has been summarised as 'putting the right workload in the right place'.

Typically, this is now driven by a need for increased efficiency to improve profitability. The warnings of Gartner to beware of cloud washing and aim for a 'cloud-smart', as opposed to 'cloud-first' approach[7], have been embraced in this new context.

To be cloud-smart, businesses need infrastructure partners that can offer comprehensive options to enable them to run lean, resilient IT operations. It is no longer about just space and power in a colocation data centre – especially in an age of AI workloads that will push hardware to its limits. The imperative is enabling customers to focus on their core business, not just IT management. Colocation success is about strategic business capabilities being developed. This begins even before stepping inside a datacentre. It starts where that facility is located.

One of the crucial issues with centralised, hyperscale cloud facilities has been that businesses do not have control and access to their technology. Regional data centres, such as our twelve locations across the UK, put businesses closer to their data. This not only means better control – it improves performance and reduces support costs, especially in the event of maintenance or unexpected downtime.

The benefits of partnership

To then go one step further, a colocation partner will not only minimise disruption or outage, but also ensure that assets perform at their optimal level. Resilience and performance are not the same thing, and a true partner recognises how both impact profitability.

To improve return, a colocation partner – as opposed to provider – will offer managed services. The most compelling rationale for any form of outsourcing is to enable a business to offload non-critical tasks. Digital infrastructure is no different. There is little return for a business to manage its own hardware installation, maintenance, security updates, performance optimization, monitoring or troubleshooting.

By comparison, freeing IT teams to focus strategic improvement is at the heart of achieving a return on digital transformation investment. Though it is difficult to offer a consistent figure to quantify this, research suggests that successful deployment of managed services can increase operational efficiency by 45-65%[8].

Conclusion

After periods of innovation and adaptation, the pendulum has swung back and the goal for businesses in 2024 is profitability. Organisations once again need to focus on how to optimize infrastructure costs. In this respect, colocation provides the best of both worlds – cloud versatility and scalability, whilst maintaining on-premise control.

But providers must expand their focus and deliver more than space and power. They need to offer comprehensive solutions to help enterprises build resilient, lean foundations that drive the bottom line. Likewise, businesses looking to explore colocation need to integrate it into a comprehensive infrastructure designed to control cost and deliver substantial return.

FURTHER READING / REFERENCE

- [1] See Digital Transformation Market Size: 2020, 2021, and Beyond (digital-adoption.com)
- [2] See Gartner Says 69% of Boards of Directors Accelerated Their Digital Business Initiatives Following COVID-19 Disruption
- [3] As summarised at 90 Digital Transformation Statistics: How Businesses are Using Digital to Drive Growth in 2021 and Beyond - Performance Improvement Partners (pipartners.com)
- [4] See Generative AI to Become a $1.3 Trillion Market by 2032, Research Finds | Press | Bloomberg LP
- [5] See Worldwide IoT revenue 2030 | Statista
- [6] See Public cloud computing market size 2024 | Statista
- [7] See Cloud Shift Impacts All IT Markets (gartner.com)
- [8] See Global Managed Services Market (2022 - 2027): Big Data Stands to be Driving Factor for Productivity and Efficiency - ResearchAndMarkets.com | Business Wire

Product Launch:

One-Click® Cleaner MMC

Ideal on-the-go cleaning solution for field technicians

Introducing the One-Click® Cleaner MMC from AFL. The user-friendly design incorporates auto-advancing tape to clean gently and eliminate wrist twist, with 500+ USES PER UNIT.

> ***"The One-Click simplifies the fiber cleaning process, delivering exceptional results and maximizing productivity."***
>
> *Arun Jain, Director of Product and Marketing, AFL*

Why you need the One-Click® Cleaner MMC | Network disruption by numbers

Fortune 1,000 companies report potential downtime costs of around $1 million per hour. Mid-sized businesses spend $1 million resolving connectivity incidents annually. Where downtime correlates with monetary loss, you need preventative measures.

Cost- and time-saving benefits | Efficient one-click maintenance

- **Cost-efficient:** 500+ cleans per unit
- **Enhance productivity:** Free up valuable technician time
- **Versatile:** 16F and 24F versions

Free demo | Let's talk

For more information, and to discover how the One-Click® Cleaner MMC can help you maintain your connectors while minimizing downtime across your fiber network, contact AFL today.

Scan the QR code or search MMC Cleaner AFL >>

Winning the digital space race:

Can battery storage plug the data centre construction black hole?

To keep up with huge data centre construction demand, a range of energy solutions are now required to break the bottlenecks that often lead to delays, missed deadlines and penalties. Why adopting battery energy storage systems (BESS) as part of a wider, end-to-end solution is key to keeping builds on track

BILLY DURIE, GLOBAL SECTOR HEAD FOR DATA CENTRES AT AGGREKO

DUBBED the digital space race by many in the industry, the exponential demand for more data centres across the globe is quickly dwarfing levels of supply. Savills predicts that in Europe alone, data centre power capacity will total 9,000 MW by 2025 and the number of data centres will need to increase by almost 2.5 times. In other words, more than 3,000 data centres will need to be built in the next year to meet demand.

The surge in demand for data centres is powered by an increased global need for access to data. In Southern Europe alone, the number of internet users is projected to grow to 208 million by 2027 from approximately 195 million in 20231. Fuelled by many factors including the move to digitally working from home post-pandemic and the rise in AI, access to data is quickly becoming an integral part of everyday life.

Trying to keep up with this exponential demand is putting strain on data centre construction. There are several factors that can delay data centre builds and project managers will be all too aware of the common pinch points. Two common stumbling blocks are waiting time for a grid connection and local emissions standards. These can both be navigated by implementing BESS onto site. The systems work alongside generators to ensure data centre builds always achieve a steady power supply, especially during peak times.

The great grid dis-connect

Those involved in the data centre construction industry know the huge amount of power required during a typical build. This demand will remain high and with a growing requirement for more data centres across Europe, the strain on the grid will only increase. Now, many builds are stuck in a seemingly endless queue waiting for a connection, similar to the more than £200bn worth of renewable projects sitting in line to connect to the UK's National Grid. The situation is especially strenuous in the FLAP-D markets (Frankfurt, London, Amsterdam, Paris and Dublin), with some placing moratoriums on new builds or only considering applications on a case-by-case basis.

Even in the best cases where data centre builds are connected to the grid promptly, a reliable connection is hard to find which causes delays to project schedules.

Once the load profile of a site has been established, BESS, as part of a hybrid power package, can be incorporated to reduce reliance on the grid and keep construction running smoothly. Rather than

waiting for a grid connection, these hybrid solutions transfer power control back to site managers who can use the systems to avoid connection bottlenecks.

Carbon-Conscious sites

Many data centre construction sites are bound by local environmental and noise regulations that factor into the choosing of suitable machinery and operating times. This is where a hybrid system, commonly consisting of a Stage-V generator paired with a BESS system, can help. Using a hybrid system, allows for periods of zero-emissions power supply when demand is lower (such as at night) when the battery is solely taking the load.
The generators in these systems can also be ran on hydrotreated vegetable oil (HVO) or integrated with renewables to further maximise reductions in emissions. For example, using stored energy in BESS as a spinning reserve during intermittent power supply helps sites with unstable connections or uneven load profiles.

For colocation DCs in urban areas, this is especially important as there is often noise or clean air zone restrictions to consider during a build. Arguably the top DC market in Europe2, London data centre construction has had to compete with an expanding Clean Air Zone (CAZ), emphasising the value of hybrid solutions that can adhere to current and future environmental legislation.

It's unsurprising that many businesses, especially those involved in data centre construction, are concerned about the upfront investment necessary to incorporate renewable energy sources3. However, many greener solutions, such as BESS, offer a low-risk, high-reward route to more sustainable construction.

For example, when powering temporary office cabins during the build phase, a hybrid solution comprising 3 x 320 kVA generators and a 300 kW battery can provide significant reductions in fuel usage, costs and emissions. In this scenario, an estimated 20,000 litres of fuel and 53,000 kg of CO2 emissions can be saved over a 2-month period.

Security and control

As well as navigating environmental regulations, a BESS can work in conjunction with Stage V Generators, allowing site managers to monitor power loads to ensure the site is running at safe levels of emission output. This approach also enables periods of zero-emissions when running solely BESS for set periods. Remote monitoring also allows the site manager to analyse, and in turn optimise, their load requirements for maximum carbon savings.

Again, construction on many colocation projects will benefit from these periods of downtime without the fear of dips in power supply thanks to BESS. This also allows those DCs operating within built

environments to compete with caps on emissions that may have previously stopped projects completing to schedule.

Remote connections

It's not just data centres constructed in urban environments that can benefit from bringing BESS onsite. Projects far from the grid in remote locations can also reap the environmental rewards of these bridging solutions to facilitate construction in energy insecure locations.

Some data centres are purposefully built in some of the most remote locations in the world, such as the Nordics, because of the free cooling potential. However, this also presents grid issues, as the power infrastructure required to build a project of such scale is not always present in such remote locations.

Additionally, some of these Hyperscale builds can have thousands of construction workers on site, proving costly in the event of outages without a backup power source. BESS provides this backup solution for builds struggling to maintain a stable grid connection while keeping the project in line with often strict environmental regulations.

Across Europe, BESS capacity is ramping up, with the UK adding more large-scale capacity in 2022 than any other nation and predicted to quintuple its energy storage capacity by 2030. Investments of such scale proves the case for BESS construction in various countries, with or without stable connection to a grid. Ultimately, these bridging solutions allow construction to keep up with the seismic growth in demand for data in some of the world's most urban and remote locations.

FURTHER READING / REFERENCE

- [1] Internet users in Europe | Statista
- [2] The London Market | DC Byte
- [3] Uptime on the line I Data centre research report, Aggreko UK

AI can only reach its potential if data centres evolve to accommodate it

From personalised shopping experiences to smart transport systems, Artificial intelligence (AI) is becoming more and more ubiquitous in our lives, fundamentally changing how we live and work. And with the arrival of ChatGPT and other AI driven apps, it is clear that this technology is reshaping the digital landscape and redefining what data centres need to handle. Many industry experts are anticipating the ongoing growth of AI, including Statista who predicts that the market will reach US$305.9bn in 2024 and expand to US4738.80bn by 2030.

BY SAM BAINBOROUGH, DIRECTOR EMEA-STRATEGIC SEGMENT COLOCATION & HYPERSCALE AT VERTIV

HOWEVER, AI will only be able to succeed if the technology infrastructure evolves to accommodate the computing power required to process the data and run the IT systems that enable this growing phenomenon. This means that data centres are crucial in enabling this technological revolution.

The evolution of data centres

To meet the escalating demand for computing power, data centre operators are prioritising the development of infrastructure capable of not only satisfying current needs but also accommodating future growth. They must rethink design strategies and make significant changes to network architecture, power systems and thermal management.

A holistic approach is required emphasising adaptability, energy efficiency and reliability - not least because data centre owners are confronted

with multiple challenges such as carbon reduction regulations, surging power requirements and heightened heat generation.

The combination of increasing bandwidth requirements and the continuous influx of data is fundamentally reshaping the business landscape, and prioritising efficiency and innovation is even more paramount. Two key areas that need to be addressed are power, to cope with the demands of AI workloads, and thermal management, to enable the critical digital infrastructure to operate as efficiently as possible.

Power

High Performance Computing (HPC) is changing with the rise of AI, causing a significant increase in power demands, fuelled by the adoption of specialised processors essential for managing complex tasks. Typical data centre computer racks are expected to increase from 5 kW to 7 kW today (equivalent to the size of a small residential backup generator) to 50 kW or more in the not-too-distant future, according to Omdia's 2022 Data Center Thermal Management Market Analysis report. Addressing this challenge demands that data centres adopt creative solutions for managing and optimising power usage. Integrating energy-efficient hardware into data centres requires implementing state-of-the-art hardware designs and staying updated with advancements in processor technology.

The strategic emphasis on power efficiency aligns with the broader imperative of promoting sustainability in the face of escalating energy consumption. This includes expanding the use of alternative energy, smart grids, hybrid grids and innovative data centre designs to deliver reliable solutions for customers, while lessening the negative impacts on our planet.

Thermal management and cooling solutions

To maintain optimal performance and prevent hardware failures due to overheating, data centre operators keep abreast of innovative cooling technologies. Liquid cooling systems are becoming more popular, perfectly integrating with chilled water systems that are an established choice. Striking a delicate balance between processing power and thermal management is crucial, safeguarding the longevity and reliability of the entire data centre infrastructure.

There are two liquid cooling technologies that are in use today:

Air-to-liquid cooling: While these technologies don't bring liquid directly to the server, they do utilise the high thermal transfer properties of liquid. Passive or active heat exchangers replace the rear door of the IT equipment rack with a liquid heat exchanger. With a passive design, server fans expel heated air through a liquid-filled coil mounted in place of the rear door of the rack. It is the coil that absorbs the heat before the air passes into the data centre. Active heat exchangers include fans to pull air into the datacenter through the coils and remove heat from even higher density racks. These systems can be used in conjunction with air-cooling systems to cool environments with mixed rack densities.

Direct-to-Chip cooling: This is where a cool liquid is circulated to cold-plate heat exchangers embedded in the IT equipment. With this method, servers and chips are integrated with micro fluid channels close to the heat generating components. The heated fluid is transferred outside the rack for heat rejection, which is typically performed by the CDU. Direct-to-chip cooling technologies generally have higher heat removal capacities than rear door heat exchangers.

The next phase in this evolution is the immersion cooling

Immersion cooling: This involves submerging servers and other components in a thermally conductive dielectric liquid or fluid. With this method, the need for air cooling is eliminated, including the fans within servers. This approach maximises the thermal transfer properties of liquid and is the most energy efficient form of liquid cooling.

Can liquid cooling and air cooling co-exist?

Air-cooled and liquid-cooled solutions will absolutely co-exist and data centres will need to tightly orchestrate both to optimise the overall environment within the facility. Even within liquid-cooled servers, air cooling will continue to be required as direct-to-chip technology does not remove 100% of the heat from equipment in the rack. Typically, this approach can remove 70-75% of the heat generated by the equipment in the rack, requiring a hybrid approach to cooling.

It's important to note that innovative thermal management practices not only optimise

performance but also reduce the environmental impact of data centres, emphasising energy efficiency and resource utilisation. By minimising energy consumption and maximising resource utilisation (including waste heat recovery to support the circular economy), sustainable cooling practices play a pivotal role in mitigating the ecological impact of data centre operations.

Ensuring a holistic approach

Successfully navigating this evolving dynamic landscape necessitates a holistic approach. One of the keys to success lies in involving all stakeholders, recognising the importance of collaboration and communication across diverse disciplines. Engaging not only power and cooling specialists but also those responsible for facility management, storage and technology deployment, fosters a comprehensive understanding of the data centre's intricate requirements.

As data centres evolve with denser configurations and rapid technological advancements, design must go beyond technical specs. It involves efficient decision-making and proactive engagement with industry experts to navigate the complexities of AI-driven transformations. Holistic design helps with streamlining decision-making processes while considering lead times and involving stakeholders at every stage.

AI is a fascinating technology that's poised to change the world, but it's impossible to predict exactly how it will evolve and what it will do. However, its potential is only as great as the world's data centres' capacity to support the computational intelligence it will require. The data centre industry must continue to evolve to provide the dynamic and innovative cooling and power solutions needed to support data centre challenges and maximise AI's true potential.

This proactive approach not only enables data centres to meet the burgeoning demands of AI applications but also positions them as catalysts for progress. By prioritising innovation, data centres can mitigate their environmental impact as well as enhance their resilience in the face of evolving challenges such as climate change and resource scarcity. Moreover, by optimising efficiency through innovative practices and technologies, data centres can operate at optimal performance while minimising energy consumption and operational costs.

Ultimately, the significant AI proliferation heralds a new frontier in data centre design. By embracing a holistic approach, data centres are poised to lead the charge in innovation, spearheading progress in an era defined by growth and technological advancement.

Power protection

that's out of this world.

Galaxy VS UPS

Huge power in a small footprint…

The Galaxy™ VS from Schneider Electric is the best-in-class power protection that innovates against downtime. It is an efficient, modular, simple-to-deploy 3-phase UPS that delivers intelligent power protection to edge, small, and medium data centres, as well as other business-critical applications

- 99% efficient in ECOnversion™ mode
- Compact design, optimised footprint architecture
- Battery flexibility, including Lithium-ion batteries
- New patented hybrid technology

Discover the Galaxy VS UPS

www.se.com/uk

Life Is On | Schneider Electric

How must data centres evolve to meet AI workloads?

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

BY DARREN WATKINS, CHIEF REVENUE OFFICER AT VIRTUS DATA CENTRES

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

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

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

Location: where to build?

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

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

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

Sustainability is even more important

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

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

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

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

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

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

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

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

Hybrid cloud: driving demand for regional and edge data centres

For many reasons, including cost, access, control, security and regulatory concerns, enterprises are increasingly turning to Hybrid Cloud solutions to meet their diverse computing needs.

BY ADRIAAN OOSTHOEK, CHAIRMAN PORTUS DATA CENTERS

THIS STRATEGIC APPROACH combines the flexibility and scalability of public cloud services with the lower cost, better control and security of a private infrastructure. As businesses embrace Hybrid Cloud models, demand for regional and edge data centre facilities is growing. Let's delve into why this trend is emerging and its implications for the data center industry.

Hybrid Cloud environments offer businesses the best of both worlds. They enable organisations to leverage the agility and flexibility of public cloud platforms for certain workloads while keeping stable workloads, sensitive data and mission-critical applications in private clouds or servers. This approach provides flexibility and scalability but also control over data management and regulatory compliance and enables organisations to combine the best features of public cloud and dedicated private infrastructure set-ups.

So what does the increase in hybrid and private cloud adoption mean for data centres?

Data Centre concentration or diversification

Data centres in Europe, and across the world, have tended to concentrate in certain cities due to initial network constraints and concentration points when the industry started in the late nineties. In Europe the phrase FLAP was coined many years ago: Frankfurt, London, Amsterdam and Paris. Whilst cities like Berlin, Dublin and Madrid have also become large data centre hubs, the landscape is still extremely concentrated.

However, this is starting to change as IT architecture developments, scarcity of land and power and logistics drive increased demand for IT infrastructure housing closer to end users. Whilst there are a lot of enterprises in the 'extended FLAP' locations, there are far more enterprises and other organisations that are located elsewhere.

Looking at GDP output for example, Frankfurt, whilst boasting the largest concentration of data centres in Europe, only comes in 4th place in terms of GDP output in Germany – at about 50% of the GDP of either Munich or Hamburg.

As enterprises adopt Hybrid Cloud setups, they are increasingly looking for data centres that are near them, avoiding the expensive, constrained and often far away data centre locations of the FLAP. This is particularly true in Germany as its GDP is very distributed across the country.

Regional data centres on the rise

Regional data centres have many functions. They serve as intermediary hubs between centralised cloud regions and local edge locations. They offer low-latency connectivity and data processing capabilities closer to end-users, making them ideal for applications requiring real-time responsiveness and high-bandwidth requirements.

By strategically placing their IT infrastructure in data centres that are in key regional geographic locations, enterprises can reduce latency and improve the overall performance of their Hybrid Cloud environments as well as have greater control and a more cost-effective solution.

Edge data centres, such as those owned by Portus Data Centers bring computing resources closer to end-users. These facilities are essential for applications that either generate and transport very large volumes of data or demand ultra-low latency, such as autonomous vehicles, augmented reality, industrial automation, and certain IoT devices and use cases.

Edge data centres enable data processing and analysis to occur locally, minimising the need to transmit large volumes of data back to centralised clouds. This not only reduces latency but also alleviates bandwidth constraints, reduces network costs and enhances data privacy and security. The adoption of Hybrid Cloud architectures can therefore be seen to be driving the proliferation of regional and edge data centres. There are several reasons for this.

Private cloud instances often require more direct management by an organisation's IT technicians, and hence these deployments are required closer to home for greater ease of access and control, resulting in increased performance.

Transmitting large volumes of data is costly and difficult, particularly over larger distances. Regional data centres alleviate this burden by reducing the distance the data needs to travel. This optimises bandwidth utilisation and reduces network congestion. Increasingly, even dedicated fibre connections to the regional data centre are available at a reasonable cost which address latency, volume and security concerns.

Regulatory requirements, such as GDPR, mandate strict data sovereignty and compliance standards. Regional data centres allow enterprises to store and process data within specific geographic boundaries, ensuring compliance with local regulations while maintaining data residency requirements.

Distributed data centre architectures can enhance resilience and fault tolerance by dispersing workloads across multiple locations. In the event of a network outage or hardware failure at one location, redundant infrastructure set-ups (in diverse edge data centres) should ensure uninterrupted service delivery.

For certain applications like video streaming, online gaming and financial transactions, minimising latency has become paramount. Regional and edge data centres enable businesses to deliver seamless user experiences by reducing the distance between data processing and end-users.

In summary, regional and edge data centres play an increasingly important role in enabling enterprises to deploy modern IT architectures that meet their varying requirements. These distributed computing facilities play a crucial role in controlling cost, optimising performance, ensuring compliance and enhancing the resilience of Hybrid Cloud environments. They also serve to reduce the burden on the areas where data centres are now so very concentrated and which are increasingly congested.

How data centre businesses are a hub for green expertise

Sustainability is standing firm as a business-critical priority for those in the data centre industry this year. With customers challenging data centre operators and service providers on their green credentials, and the pace of government regulations in the industry gaining momentum, no data centre business can avoid investment into green goals if it wants to keep a competitive edge in this industry.

BY TERRY STORRAR, MANAGING DIRECTOR, LEASEWEB UK

IN THE EU, businesses signed up to the Climate Neutral Data Pact have only one more year before they need to fulfil their commitment to a range of sustainability performance standards. It is no surprise that there is a sense of urgency in the efforts to reduce energy consumption, optimise power management and find more ways of tapping into renewable energy sources.

More regulations will inevitably come into force; in the UK, many of these will stem from the government's 2050 net zero target. And although mandates are not likely to be universal across the globe, new government requirements will have a profound impact in shaping the industry in the coming decades.

In practice, rather than a seismic change, data centre operators and service providers are taking small but sure steps towards environmental goals, such as achieving 100% renewable energy use. The drive to be as green as possible is fuelling innovation in the industry; for example, some businesses are exploring new clean energy sources such as hydrogen, while others are evaluating how new technologies can help to further optimise efficient energy use.

Is AI a double-edged sword for sustainability?

New technologies – notably AI – are presenting both challenges and opportunities for the data centre industry in its quest to meet green targets. While surging demand for AI technologies is placing unprecedented pressure on data centre operators to provide sufficient power and capacity to support this growth, data centre operators must do this within limits. Both environmental targets and the unavoidable worldwide power shortage are directly impacting data centre design and operations. Balancing power to meet ever-increasing compute demands with sustainable operations will be testing for most data centre operators.

AI is also set to be gainfully employed by data centre businesses for green initiatives this year. Tools like predictive analytics are already enabling better data and resource management and process automation, and enhanced energy and water usage efficiency in line with aggressive sustainability performance targets. AI-based technologies can also deliver

By positioning strongly on net zero, data centres can offer their carbon responsible customers value added services that will attract a premium from clients looking for high quality green energy

insights that improve operational decisions like workload management and capacity planning.

Recognition of sustainability expertise is growing

From a business standpoint, there is widespread recognition that specialist data centre providers are now the best option for managing environmentally friendly models such as IaaS and SaaS. Industry research has found that organisations migrating from on-premises to IaaS infrastructures can significantly reduce their energy consumption by up to 65 percent and carbon emissions by up to 84 percent.

In the majority of cases, it simply no longer makes sense for a business to run its own data centre operations, especially with the introduction of requirements such as the Streamlined Energy and Carbon Reporting (SECR) framework. This is mandatory for around 12,000 large companies in the UK and requires these organisations to document their efforts to improve energy efficiency. Why then would a company not tap into the specialist knowledge and economies of scale that the data centre industry can already provide?

The long-term business value of data centres

In 2024, we expect to see an increased and intensified focus from end customers on sustainable data centres. From a data centre sector perspective, being sustainable represents a key driver for business growth and competitive advantage.

By positioning strongly on net zero, data centres can offer their carbon responsible customers value added services that will attract a premium from clients looking for high quality green energy. Similarly, they can offer clients customised sustainability reports on their carbon footprint and environmental impact that more and more businesses will need to justify their own carbon neutral efforts.

DCA News and Updates

By Steve Hone, CEO, The DCA

THE DCA was set up around 15 years ago. Its goal – to support and assist the developing Data Centre sector and those working within it. The DCA also encourages best practice and knowledge sharing. With this in mind we are proud to be hosting our annual conference

Data Centre Transformation 2024
22 October 2024 at The IET, Birmingham
This one-day event comprises of panel sessions, workshops and updates from Government and Industry Experts. The conference programme starts at 10.00am and finishes at 17.00pm, followed by informal networking drinks and The DCA Dinner.

All DCA Members and Partners are welcome at DCT along anyone else who has an interest in the Data Centre Industry.

Click here to register for Data Centre Transformation 2024!
NEWS UPDATE: The editorial team from Data Centre Solutions will be attending DCT 2024 and filming One-to-One interviews with delegates, these will appear on The DCA and DCS sites!
If you are interested in booking an interview please get in touch - info@dca-global .org

The DCA Update in Issue 04

This month Data Centre Solutions focus on a number of topics including Power, Cooling, ESG and Design / Construction. Articles in this feature are related to these topics. I'd very much like to thank Frida, Jon and Beth for taking the time to write these pieces which I hope you will find them interesting.

Frida Cullen Persson, SWEP focuses on Liquid Cooling as explains why the demand for more compute and data-intense tasks like AI will result in air-cooled systems reaching their limits. Frida is predicting that this is where large-scale liquid-cooled systems will come into play.

Jon Healy, Keysource discusses the benefits of a well-planned Pre-Construction phase to circumvent nasty surprises.

Beth Whitehead, Operational Intelligence provides us with a very informative piece related to ESG, DC Sustainability & Legislation – the clear and concise content should be very helpful to many in the sector.

To find out more information about The DCA click here or email us mss@dca-global.org

The DCA was set up around 15 years ago. Its goal – to support and assist the developing Data Centre sector and those working within it

The benefits of preconstruction phase

By Jon Healy, COO at Keysource,
the leading global data centre and critical environment specialist

HAVING a detailed pre-construction phase undertaken before starting the design and build or upgrade of a data centre facility has a number of major benefits. In simple terms it enables organisations to get an independent evaluation of every aspect of the project before it begins to highlight and mitigate delivery or commercial risks. And the outcome, in my experience, is usually better as there are no nasty surprises either from a cost or delivery perspective.

A false economy

However, many organisations choose to sidestep this part of the process. I believe that this can be a false economy that can often result in, at best, a lack of consistency of tender responses and a loss of control by the client, and at worst significant additional costs and a major impact to project delivery, especially within live environments. Needless to say, that at Keysource we are increasingly cautious about tendering for projects without the security and guidance of a 'preconstruction' phase.

Tendering blind

The issue is that some organisations rely on the companies tendering for the work to weave this into their bid. Whilst many are happy to do this it means that from the start, it will be impossible to do a like for like comparison as there are often many differing views on how to achieve a certain end result. Companies tendering are almost doing it blind and are often having to 'second guess' at the importance of the key drivers of the project such a resilience, sustainability and futureproofing. If you factor in the pressures on margins in our sector then there is also a real danger that not all costs will be included.

The big picture

Our experience is that a good pre-construction allows clients to look at the big picture rather than just the specific project addressing issues such as how this will fit in my overall IT strategy. It also ensures an increased buy in from all the stakeholders who have been part of the collaboration and may well have some real value to add. It also means that any concerns can be addressed early on. With a formal plan in place that includes budgets, schedules, and designs there is little to no need for any member of the team to second guess during decision making processes. Ultimately this puts the client firmly in control of what they want.

Most projects start by undertaking a needs analysis based on a detailed brief and performance specification for stakeholder agreement and senior level approval. The next stage is to develop concept solutions to meet the brief including associated commercial, technical and delivery related considerations and identifying risk. Finally, we develop the preferred design, construction phase plan and commercial schedules.

The preconstruction service can evaluate different approaches to deliver the required performance specification giving clients the ability to mitigate risk associated with the project whilst having the flexibility to make commercial decisions through the process. This enables us to define the design activity for construction including associated surveys and provide additional comfort and/or accuracy associated with provisional sum items. In addition, we are able to procure known long lead time plant items and engage and establish the required project delivery team early.

Our recent acquisition

We have recently further broadened and strengthened our service offering in this area with the acquisition of 2bm an expert in complex design and build projects which complements our existing fully comprehensive range of services to design, build, operate and maintain data centres and mission-critical infrastructure. 2bm will continue to operate under its existing brand name as part of the Keysource Group with Mark King, Managing Director of 2bm, remaining in his current role and leading the company's continued growth. Their specialist skills and experience in data centres and critical environments are a perfect fit for our business, and we see significant opportunities for collaboration.

The devil is in the detail

There is no doubt that having a robust pre-construction phase before undertaking the design and build or upgrade of a data centre facility has a number of major benefits for clients. These include consistent tender responses and an ability to maintain cost control. For organisations that are operating a live environment it also ensures that there is no impact on existing operations. The devil is always in the detail and to ignore this is a false economy.

There is no doubt that having a robust pre-construction phase before undertaking the design and build or upgrade of a data centre facility has a number of major benefits for clients

Sustainable data centres and the changing legislative landscape

By Beth Whitehead - Sustainability Consultant, Operational Intelligence

We have long known that data centres are high energy consumers. Globally in 2022, data centres consumed 1 – 1.3% of total electricity demand and accounted for 1% of energy-related carbon emissions. Dealing with energy efficiency is a well-trodden path, and one that most of the industry is at varying points along. However, energy can no longer be the sole-focus, as the broader issues of sustainability become more urgent.

Sustainability isn't new to the industry. It already has many efficiency metrics including PUE for power, CUE for carbon, WUE for water, and ITEEsv for server energy efficiency. Though helpful, these single-issue metrics have always had their limitations. One being their inability to address the interaction between different impacts. For example, PUE doesn't address IT efficiency. And yet this interplay of factors is at the very core of sustainability.

Addressing this interconnection and knowing what 'sustainable' looks like has been hard. It has led to a performance gap where only those with the budget or core values have made progress. In truth there is not one single pathway to a sustainable data centre. It requires whole systems thinking, innovation, and collaboration.

ESG and sustainability

ESG and sustainability are often discussed in the same breath, and yet there is an important difference. ESG stands for environmental, social, and governance, and is a set of criteria used to assess corporate governance practices and impact on the environment and society.

Sustainability is the capacity to support a process and maintain its current state whilst considering the interaction between environmental, social, and economic factors, far into the future.

A sustainable strategy can use an ESG framework. It measures performance in areas of ESG and economics and has ethical and responsible action plans, targets, policies, and services that reduce negative impacts, increase positive impacts, and ensure long-term value for the business and society.

Legislation, sustainability reporting, and investment

Increased legislation is driving momentum. Some apply directly to the data centre industry – such as the EU energy efficiency directive (EED). This provides a framework based on 'energy efficiency first' to reduce EU energy consumption, and places mandatory reporting of energy consumption on data centres with a total load greater than 500 kW. It also calls for the use of waste heat and renewable energy.

At the corporate level, the corporate sustainability reporting directive (CSRD) mandates on EU companies that fall under scope to report on their sustainability in areas of ESG including climate change, pollution, water and marine resources, biodiversity and ecosystems, resource use and circular economy, own workforce, workers in the value chain, affected communities, consumers and end-users, and business conduct.

Although these are both EU mandates, some UK companies still fall under scope. And for those that don't, it should be a warning that UK legislation is coming.

These two drivers create transparency on industry performance. The EED will provide much needed benchmarks on the number of data centres, where they are, and energy consumption.

Whilst sustainability reporting makes companies accountable to the impacts they create, the targets they set, and how they work to achieve them.

Another driver is sustainable finance – seen as key to transitioning to a net zero carbon economy. In sustainable finance, investors put money into areas that show sustainability, such as projects that reduce carbon emissions, reverse biodiversity loss, or eradicate poverty. Companies and projects that commit to ESG targets – like using 100% renewables in their operations or switching to an all-electric fleet of vehicles and plant – that help meet investor targets are better placed to access this funding. Indeed, such targets can be a condition of financing.

What does a sustainable data centre look like?

This new landscape places more pressure on the industry but offers the potential for innovation. We must lead with sustainability which runs through the core of every decision. We must adopt a whole life cycle approach and break down industry silos to support collaboration. Each stakeholder needs to think through the impact of their decisions beyond the boundaries of their immediate influence, something that can be supported through education. Effort to improve outcomes is needed as early as possible and should be revisited throughout the building life cycle – not just to the point of practical completion, but through operation and end-of-life.

The first step should be to understand what ESG targets you or investors have – for example zero waste to landfill, improving biodiversity, innovation around low-carbon materials, or energy efficiency implications of EED. These needs should be mapped across the project life cycle to understand where decisions need to be made, who has the control to implement solutions, and who they affect. These guiding principles form the basis of your

Area	Options
Design Philosophy	* Reduced complexity. * Design for longevity, repair, future flexibility, adaptability, and disassembly. * Whole life cycle and circular perspective. * Early involvement of the whole design team/contractors to enable collaboration. * Project information on whole life carbon, material and component passports, and disassembly.
100% Renewables	* On-site renewables. * Off-site renewables. * PPAs (power purchasing agreements).
Construction	* Modern methods of construction such as off-site manufacturing. * Energy storage systems and sustainably sourced drop-in fuels. * Electrification of plant and vehicles. * Hybrid and hydrogen generators. * Straight-to-grid connections. * Power down technologies (eliminate idling). * Track waste and zero waste to landfill.
Materials	* Low-carbon (e.g., low-carbon aggregates). * SteelZero. * High recycled content. * Design out critical raw materials and hazardous materials. * Consider ethics of the supply chain. * Rainwater harvesting.
Cooling	* Low energy/zero refrigeration/compressor-free. * Increased operating temperatures + air segregation. * Can the cooling support future chip technology/growth in compute.
Power	Smart grid ready UPS. * Modular/efficient UPS. * Eliminate fossil fuels in generators. * Waste heat reuse.
IT	* Refurbished. * EnergyStar compliant. * Send for refurbishment.
Procurement	* Screen supply chain using ESG criteria such as carbon commitments, availability of EPDs, takeback schemes, location, and equity, diversity, and inclusion. * Increase supply chain knowledge. * Inclusive recruitment. * Secondary markets and material reuse networks.
Operation	* Optimisation for part load. * ICT: o Increased utilisation (virtualisation and consolidation) o Higher intake set points and widened humidity ranges. * Air management: o Eliminate air bypass and recirculation (blanking plates, and aisle containment). * Pumps, fans, compressors: use VFDs. * CRAC/CRA H: control on supply air temperature.
End-of-Life	* Disassemble, dismantle, recover, reuse, refurbish, recycle. * Use waste treatment providers that have net zero carbon commitments and use 100% renewables.
Innovation	* Partner on sustainability research projects. * Trial sustainability innovation on projects.

strategic response. They should be included in any project brief alongside implications of aligning with the EU-taxonomy – a classification system for "environmentally sustainable" economic activities. Practical options to achieve these strategic principles can then be explored. For example (but not limited to):
The future

Sustainability needs to take a front seat. For the industry to meet ESG legislation and the benchmarking that this involves, it must track data and make it available throughout the facility's lifetime to inform decision making. Data collection structures need to be implemented from the start and should be integrated within existing systems to limit additional work.

For example, carbon data (e.g., from BECD – the built environment carbon database) could be linked to bill of quantities and project costing.

This can pass through the project and be updated to an as built version to deliver a total upfront carbon value for the building. This can be used in the carbon accounts for the client, displayed to customers, and drive reduction on subsequent projects. Done early enough, it can also drive low-carbon design solutions. The provision of data upfront must become commonplace to support a whole industry shift.

The industry cannot work in silos. This must be a team effort intrinsically motivated by the achievement of sustainability.

Liquid cooling – The future of data center cooling

By Frida Cullin Persson, MSc, Industry Segment Manager - SWEP International

AS PERFORMANCE NEEDS – and heat – increases, liquid cooling is delivering efficiency and sustainability to data centers around the world.

Growing demand equals growing power consumption and heat

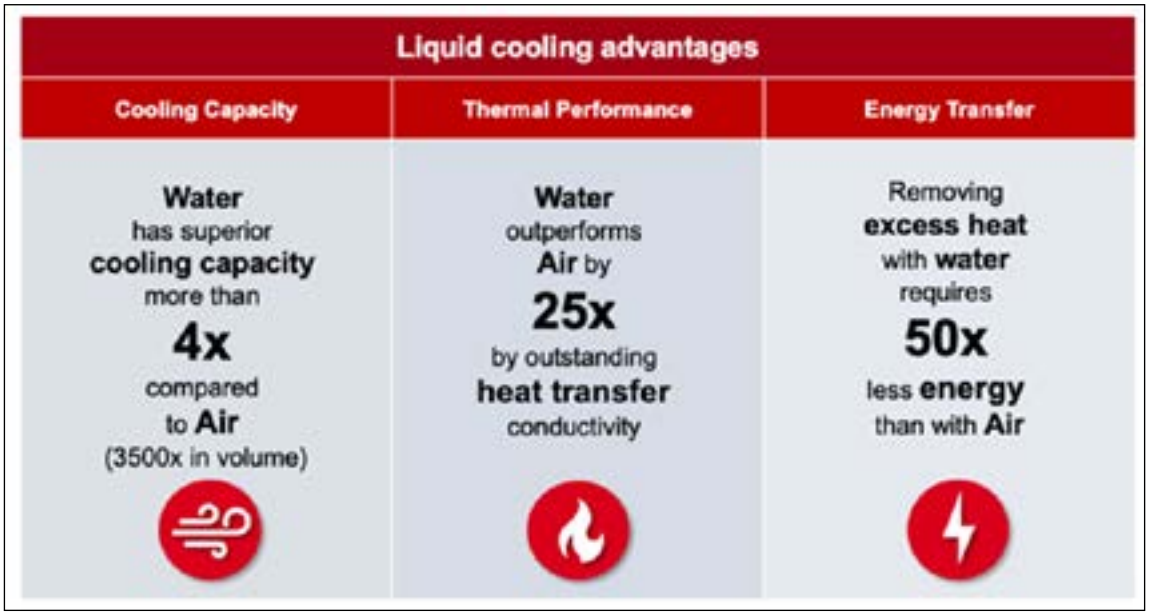
US data center demand is expected to grow 10% a year until 2030. With demand being measured by power consumption to reflect the number of servers in a data centre.[1]

While this is a US-based prediction, we can already see countless new data center construction projects on the horizon in the EU, APAC and LATAM markets.

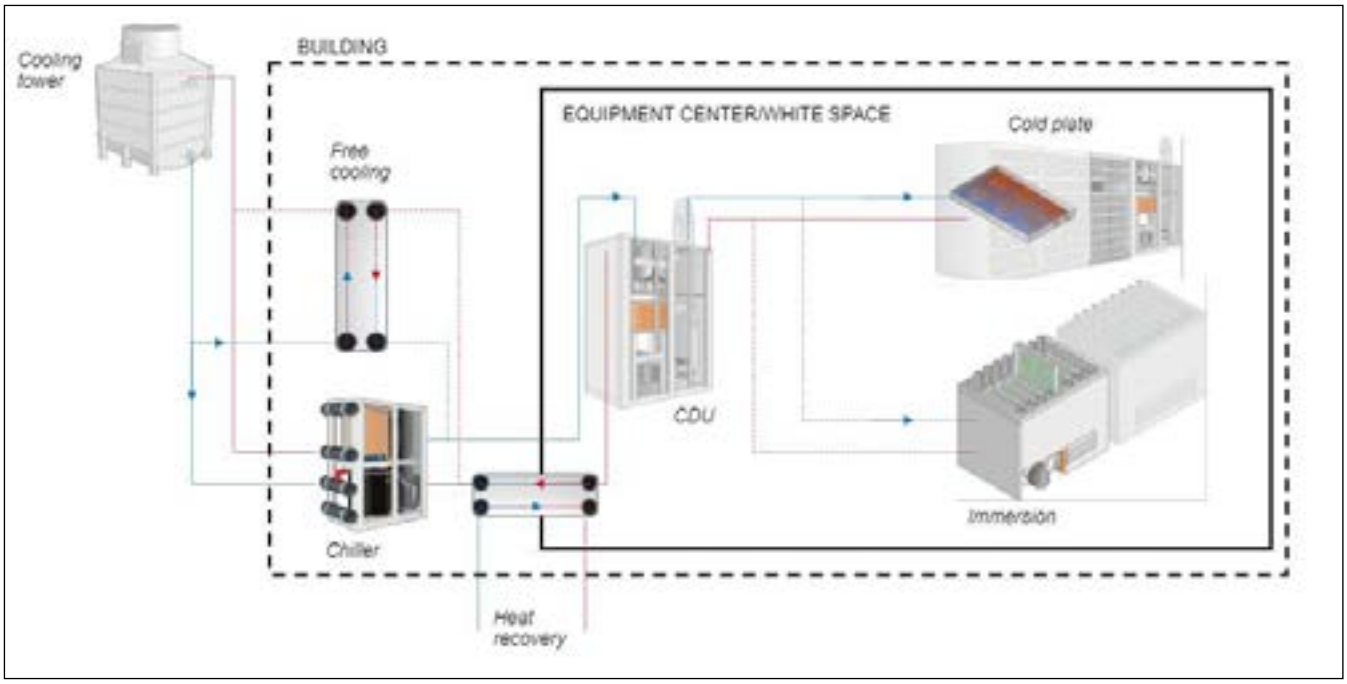
This data center need is being driven by our ever-increasing digital footprint, and fast-growing tools like AI, big data and high-performance computing.

With this exponentially increasing amount of power density, data center builders are looking to new types of cooling that can manage not only the increased amount of cooling needed, but also to meet new regulations for data center heat recovery and reuse.

Modern data centers can use as much power as 80,000 households. There's growing pressure to make data centers sustainable, and regulators and



Source 1) www.mckinsey.com/industries/technology-media-and-telecommunications/our-insights/investing-in-the-rising-data-center-economy



governments in Singapore and the Netherlands are already beginning to impose sustainability standards on newly built data centers. This trend towards more sustainable data centers is likely to grow in the coming years due to public sentiment and the focus of lawmakers.

Liquid cooling – An efficient alternative

Liquid cooling was first developed by IBM in the 1960s. And while popularized by some niche consumer segments, it hasn't been necessary for data centers to choose liquid cooling because air-cooled systems have, up until now, been more than sufficient. As the demand for more compute- and data-intense tasks like AI burst into the mainstream, air-cooled systems will reach their limits. This is where large-scale liquid-cooled systems come into play.

Water has more than four times the cooling capacity when compared to air, outperforms air at heat transfer conductivity by 25 times, and removing excess heat with water requires 50 times less energy than with air.

At the heart of the liquid-cooled system is the brazed plate heat exchanger, also known as BPHE. This compact device can be used in multiple cooling circuits within the data center, including in the coolant distribution unit (CDU), in the chiller and as a loop breaker between the cooling tower and the chiller or the CDU. When used as a loop breaker, the BPHE creates two closed circuits that reduce the risk of contaminants from external water supplies. The CDU can be used together with several different cooling systems for example Cold Plate or Immersion System, depending on your cooling needs.

Unwanted heat from the data center can easily be recovered and reused in a liquid cooled system by using a brazed plate heat exchanger. Temperatures around 30°C can easily be recovered but a heat pump can further raise the temperature, up to 90°C, for use in district heating systems. This is especially important in areas with increasing regulations for sustainability standards.

As data center power density needs are growing, air-cooled systems are reaching their limits. Liquid cooled systems with SWEP brazed plate heat exchangers are the next step in efficient and sustainable data center cooling.

To learn more about our brazed plate heat exchangers and how liquid cooling can give your data center project a competitive edge, visit Liquid is the future of cool - Data Center Cooling
If you'd like to talk to one of our experts about SWEP brazed plate heat exchangers, you can also send us a message at SWEP Contacts.

About SWEP

SWEP has been designing and developing brazed plate heat exchangers for over 40 years, and produces and sells more than 4.3 million BPHEs annually. Key areas include data center cooling, heat recovery, district energy and air conditioning among others. Visit SWEP at **www.swep.net**