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ISSUE I 2023

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Power: The ongoing challenge

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Editor's View

By Phil Alsop Editor

Sustainability – it's decision time!

THE MAJORITY of our daily activities, whether at home or in the office (wherever that might be!), are, strictly speaking, unsustainable. Unsustainable in the sense that somewhere along the way there will be the consumption of some raw materials or natural resources which cannot be replaced. For example, there are only so any minerals and elements in the ground. Wind turbines and solar panels might well provide us with sustainable, renewable energy, but what about the materials of which these items are constructed?

Once one understands and accepts this unsustainability, the question for each individual and corporation is to what extent are we prepared to compromise, or not, our current lifestyles/approaches to business in order to move towards more sustainable solutions?

At one extreme, we have those who continue to deny the growing evidence of climate change and the volatile weather conditions it brings with it, and maintain that it should be business and life as usual. At the other, are those who would, it seems, take us back to a more innocent time, with consumption of any resource (and one which must be renewable) kept to an absolute minimum. Somewhere between the two are what I suspect is the vast majority of us, wrestling with decisions as to what is or isn't acceptable in terms of the compromises we might make in our personal and professional lives.

This column isn't about to offer any startling solutions or even advice as to how we can all embrace sustainability (should we wish to do so), rather highlight the fact that, where politics has, for hundreds of years, largely revolved around the idea of right, centre and left wing views, it will increasingly be seen in terms of government and people's attitudes to sustainability. While it might be easy to characterise the climate deniers as to the right of the political spectrum and the environmentalists to the left, there is growing evidence that sustainability does transcend traditional political boundaries.

What has all this to do with the data centre industry? Well, depending on the where and the how of your data centre activities, you will, or will not be required to make some fairly major changes over the coming years. Today's largely voluntary work towards sustainability will be increasingly overtaken by government legislation. In some countries this might require a radical re-think of even the data centre basics. In others, the new rules will pay little more than lip service to the idea of sustainability and it will be, largely, business as usual.

Good luck with making the decision as to which side of the argument you and your business want to be!

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Datacentre Solutions is published 4 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. © Copyright 2023. All rights reserved. Contents may not be reproduced in whole or part without the written consent of the publishers. The paper used within this magazine is produced by chain of custody certified manufacturers, guaranteeing sustainable sourcing. ISSN 2756-1143 (Online)

84% of organisations prioritise commercial success over sustainability

But being sustainable is good business: 97% of businesses agree that sustainability credentials are either essential or important in their buying decisions.

SOFTWARE AG has published the results of a new global survey of over 2,000 senior IT decision-makers from the U.S., Canada, U.K., Germany and France. It finds that the majority (84%) of organisations will prioritise commercial objectives over sustainability in the face of economic challenges. This is despite the fact that almost all (95%) leaders agree sustainability is either a top or high priority and a similar number (97%) agree that other firms' sustainability credentials are either essential or important in their own buying decisions.

The annual Reality Check reports seeks to investigate how technology initiatives can benefit both sustainability and commercial objectives.Despite the difficulties of delivering sustainability initiatives, 87% of companies believe that they will lose investors if they don't have a clear strategy and many lack the technology to deliver one. In almost a third (32%) of cases the necessary technology is simply not in place. And even when it is available, it is poorly implemented or used by almost half (47%) of companies. In particular, 36% say that they are unable to effectively track the progress of sustainability initiatives to determine whether they are effective.

The majority (87%) of organisations tackle sustainability and digital transformation separately. The Reality Check report shows how an integrated approach can address multiple challenges at once. Promisingly, a third (33%) of organisations have already integrated sustainability plans into their technology roadmap. Sanjay Brahmawar, CEO, Software AG commented: "In the current climate, it's no surprise that commercial objectives are a top priority – they have to be otherwise organisations cannot continue to operate. We are keen to help organisations to find solutions using the 'Genius of AND', where they don't have to be torn between commercial and sustainability objectives. The right application of mission critical technologies can make enterprises more connected. When this happens, and data is free to move around it and be accessible to everyone who needs it, we will start to see progress in multiple areas at once." Technology-enabled sustainability Digital transformation is a priority for organisations. In fact, more than two thirds (69%) of CEOs even plan to divert resources from other areas into their digital transformation efforts.

According to business leaders, the technologies that have the most positive impact on sustainability are cloud (45%), data integration (28%) and edge computing (27%). Together, they enable organisations to gain visibility of their environmental impact and therefore reduce emissions and waste as well as costs and process inefficiencies. Improvements in these areas will also yield commercial benefits. For example, API-enabled, hybrid cloud environments enable more efficiencies and innovative new services for customers. Meanwhile, data integration helps organisations to combine multiple data streams to inform advanced analytics and decision-making. Edge computing delivers visibility across expansive operations via Internet of Things (IoT) sensors and devices capable of making decisions about the data they capture.

Alongside these benefits, there are also costs to inaction. In fact, 82% of companies candidly admit that they would accept regulatory penalties to avoid taking on sustainability initiatives. This is likely because of the cost and difficulty of delivering such projects. However, beyond the cost of non-compliance, the majority (84%) believe that without a clear sustainability strategy they are also likely to lose staff. This risk is real, as 82% of companies acknowledge that employees don't have clear sustainability targets, incentives or reporting of the kind they have with commercial initiatives.

The liability of legacy

Concerns around recent global events and the subsequent inflationary pressure on power, materials and labour costs are not, as yet, adversely affecting growth in the data centre sector which continues to remain buoyant.

THIS IS according to the latest independent industry survey, which captures the views of over 3000 senior datacentre professionals across Europe, including owners, operators, developers, consultants and end users.

“The European economic outlook remains surrounded by an exceptional degree of uncertainty as Russia’s war of aggression against Ukraine continues and the potential for further economic disruptions is far from exhausted. Yet against this backdrop our respondents are confident with a 100% agreement that demand will either grow or remain the same in the coming 12 months,” explains Jim Hart, CEO at BCS who commissioned the report which is now in its fourteenth year.

However, with further rising inflationary pressures forecast, 85% of respondents stated that they expect to have to raise prices to cover costs. This is in part due to adverse developments on the gas market, the risk of shortages and the impact on energy costs, especially in the winter of 2023-24. In addition, 82% of our respondents agreed that the current pressures will increase the demand for power efficient data space over the next three years which represents a significant uplift on the two thirds that expressed this same opinion 12 months ago.

The survey suggests that this will certainly be the approach for new developments moving forward and will accelerate the uptake of alternative power sources and ever more efficient design solutions.

Our survey participants continue to illustrate that commitment with over four-fifths once again agreeing that they expect the sourcing of power for data centres to be at least 90% from renewable sources by 2032.

However, the issue of legacy data centres remains key as they are still consuming huge amounts of energy at far greater PUE’s than their modern and future counterparts. In response almost two-thirds of those surveyed agreed that retrofitting of existing facilities to enable them to adopt or enhance renewable energy power sources is something that they would be prepared to consider as they look to meet regulatory requirements around net zero targets.

“The pursuit of green, renewable energy continues with the sector having committed to ambitious targets. The challenges are most complex for the stock of data centres spread throughout Europe around 60% of which are in excess of eighteen years old but remain vital to enabling the sector to meet demand. At BCS we are addressing these legacy challenges for a number of our clients and have seen significant improvements to sustainability delivered as part of a general refreshment of assets that are often beyond their economic life as we look to renew, re-use, refresh and repeat rather than rebuild. This action will ensure that legacy is no longer a liability,” concludes Jim.

Businesses will finally start actioning sustainability commitments in 2023

The energy crunch, sustainability strategies and lack of skills are the major IT forces and trends organisations should prepare for in the year ahead say Telehouse Europe.

GLOBAL COLOCATION PROVIDER, Telehouse International Corporation of Europe, has unveiled the top six trends it expects will shape the world of IT infrastructure in 2023. The predictions have been informed by the latest insights from industry experts and recent Telehouse research.

Telehouse anticipates that the countdown towards ambitious net-zero targets at the end of the decade will spur greater action on IT sustainability throughout 2023. These pressures could lead to more organisations outsourcing their IT infrastructure to support flexible working, fill skills gaps, and realise cost and efficiency savings – especially as the energy crisis deepens.

The latest predictions come at the close of a year marked by external shocks, including geopolitical and economic turbulence. At the same time, post-pandemic workplace trends continue to shape IT infrastructure, with cloud connectivity, colocation, and artificial intelligence (AI) also set to dominate 2023.

1. Sustainability: businesses will start turning commitments into action
As the clock ticks relentlessly towards the net-zero targets of 2030 and 2050, many businesses are realising the limitations of their current approaches to sustainable IT. Worryingly, a recent Telehouse survey of IT decision-makers in the UK found that over a third (34%) of organisations have not yet made any progress on their sustainability goals or have not even defined them.

This is likely to change in 2023, with mounting customer and regulatory demands making it essential for businesses to take responsibility for all their IT operations – from manufacturing processes to the Scope 3 supply chain emissions that are outside a company's immediate control.

2. Energy pricing pressures will fuel IT cost efficiencies

With the price of energy reaching unprecedented highs, many organisations will see their IT spend continue to rise next year. However, while budgets might be able to absorb these extra costs in the short term, it is not a sustainable financial option for most businesses.

Decision-makers will therefore start to look towards other means of ensuring a reliable, secure energy supply and energy reduction schemes to minimise the impacts on operational costs to ensure current and future productivity.

3. Flexible working will drive data demand

As organisations continue to adapt to a flexible 'new normal' of work, managing ever-increasing volumes of real-time data will be a key challenge for IT managers in 2023.

More and more businesses will turn to cloud connectivity to provide the agility and scalability needed to meet employee demands for reliable, any-time, any-place, any-device access to the data they need.

4. AI and robotics will become commonplace

The benefits of automation have become clear over recent years, making sensationalist headlines about robots "stealing" people's jobs ring increasingly hollow. As a result, growing numbers of businesses will leverage AI and robotics in 2023 and beyond, recognising its potential to free up human employees for more rewarding tasks, augment their skills, and unlock the power of intelligent decision-making by ensuring a continuous flow of accurate, high-quality data.

5. Smart outsourcing will plug IT skills gaps

With the IT skills gap set to continue through 2023 and beyond, organisations will need to embrace more innovative ways of attracting, developing, and retaining new talent. At the same time, more businesses will outsource their IT infrastructure to a trusted provider, leaning on the knowledge, experience, and expertise of colocation data centre operators.

This will help fill IT skills gaps in-house, whilst also providing greater levels of resilience, uptime, and cost efficiency during the challenging years ahead.

6. Connectivity will be king

In 2023, organisations will leverage connected ecosystems to support the growth and resilience of their IT infrastructure. By integrating on-premises, colocation, cloud, and edge delivery options, they can extend network reach while improving performance and reducing latency and costs. Telehouse recently found that 28% of IT decision-makers prioritise connectivity when picking a data centre provider – a figure that is only set to increase as more businesses realise the benefits of having the right connections.

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- Successfully adoption of Zero trust architecture (ZTA)
- Emerging advances in AI, automation and XaaS
- The state of cloud adoption, and hybrid and edge computing
- Hybrid and remote working best practice
- Addressing the growing cyber security skills gap
- Participation with local business community leadership organisations

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Data centre physical infrastructure accelerates to 11 percent growth in 3Q 2022

According to a recently published report from Dell'Oro Group, Data Center Physical Infrastructure (DCPI) revenues grew 11 percent year-over-year in 3Q 2022, primarily by average selling price increases and slight improvement in unit shipments.

SUPPLY CHAIN disruptions are beginning to ease, but electronic component shortages are expected to linger into the first half of 2023 leading to the golden screw phenomenon for DCPI manufacturers. Orders for DCPI remained strong in 3Q 2022, outpacing sales and pushing already historically high vendor backlogs to new highs at the end of the quarter.

"Growth continues to accelerate for the DCPI market as vendors work through backlogs with increasing price realization," said Lucas Beran, Principal Analyst at Dell'Oro Group.

"Furthermore, demand remains incredibly strong for DCPI, with orders outpacing sales and driving vendor backlogs to new record high yet again. This historic industry backlog is critically important for the 2023 market outlook, as the majority of it will be delivered in the first half of 2023, supporting continued market growth. However, growing macroeconomic uncertainty is expected to moderate DCPI growth for the enterprise market segment in 2023, but have a limited impact on cloud and colocation service providers."

Additional highlights from the 3Q 2022 Data Center Physical Infrastructure Quarterly Report:

- Vertiv, Huawei, and Delta were the three vendors who gained the most revenue share in 3Q 2022.
- North America, Asia Pacific (excluding China), and China were the fastest growing regions, at double-digit growth rates, in 3Q 2022. The Caribbean and Latin American (CALA) grew at mid-single-digits and Europe, the Middle East and Africa (EMEA) low single-digits.
- Product growth was broad-based; rack power distribution, thermal management, IT racks and containment, and UPS grew at double-digit rates, while cabinet power distribution and busway, and software and services grew at slightly lower rates.
- Worldwide DCPI revenue growth is forecast to accelerate to 12 percent in Q4 2022, driven by double-digit cloud and colocation service provider growth and mid-single-digit enterprise growth.

Cost and fragmented data emerge as top barriers to reducing carbon footprint

And only 38% business leaders rate their decarbonisation efforts so far as very successful.

COLEMAN PARKES RESEARCH has published a new report that seeks to answer the question "How are companies and business leaders managing their decarbonisation efforts to reach net zero in Europe by 2050?".

Commissioned by Atos and Amazon Web Services (AWS), Coleman Parkes Research surveyed 4,000 business people across three sectors, energy and utilities, financial services, and manufacturing, in four major European countries, France, Germany, Spain and the United Kingdom.

Against the backdrop of the Paris Agreement goals and the broader recognition to drive sustainable and digital transition towards an increasingly low-carbon society, almost all organisations surveyed (96%) have set emissions reduction targets. With this being merely the first step in a long journey, businesses across different sectors are facing diverse challenges in properly tracking their carbon footprint and delivering the necessary solutions to meet these targets.

The report suggests that while three in four business leaders believe that cloud technology would accelerate their companies' journey to net zero by two years or more, there was still a fifth of the organisations who were yet to go cloud-first and thereby benefit from a reduced carbon footprint. Only 38% of business leaders surveyed rated their decarbonisation efforts to date as very successful.

Overcoming Fragmented Data

Among the key obstacles to businesses' decarbonisation journeys were the impact that rising costs and economic uncertainty were having on their budgets, as well as the fragmentation

Robust data can be harnessed to provide deeper insights into a business' environmental impact and to drive cost reduction, streamline operations and manage decarbonisation. In this study, over half of businesses cite 'accurate and reliable data' as one of the top three elements that they would find most helpful in the implementation of their carbon reduction plans.

Target Setting v. Performance Measurement Gap

Only just over half are measuring emissions scopes 1 (covering direct emissions from owned or controlled sources) and 2 (covering indirect emissions from the generation of purchased electricity, steam, heating and cooling consumed by the reporting company).

Less than a tenth cover scope 3 (which includes all other indirect emissions that occur in a company's value chain), and just 14% are setting targets validated by the Science Based Targets initiative for all three emissions scopes. Slightly at odds with these findings was the confidence among business leaders in their ability to control GHG emissions: 75% reported being confident of achieving their carbon reduction targets.

The Role of Technology

Among the countries in scope, UK and Spanish businesses are slightly ahead of the average in their decarbonisation initiatives; their investment in the cloud is one of the key solutions in achieving carbon measurement and reduction.

Among a proportion of French and German businesses, more needs to be done in helping them to understand the real value that cloud can bring in the long term.

Almost a third of businesses surveyed said their technology solutions could be improved, and one in five said they lack the appropriate technology to see through their plans. 75% of business leaders admitted that their environmental impact reporting would be improved by an emissions measurement tool.

Fujitsu research reveals gap between perception of 'Sustainability Transformation' preparedness and reality

61% of organizations claim to be advanced on their sustainability journeys, but in fact, less than one in 10 have completed major sustainability imperatives.

FUJITSU has published the results of new research commissioned by Fujitsu, carried out by FT Longitude, the specialist research and content marketing division of the Financial Times Group, indicating that sustainability impact is the number one priority for organizations surveyed, and that they are aiming to improve on the three pillars of Sustainability Transformation (SX): environmental, economic and societal.

The research shows, however, that few organizations have in fact completed important Sustainability Transformation initiatives, suggesting that many of them have not come as far as they think, despite the importance they believe sustainability holds for the future.

For example, only 26% of the organizations surveyed have implemented health and wellbeing initiatives for employees, and only 12% are using or creating carbon-neutral products.

The report identifies that more than two-thirds (68%) of organizations say that Sustainability Transformation will not be a success without significant investments in technology. When asked about the support they needed to achieve their Sustainability Transformation, 42% said that they need help with transforming existing/legacy technology.

Key findings:

The sustainability gap

While 61% of organizations believe that they have made substantial progress on their advanced sustainability journeys, less than one in ten have completed major sustainability imperatives such as developing sustainable supply chains (9%), achieving net zero status (2%) and preparing for environmental emergencies (7%).

Organizations need support with their technology transformation

The research shows that organizations are investing in modern technology, recognizing that this represents a fundamental step in supporting many Sustainability Transformation initiatives.

However, the report identifies that getting help with transforming existing/legacy technology is one of the main concerns for organizations seeking to make progress with Sustainability Transformation.

The Changemakers

A small group of leading organizations was identified, the Changemakers. This group accounts for the 6% of organizations that are leaders in sustainability and technology. This group has made substantial progress on their sustainability goals, by powering their efforts with innovative technology. They lead the way on both sustainability imperatives and technology transformation.

Technology is key for a successful Sustainability Transformation journey

Being successful at Sustainability Transformation requires companies to be both sustainable and tech savvy.

If organizations want to succeed in their Sustainability Transformation plans, focusing only on sustainability isn't enough. Technology plays a key role for this to happen.

Fujitsu View

The research findings show that execution is the key to Sustainability Transformation. Intent and motivation is already present, but organizations need support to overcome the barriers to achieving their goals.

Fujitsu can help customers to do this, by taking an issue-driven approach and applying technology and innovation to deliver business and social impact.

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Top 10 predictions for the future of digital infrastructure

International Data Corporation's (IDC) highlights key, impactful trends for the future of digital infrastructure and its top 10 predictions for the next five years.

DIGITAL BUSINESSES depend on digital infrastructure – compute and data management horsepower; network connectivity; operational support; and management – to power business applications, analytics, and activities.

IDC's Future of Digital Infrastructure framework provides a model for understanding how a successful digital-first strategy is built on critical digital infrastructure investments across dedicated on-premises datacenters, edge locations, and public cloud resources. Digital infrastructure spans compute, storage, network, infrastructure software (including virtualization and containers) and the automation, AI/ML analytics, and security software and cloud services needed to maintain and optimize legacy and modern applications and data. Ecosystem partners, including systems integrators and channel partners, are also important contributors.

Organizations that optimize hybrid and multicloud digital infrastructure environments consistently realize higher levels of operational resiliency, security, revenue growth, and overall productivity at scale.

"Digital infrastructure provides the underpinning for digital business agility and innovation," explains Mary Johnston Turner, research vice president, Future of Digital Infrastructure.

"IDC's 2023 predictions for the future of digital infrastructure identify critical shifts in governance, operations, architecture, and sourcing that need to be factored into enterprise digital transformation strategies going forward."

IDC's top 10 predictions for the Future of Digital Infrastructure are:

Prediction 1: By 2026, 65% of tech buyers will prioritize as-a-service consumption models for infrastructure purchases to help restrain IT spending growth and fill ITOps talent gaps.

Prediction 2: By 2026, 65% of IT organizations will only purchase infrastructure solutions that incorporate predictive cyber-resiliency mechanisms proven to reduce post-cyberintrusion recovery efforts.

Prediction 3: By 2027, AI-enabled automation will ensure consistent digital infrastructure configuration, performance, cost, and security by reducing the need for human operations intervention by 70% and improving SLOs.

Prediction 4: By 2023, amid ongoing IT supply chain disruptions, 80% of G5000 infrastructure customers will adopt proactive multisourcing strategies to protect themselves against future IT supply risks.

Prediction 5: By 2024, 40% of digital business apps will depend on contractually guaranteed cross-provider data transfer and operational/financial data sharing agreements between public clouds and on-prem tech partners.

Prediction 6: By 2026, 95% of companies will invest in fit-for-purpose, heterogeneous compute technologies that deliver faster insights from complex data sets to drive differentiated business outcomes.

Prediction 7: By 2025, 70% of the G2000 will prioritize the trusted infrastructure of sovereign clouds to ensure consistent security and local/regional regulatory compliance for specific sensitive workloads and data.

Prediction 8: By 2025, to ensure data and workflow integrations spanning distributed clouds and edge environments, 50% of enterprises will deploy multicloud networking, bringing consistency and simplicity to NetOps.

Prediction 9: By 2027, the need for faster, higher-quality data-driven decisions will cause 80% of G2000 CIOs to mandate companywide data logistics strategies for data management, protection, and integration.

Prediction 10: By 2024, due to economic pressures, 50% of G2000 will prioritize infrastructure vendor selections based on tech partner ecosystems that offer cost savings provided by preferred pricing and support deals.

DX initiatives keep European server market afloat

Despite concerns about the general economic and geopolitical climate, the European server market continued posting strong growth in the third quarter of 2022 according to the Worldwide Quarterly Server Tracker published by International Data Corporation (IDC).

The server market in Western Europe (WE) grew year on year by 27.9% in Q3 2022, while spending in Central and Eastern Europe (CEE) increased by 40.7% (Russia not included in the CEE market). There are a number of factors driving investments into digital among European organizations. Some emerged as a result of the pandemic and include labor shortages, global supply chain disruptions, and component shortages. More recently, inflationary pressures and power costs and supply disruptions in Europe have been drivers of spending. In the longer-term, EU green-focused financing and investments will also lead to switching from old and inefficient infrastructure for newer systems that can deliver much more performance for less energy.

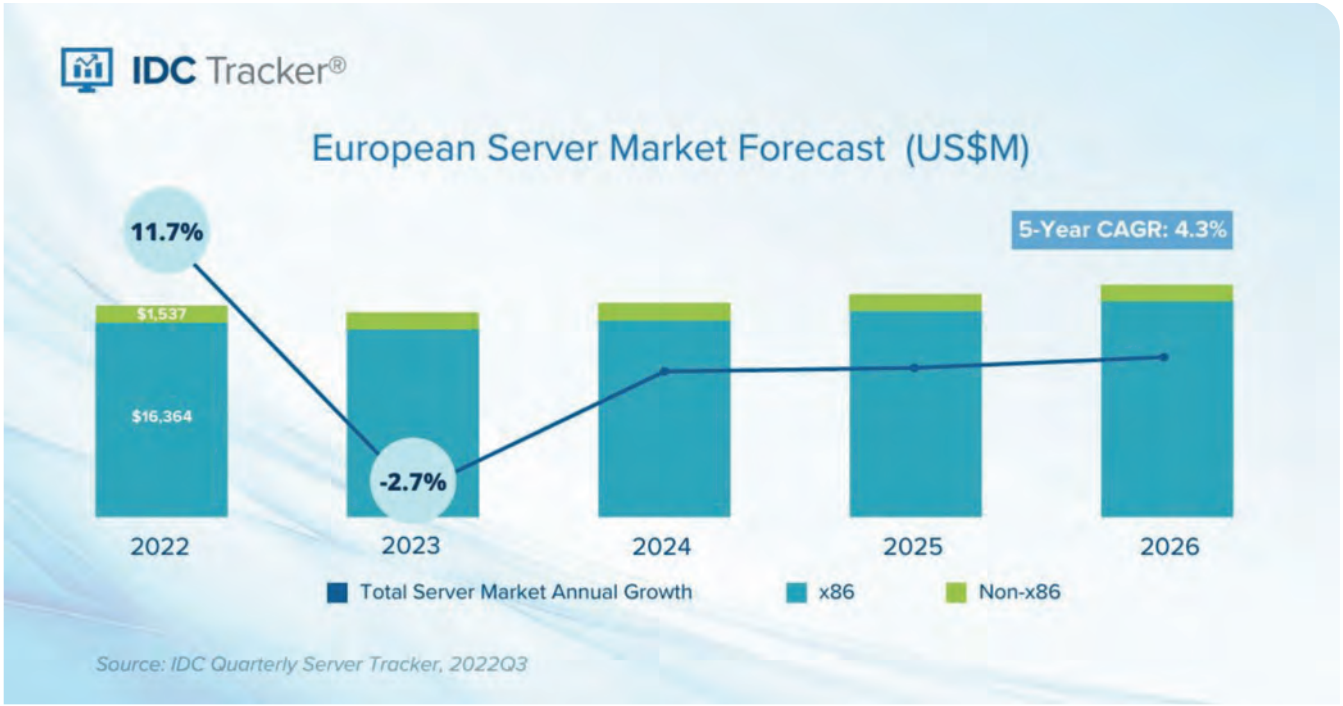
“Backlog release and digital transformation initiatives were the two major drivers behind the strong growth of the European server market in the third quarter,” says IDC’s Pavel Roland. “Supply chain constraints are easing, and server manufactures are able to build and meet customer demand more predictably. We see a significant backlog in the market, so demand will remain robust for the upcoming few quarters, and the backlog should normalize after that.”

Initiatives such as digital transformation and modernization of datacenter infrastructure continue to be significant drivers of spending among enterprises. Despite the overall general economic pressure, many organizations will invest in servers and other infrastructure technology to support their business growth, meet sustainability commitments, and increase energy efficiency in their datacenters. Currently, cloud service providers and key verticals as retail, automotive, and oil & gas are leading in terms of investments into servers and datacenter infrastructure in Europe.

The war between Russia and Ukraine continues to impact the market directly and indirectly. In the most direct way, system sales in Russia and Ukraine contacted in Q3 2022. Indirectly, the war exacerbated already rising energy prices and transportation costs, with a ripple effect on the IT industry, especially in regions that historically relied heavily on energy from Russia.

Although all major vendors have stopped business operations (sales and service) in Russia, new routes to other markets are being established, and small quantities of servers and other infrastructure tech are being imported into the country. However, supply is very tight and limited to less advanced products/configurations, so enterprises will be focusing on how to best utilize the platforms they already have.

European server market spending is expected to contract in 2023, posting a five-year compound annual growth rate (CAGR) of 4.3%, according to IDC. The macroeconomic environment will continue to be a key factor for market performance in the short term. In the longer term, continuous investments in infrastructure modernization, fast-growing workloads like AI/ML, and cloud and edge deployments will drive growth.



The top trends impacting infrastructure and operations for 2023

Gartner, Inc. has highlighted the six trends that will have significant impact on infrastructure and operations (I&O) over the next 12 to 18 months.

"THE CHANGES that I&O teams face are shifting views of how to purchase, deploy, and manage technology solutions for optimal business results," said Jeffrey Hewitt, research vice president at Gartner. "Furthermore, the rapid increase in solution complexity and deployment scenarios is challenging I&O leaders to approach skills, roles and career path management from a different perspective."

Here are the top trends impacting I&O in 2023:

Trend No. 1: Secure Access Service Edge (SASE)
SASE is a single-vendor product that is sold as an integrative service which enables digital transformation. This trend connects and secures users, devices, and locations as they work to access applications from anywhere. Gartner forecasts that total worldwide end-user spending on SASE will reach $9.2 billion in 2023, a 39% increase from 2022.

"Hybrid work and the relentless shift to cloud computing has accelerated SASE adoption," said Hewitt. "SASE allows users to connect to applications in a secure fashion and improves the efficiency of management. I&O teams implementing SASE should prioritize single-vendor solutions and an integrated approach."

Trend No. 2: Sustainable Technology
Sustainable technology encompasses sustainable IT within the context of a tech-enabled enterprise and customer sustainability. This trend involves four key aspects: environmental, social, governance (ESG) and economic. With a recent Gartner survey revealing that 87% of business leaders expect to increase their organization's investment in sustainability over the next two years, I&O must embrace sustainable technology to support organization-wide ESG goals."I&O has an opportunity to be a key part of enterprise sustainability efforts," said Hewitt. "From improving the sustainability of data centers and the cloud to embracing the IT circular economy for devices, I&O can promote sustainable technology by improving efficiency and performance of infrastructure assets."

Trend No. 3: Platform Engineering
Platform engineering is the unity of management tools and various components of infrastructure technologies such as application resource management (ARM), application performance monitoring (APM), digital experience monitoring (DEM), and digital platform conductor (DPC) tools. This trend enables user-driven, self-service infrastructure and deployments that extend the

principle of continuous integration and delivery, furthering I&O agility, speed, efficiency, safety, and compliance. I&O can embrace platform engineering by determining what skills and competency gaps exist within I&O organizations and creating a plan to fill those gaps. Adopting practices such as automation can enable self-serviceability.

Trend No. 4: Wireless Value Innovation
I&O can leverage multiple wireless technologies to extend business disruption opportunities beyond connectivity. Overlaps between various technologies including Wi-Fi, 5G, Bluetooth and high frequency (HF) facilitates connectivity solutions and creates innovation opportunities.

"Wireless value innovation creates a scalable return on wireless investment and makes networks a strategic innovation platform," said Hewitt. "However, there is significant complexity at play and several new skills that are required to achieve this innovation, such as wireless integration capabilities and wireless tracking implementation experience."

Trend No. 5: Industry Cloud Platforms
Public cloud is not one-size-fits-all. Industry clouds are an alternative to enterprises purchasing a variety of cloud offerings, as they provide a pre-integrated solution that coincides with specific vertical market needs. Industry cloud platforms are a combination of traditional cloud services with tailored, industry-specific functionality. Organizations looking to accelerate time to value, leverage composability to build differentiating digital products and services and benefit from cross-industry innovations are turning to these solutions. Gartner predicts that by 2027, more than 50% of enterprises will use industry cloud platforms to accelerate their business initiatives.

Trend No. 6: Heated Skills Competition
As digital implementation continues to grow, there is a greater demand for a wide variety of skills within I&O organizations. Yet, there is a limited talent pool available for high-demand skills, including expertise in cloud, automation, and advanced analytics. Simultaneously, some organizations are creating I&O positions within business units, which increases internal competition for skills.

"While competition for new skills creates more career opportunities for I&O leaders, it can also cause talent gaps within an organization to be more costly to fill and can create challenges retaining employees," said Hewitt.

"I&O leaders must become more sophisticated in their thinking around the value proposition of their teams. Consider tools to identify upcoming skills requirements and new training approaches to enrich the skills of existing employees, to reduce the risk of them moving to other business units or competitors."

Power: The ongoing challenge

While the growing global demand for IT services presents major opportunities for the data centre industry, it also presents a significant challenge – the need to source a sufficiency of power required to meet this ongoing expansion.

BY REES WESTLEY, HEAD OF UTILITIES AT BCS

IN OUR LATEST SURVEY, the BCS Summer Report, which showcases the views and insights of over 3,000 senior industry professionals, once again power – accessibility, cost and sustainability were headline concerns as our respondents felt strongly demand for power in the sector will continue to grow. Around 84% of respondents reported that they expect their power consumption levels to rise over the next three years, a rise from 76% recorded in Q4 2021 and 73% a year ago.

The European Market Differences

As a European wide survey, our respondents operate across multiple countries with different infrastructures for sources of power delivered over their respective national grids. As is to be expected, European nations have a variety of diverse policies driven by numerous and complex geopolitical factors that have dictated the history of power resourcing and are changing the future landscape.

Germany, the sixth largest consumer of energy in the world and the largest national market of electricity in Europe, has reduced its reliance on coal power substantially in recent years. In 2013, coal made up about 45% of the country's electricity production down to around 24% in 2020

For example, Germany, the sixth largest consumer of energy in the world and the largest national market of electricity in Europe, has reduced its reliance on coal power substantially in recent years. In 2013, coal made up about 45% of the country's electricity production down to around 24% in 2020. In addition, the country has an ongoing plan to shut down its nuclear power plants. At the time of writing three nuclear power plants remain active – down from 17 in 2011 – and the remaining three are scheduled for decommissioning at the end of this year. To replace these resources, Germany has had an active policy to promote various renewable energy generation initiatives and the government has set the goal of meeting 80% of the country's energy demands from alternative energy by 2050.

In contrast, in France the approach to nuclear power is very different to its neighbour, as it is responsible for some 70% of total electricity production. Meanwhile, in Spain wind power overtook nuclear power as the leading source of electricity, and in Denmark, bioenergy (energy stored in organic material or biomass) has recently overtaken wind energy as the most widely used renewable energy source.

The recent invasion of Ukraine and subsequent economic sanctions against Russia has undoubtedly helped to accelerate the focus on renewable sources across Europe. In 2021 Russia was the largest exporter of oil and natural gas to the European Union, accounting for about a quarter of the oil EU countries import and 40% of natural gas consumed.

Cost will drive efficiency

The vast majority are however in agreement that the rising costs of power will continue which will help drive energy efficiency in the sector moving forward. Around 27% of our respondents' data centre portfolio is powered only from a mix of renewable sources including solar, hydroelectric/ tidal and wind farms/turbines, an encouraging increase from 21% recorded in our last survey. Nuclear power was used in a least part of their portfolio by around 25%, down from the 30% recorded at the last survey. There has been almost universal agreement amongst our survey participants that they expect to see a rise in the proportion of power used from renewable sources which will service their data centre facilities. 84% agreed to this in our latest survey; a rise on the 79% six months earlier.

Promising Progress

The direction of travel in terms of utilisation off gas or coal power in our respondents' facilities is also encouraging - around 45% of our respondents utilise some degree of gas or coal power in their facilities, down from 48% six months ago and 53% a year ago. This proportion declines to around 28% over the next five-year period. In addition, nuclear power is expected to remain as a source of power by around 29% of respondents on at least part of their portfolio in five years' time.

Conclusion

In conclusion, whilst the growing global demand for IT services presents major opportunities for the data centre industry, it also presents a significant challenge – the need to source a sufficiency of power required to meet this ongoing expansion. This must be achieved against a background of environmental commitments to ensure clean and renewable energy use across data centre estates, driving down the carbon footprint of the industry.

At BCS Utilities we are helping a range of international clients to implement strategies across a suite of project utility requirements including power, water, gas, drainage, telecoms, and district heating. Our highly qualified and experienced team of consultants provide consideration of all technical, regulatory, and commercial elements associated with utility procurement and delivery on a project. These inhouse specialisms ensure efficiencies are driven through the pre-construction and construction stages and throughout the operational life of the assets.

Data centre evolution in 2023

Efficiency is the name of the game

BY JOHN SCHMIDT, SENIOR VICE PRESIDENT, BUILDING & DATA CENTRE CONNECTIVITY, COMMSCOPE

THE LAST FEW YEARS have introduced unprecedented business conditions for every industry, but among the most heavily affected are cloud-based services that are run by the global network of data centres. The business model has changed to accept new realities and fulfil new obligations - and extrapolating this recent history into the near future is an uncertain exercise at best.

Nevertheless, it is of vital interest that we do gain as clear a perspective as possible - because more of the world depends on cloud services, and by extension, data centre operations than ever before. If there's one thing we know the future holds, it's that our dependence on them is going to increase.

An unprecedented one-two-three punch

The challenge is that over recent years the baseline has continued to move. First, the world was rocked by global COVID-19 lockdowns and the overnight reality of hundreds of millions of people working and learning from home. This shift threw immense pressure onto data centres to handle high-bandwidth video and other cloud-based applications over a much more widely distributed area.

Then came the worldwide supply chain disruptions and labour shortages, making it hard for data centres to build out additional capacity because they couldn't find critical components or the skilled people to install and run them.

And most recently, global inflation and spiking energy prices, exacerbated by the conflict in Ukraine, have forced companies and nations alike to further rearrange their supply chains and make adjustments to continue operating persistently elevated energy costs.

Note that these are just world events that aren't even exclusive to the business of data centres. In addition, the growing social and commercial role of back-end data centre processing and storage has presented just as many challenges.

Low-latency 5G is unlocking the bandwidth - and just as important, the low latency - that many of these new and amazing applications require to work

Doing more, in more places, with less margin for error

Consider all the new applications that rely on capable, reliable data center support to operate. For instance, there is the mobile app ordering at your local restaurant, the high-speed robots in a warehouse picking your online order just minutes after you hit "Check Out" and even the driving assist-equipped vehicle in the next lane. The speed and volume of data being generated, processed and transported by these applications and countless others is growing exponentially. The world cannot afford downtime, no matter if the consequence is a delayed lunch order or compromising the full efficacy of a 5G-connected driving-assist system. Low-latency 5G is unlocking the bandwidth - and just as important, the low latency - that many of these new and amazing applications require to work. All that gets piped to data centers, which are increasingly being moved to the edge of the network to shave those last few precious milliseconds off the response time reporter (RTR).

Energy efficiency will drive data center evolution in 2023

For all data center environments, efficiency is not so much a metric for profitability as it is a metric for survival. Whether a small to mid-sized multi-tenant data centre or a vast cloud or hyperscale deployment, the intense, simultaneous pressures of demand and expenses - particularly energy expenses - will determine its future. The bottom line is that data centers must increase the efficiency of their delivery of services, using fiber and edge-based infrastructure, as well as machine learning (ML) and artificial intelligence (AI). And at the same time, they must increase the efficiency of operations - and that means reducing energy use per unit of compute power.

Certainly, cost is the most obvious factor when weighing energy efficiency, but it's by no means the only one. Consider how customers and investors are growing more attuned to how their corporate partners source and use their electricity. Some progressive metropolitan areas are telling data centres that, in addition to concerns about data centres' appearance, noise and water use, their energy-hungry business is not wanted. And in some cases, the area lacks available electrical grid capacity to host them. Going into 2023, where we are dreading headlines from Europe and elsewhere about rolling blackouts and insufficient heating, both regulatory and social opinions will only tilt further away from data center developers. That is why it is so urgent that energy efficiency takes top priority and data centres make those critical upgrades, such as:

- Converting storage to the most efficient media, based on access time
- Use detailed analytics to identify storage, compute, and power consolidation opportunities
- Deploy ultra-efficient UPS systems
- Re-evaluate the thermal limits of the center itself
- Consider colocation to share electrical and communications overhead
- Accounting for stress on existing electrical grid and moving to more sustainable power, localised to the data center

On a more strategic level, moving data centers to the edge of the network, connected by high-speed fiber, can improve energy efficiency as well as latency. Also, consider locations where there is access to renewable energy sources like wind, solar, hydro and nuclear. For the largest cloud and hyperscale data centers, there is an opportunity to take advantage of localized power generation in various forms, to both power the data centre, and if excess power is generated, provide back to the grid.

Efficiency flows downstream

While many may never appreciate the broader social and commercial impact a data center has on the world, it's worth remembering how fast, robust data storage and processing can improve all of the most vital parts of our days – and indeed, our lives.

For instance, every day, the cloud-based services that data centres enable, help:

- Employees to connect with each other and work efficiently from their homes, office, or while traveling
- Farmers to plan, plant and harvest healthier crops while reducing wasted water and chemical applications
- Factories to build, stock, manage and ship products with robotic labor that prevents countless workplace accidents and injuries
- Ordinary people to create expressive user-created content that connects individuals across a school or around the planet in gaming, social media and the metaverse
- Service providers to stream all kinds of entertainment and information content to homes, laptops and mobile devices in a seamless mesh of connectivity

All of these examples, and countless others, demonstrate how much efficiency in our daily life depends on data centers - and that demonstrates how important energy efficiency will matter to those data centers in 2023 and beyond.

A progressive industry: Tackling data centre sustainability myths

It's only by working together that we will make the necessary steps to truly green the data centre industry for the long-term.

BY DAVID WATKINS, SOLUTIONS DIRECTOR, VIRTUS DATA CENTRES

JUDGING BY the main stream media headlines, you could be forgiven for thinking that it's been a bad few months for the data centre industry. The news that Thames Water is looking into the impact of data centres on water supplies was closely followed by a story on house building being halted due to purported data centre-related electricity capacity issues - and a very public spotlight was shone on the data centre industry and its sustainability.

Those working in the industry will know that both issues were sensationalised by the media, with limited investigation (or general education) as to whether data centres were actually the culprit for their accusations. The truth is that the data centre industry has long been committed to ensuring sustainability and efficiency, with providers working hard to use resources, including power and water, responsibly. As well as recognising this progress, it's important for the general public to understand that data centres are fundamental to the functioning of the economy and modern society – without them, businesses simply couldn't operate – but this is not widely understood beyond our industry.

So, what are the myths that need dispelling? And how are experts in the industry tackling sustainability issues and driving progress towards a greener future?

Myth 1: Cooling data centres reduces water supply for household use

One myth that needs to be dispelled is that data centres use enormous amounts of water to cool equipment and keep facilities working efficiently. It's true that more providers are turning to chilled water systems as an economical, effective and efficient way to maintain cooling. But importantly, the water used for cooling systems is often sourced sustainably, from bore holes or using impurified

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water: NOT the supply as we rely upon for household use. Indeed, Thames Water is already working closely with data centre providers to look at the possibility of using 'raw water' to cool their facilities entirely. What's more, the majority of large data centres use 'closed loop' chilled water systems, meaning that water is charged into the system during construction and then continually circulated within a facility, rather than needing new water consistently pumped into the building.

A large-scale data centre will be filled with around 360,000 litres of water initially, or the equivalent of a 25 metre local swimming pool. Given this water is used as a 'transport medium' for heat, rather than being consumed, and that the average life span of a data centre is upwards of 15 years, despite what the headlines say, this is an incredibly efficient use of water.

Another cooling solution is indirect evaporative cooling which does require water periodically for adiabatic functionality, but it is more energy efficient so provides other benefits. This type of cooling uses fresh air from outside the building, which is filtered and then delivered into the facility for cooling purposes. This only requires the use of fans, so the overall energy consumption is lower. As outside temperatures rise, firstly compressors are brought on-line to provide additional cooling and only at high temperatures (24C or higher) is water consumed.

Given that data centres operate 24x7, and temperatures above 24C typically only occur for a few hours a day across a small number of months per year in the UK, water usage is minimised. Today, adiabatic cooling makes up a relatively small percentage of the overall cooling infrastructure in the UK, but the sector is increasingly looking deliver this method more widely, using alternative water sources, without impacting mains supplies.

Immersion cooling systems is another technology that is gaining traction. This involves bespoke IT hardware, that is immersed in dielectric liquids. These liquids are much better thermal conductors than both air and water, and do not require as much supporting infrastructure to ensure the IT equipment stays at the right operating temperature. This is not suitable for standard IT equipment yet but is an option for higher density computing requirements.

Myth 2: Data centres cause electricity capacity issues

It's also true that the data centre industry requires significant power. But what the headlines fail to mention is that energy consumption is another area where significant environmental strides have already been made. The ability of data centre providers to make use of renewable energy sources has been game-changing in the industry's pursuit of a sustainable future. Power Purchase Agreements (PPAs) with renewable generation operators help to increase the availability of renewables and support the UK government's net zero commitment. Investment in PPA's delivers increased volumes of renewable energy to the grid, creates 'green' jobs and delivers cost certainty for operators and competitive pricing for customers that is not subject to energy market volatility.

Diesel powered generators continue to be the main source of standby energy for data centres, but research into alternative fuel sources is well underway. The use of Hydrogenated Vegetable Oil instead of diesel in generators has the potential to reduce carbon emissions by up to 90 per cent as well as eliminate sulphur dioxide emissions and reduce harmful nitrogen oxides, and there are number of these deployments already operational. Other approaches are also being implemented where diesel is in use, such as remapping engines to run more efficiently and the addition of air scrubbers on exhaust systems which can reduce hydrocarbons, cardon dioxide and particulate matter by up to 90 per cent.

Hydrogen fuel cells are another emerging technology for providing standby power, and while not yet scalable to the levels required by a large data centre, can be used tactically within new builds - for example to support the office areas. Of course, it's important to remember that generators are only used as a backup in the event of mains power being unavailable and we are fortunate in the UK to generally have a very stable mains grid. Allowing for limited start tests each month to ensure functionality, without a mains failure, generators will only run for approximately two hours per year.

Data centre investment is also leading to significant improvements to the national mains grid, with data centre operators often directly funding the additional resources required, such as substations, to deliver the required power. The industry also has a long-term planning strategy to ensure capacity is available, so future power is secured ahead of time to limit clashes with local requirements. Combined with investments in PPA projects, this is increasing the availability of renewables, reducing the use of fossils fuels and the need to 'import' energy sources aiding the UK's path to energy independence. As the demand for energy increases with the transition to electric vehicles, grid enhancement is essential.

A bright future Currently, many experts estimate that data storage and transmission to and from data centres use 1 per cent of global electricity. But this share has hardly changed since 2010, even though the number of internet users has doubled, and global internet traffic has increased 15-fold since. There's always more that can be done, and as well as celebrating progress we should be looking to the future, and to what we can do better. The key to future success? We believe that it's only by working together that we will make the necessary steps to truly green the data centre industry for the long-term.

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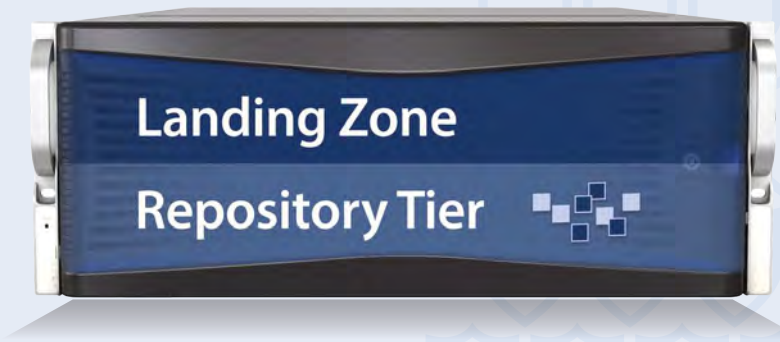

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Sustainability efforts for data centre operators: what next?

Energy efficiency and sustainability need to be even higher up the corporate agenda than they currently are.

BY TERRY STORRAR, MANAGING DIRECTOR, LEASEWEB UK

EVIDENCE of climate change is all around us. According to the Met Office, Britain experienced its hottest year on record in 2022, noting that human-induced climate change had made what would normally be a once-in-500-year event likely to happen every three or four years in future. It's not just the UK either. Europe experienced its second warmest year on record, while a new report by Copernicus - the EU's climate monitoring service - says 2022 was the fifth warmest year globally. If that wasn't enough, the last eight years have been the warmest eight ever recorded.

The figures are alarming to say the least, particularly in light of the UN 2022 climate report, warning that unless we reduce carbon emissions, global temperatures will soon surpass the 1.5°C danger threshold, leading to potentially devastating consequences around the world.

The tech industry is in the eye of the storm

Something must change, and the tech industry is firmly in the spotlight. While it may not be as bad an offender as heavy industry or oil & gas production, the tech industry is still responsible for between 5-10 percent of all greenhouse gas emissions across the globe, according to IDC Europe. What's more, these numbers will continue to rise as developing countries increasingly pursue their own technological advancement over the coming years. Fortunately, this is not lost on the tech industry.

A growing number of companies from across the sector are already taking steps to reduce their carbon footprints and greenhouse emissions. However, with a few notable exceptions, these efforts aren't yet sufficient to drive meaningful change. In short, energy efficiency and sustainability need to be even higher up the corporate agenda than they currently are.

The data centre energy conundrum

Data centre operators find themselves in a strange position when it comes to championing energy efficiency in the tech industry. On one hand, the vast amounts of energy that data centres consume make them one of the biggest contributors to the problem. On the other hand, many data centres lead the way in implementing powerful solutions like cloud computing, which are likely to play a key role in delivering solutions going forward.

Looking to the cloud for long-term sustainability

The business case for cloud computing is already well established, with many organisations using it

to achieve significant productivity and operational gains, but the environmental benefits it also brings are often overlooked.

Instead of having to manage their own energy intensive in-house infrastructure, companies can use cloud services to significantly reduce their consumption, leading to energy savings as high as 65% in some cases.

Of course, today's data centres aren't exactly known for their environmentally friendly credentials, and this isn't going to change overnight. Their large size and high energy usage are all part of the reason why they are expected to make up a third of the technology sector's global energy consumption by 2025.

However, the seeds of change have already been planted. Last year, a group of cloud and data centre operators in Europe signed the Climate Neutral Data Centre Pact, which commits them to become carbon neutral by 2030. To achieve this goal, they plan to use 100% renewable energy, improve water efficiency, reuse waste heat, and establish a circular economy for repairing and recycling servers.

Furthermore, IaaS providers everywhere are exploring new ways to achieve better environmental performance in the future, including:
Greater investment in virtualisation - Virtualisation can help minimise the environmental impact of customers using a data centre facility by allowing multiple systems and functions to run on the same server. This can also potentially reduce the need for on-site employees, allowing data centres to operate with less energy.

Replacing outdated equipment – As data centre equipment gets older, it becomes less and less energy efficient. By replacing it with newer technology, operators can quickly achieve significant gains in both performance and energy efficiency.

Adopting 'power on-demand' solutions – Another way that data centres are reducing their energy consumption is with modern 'power on-demand' solutions, which monitor usage throughout the facility and ensure it is optimised at all times. Doing so helps reduce the need for unnecessary power generation, saving both money and energy.

The devastating effects of global warming have become increasingly evident in recent years, putting pressure on organisations in every sector to examine their own sustainability goals and do everything they can to reduce their carbon footprints. For data centre operators this can feel easier said than done, but through a combination of new technology and better business practices, it is possible for them to become a champion of energy efficiency, leading the way for others in the months and years to come.

Energy management tactics for telecom networks to increase sustainability

It's widely known that energy use is responsible for the vast majority of telecommunications network operating costs, and that 5G will drive an unprecedented rise in data traffic, which in turn will increase power consumption across the network.

BY DAVID WILSON, GLOBAL OFFERING DIRECTOR FOR TELECOM AND SOLAR ENERGY SOLUTIONS AT VERTIV

THE URGENCY in urban centres and regions where 5G is a priority is palpable, but 5G is just one item on a growing list of reasons that today's telcos are increasingly focused on energy usage and carbon responsibility.

Indeed, telcos that have been caught in a seemingly endless loop of network upgrades are turning their attention to the costs and carbon footprint associated with those advancements. The good news is that there are immediate steps operators can take to reduce the energy their networks consume, source energy wisely, and ensure more responsible operation.

The even better news is that there's a solid foundation on which to work - telcos have already made strides in tackling their energy usage. The industry has been deploying hybrid energy systems for decades and was an early adopter of solar energy, albeit in limited, specific applications. However, whilst the industry should certainly be commended for these efforts, it's an evolution and there is an increasing impetus to get sustainability 'right'. So, what near and longer term strategies can telcos deploy to help boost energy efficiency and continue on their journey achieving even more sustainability?

High efficiency rectifiers

There are a number of immediate steps which individual operators can take to support the transition to a more sustainable, greener, future. The most obvious and already widely adopted strategy is simply transitioning to high-efficiency rectifiers in DC power systems that are present at every access site. Replacing legacy DC power systems with newer, high-efficiency models can reduce annual costs by over $7,000 for every 1000A at $0.3/kwhr.

Every provisioning decision at every 5G site retrofit or new deployment should be made with energy efficiency top of mind. This is happening more and more already and should be a baseline expectation of operators everywhere. In addition, modern equipment frequently includes energy-saving modes and features that too often are ignored. Today's DC power systems are more intelligent and capable of more advanced energy management than legacy systems, but frequently operators choose to disregard those capabilities in favour of static operation.

Planning makes perfect – matching your strategies to access sites.

When you consider geographies, climate, grid reliability, water availability, government regulations and countless other factors around the globe, it becomes clear that no single strategy is appropriate for every access site.

For example, there are opportunities – and an increasing compelling case – in countries with expensive utility costs to introduce solar power as a supplement to the grid. A solution for costs savings alone would be more difficult in areas such as Louisiana where electricity is nine cents per kilowatt-hour (kWh); but solar power is a clear gain in places like Denmark and Germany, where prices routinely exceed 30 cents per kWh. And, of course, those prices can and will continue to fluctuate.

So it's clear that energy and carbon management strategies must be linked to planning and real estate, and operators must tailor their approach to the conditions across their networks. Another good example of this is where hybrid energy systems are used to supplement unreliable or overtaxed grids. This is more commonplace in much of Africa, South America, and parts of Asia than in the US where grid service is usually reliable and affordable.
It is of course, an overstatement to say that every site is unique – but it's important to ensure the nuances of the geography aren't ignored and build strategies are designed accordingly.

Intelligent Controls

Today, thanks to the latest innovations in technology development, comprehensive real-time monitoring of AC and DC power network infrastructure is possible.

Intelligent controllers are available with advanced load management functionalities that enable telcos to visualise potential hotspots, power performance, and distribution inefficiencies in order to optimise the DC power supply, maximise use of cooling and avoid overload.

By proactively managing the load, operators can identify the location and power profile of every rack at a given site. This ability to map the site's power distribution and thermal output enables operators to move the load from one rack to another to improve airflow and optimise thermal management. With effective load management tools, high availability can be achieved whilst improving energy efficiencies and saving costs.

Long-term strategy

Today, operators can deploy a number of strategies to reduce energy consumption and costs, but these steps alone will not solve the problem. To increase sustainability, operators must consider more creative, ambitious approaches to managing their power usage which requires better planning and awareness of implications. When deploying solar, for example, real estate needs change - often requiring a larger footprint, an unobstructed view of the sun, and more local and regional policies and regulations to consider. In the past, operators could simply pursue the least expensive real estate they could find (cost was one issue, radio coverage was the other). As part of a larger energy management strategy, that is no longer the case.

Other innovations to look at closely include new and emerging battery technologies like sodium-ion that may present additional opportunities for off-grid operation and energy management

Operators must also look to the long term to consider more creative, ambitious approaches to managing their energy usage. Indeed, telcos are engaging with the UN's Sustainable Development Goals (SGDs), through telco sustainability initiatives and company strategy. The 17 United Nations' Sustainable Development Goals (SGDs) were set up in 2015 by the United Nations General Assembly and agreed upon by all 193 Member States. They are intended to be realised by the year 2030 and provide a "blueprint to achieve a better and more sustainable future for all".

Other innovations to look at closely include new and emerging battery technologies like sodium-ion that may present additional opportunities for off-grid operation and energy management. And, as on- and off-grid power management becomes more sophisticated, we could see networks evolving into microgrids that generate and share their own power across the network and with the utility. High-voltage DC power has also shown promise in reducing power conversions and improving energy efficiency in some limited applications and may be part of future solutions.

Any discussion of potential long-term energy management strategy changes should include activities that may lack traction today but could present opportunities as other technologies mature.

Offence or defence?

Why environmental concerns and ROI should drive New Year datacentre resolutions

BY SAMMY ZOGHLAMI, SVP EMEA, NUTANIX

WHERE TO REDUCE WASTE and where to spend to save? How to prepare for a tough 2023
"We are on a highway to climate hell with our foot on the accelerator," said United Nations secretary general Antonio Guterres speaking at the climate change conference COP27 in November. It's a sobering comment but one that we have been made only too aware of in recent years. More needs to be done, of course, especially in IT but we are also in the middle of an energy crisis, costs are spiralling and inflation is rising across Europe. Yes, businesses need to prioritise... but how?

It's becoming something of a cliched question; should costs be cut or should companies invest and go for growth? It's a difficult one to know for sure, although it's probably somewhere between the two - Harvard Business Review research from 2010 on business performance post-2008, seems to support this theory.

Also, there was an interesting piece by McKinsey global managing partner Bob Sternfels recently that suggested great companies and leaders will be those "who seize opportunities to play offense now, making bets on new green energy businesses, deploying capital at scale, and decarbonising incumbent businesses with new technologies." It certainly plays to the idea that to survive difficult trading conditions and to emerge strong and competitive, organisations need a strategy that encompasses both economic and sustainability measures. The challenge is how to get the balance right.

How do you know which technologies are going to have the biggest impact on your business without undermining your environmental plans? It's what McKinsey called a "defining leadership moment" recently and it is right. How technology leaders address this will determine the future of their organisations but where do you start?

It's important to try and free-up cash by focusing on waste. Is the business running too many software applications? Should there be consolidation of tools and a shift to subscription models? What about cloud spend? Are there opportunities to optimise

cloud usage by removing the 'nice-to-have' tools that are not necessarily critical to the business? Are you paying for unused capacity? Revisiting agreements with cloud suppliers is crucial to not just saving money but also increasing transparency and focus. That shouldn't mean organisations should stop cloud migrations, far from it. They should just be smarter about how they go about it.

Almost certainly one of the biggest areas of concern at the moment, both from a cost and environmental point of view is energy consumption. A lot has been made of the role of AI and automation in helping to reduce emissions and costs but it's also worth bearing in mind AI will make increased demands on technology services. As a recent Stanford University panel suggested, no one really knows the true impact of AI algorithms in terms of emissions yet but focusing on more efficient data management and datacentre infrastructures is key.

It's an important point because what we are really talking about here is measurement, understanding what each and every asset within an organisation costs financially but also in terms of emissions. If it is not measured, as the old saying goes, how can it be managed? This certainly applies to datacentre structures which are at the very heart of modern-day enterprise computing. According to recent research by Atlantic Ventures, in 2020, datacentres consumed 375 TWh of energy, which corresponds to around 1.5% of global energy consumption. The research adds that as digitalisation increases, the energy requirements of European datacentres will increase to 96.2 TWh by 2025.

How organisations use datacentres, either on-premise or through co-location or hyperscalers, the reality is that as energy costs increase, so will the cost of using these services. Increased demand and increased energy usage also increases emissions and so enterprises fall into a trap where growth can actually hurt the business. Servers and storage typically consume over half of the total energy consumption within a datacentre, which is why we believe a hyperconverged infrastructure (HCI) makes so much more sense. Less hardware means less cooling and more efficient storage and CPU utilisation. This means less energy use but increased datacentre performance.

Sustainability is becoming a strategically relevant topic for CIOs as energy efficiency in IT operations and the CO2e footprint now play a central role, due largely to the energy crisis and ESG reporting obligations. There is still considerable efficiency potential "slumbering" in European corporate datacentres, while modern datacentre architectures - such as HCI - can be an essential lever to improve energy efficiency, reduce the carbon footprint and lower IT operating costs.

Interestingly, the Atlantic Ventures research estimated that by 2025 a full changeover to HCI

across UK datacentres could potentially save 8.1 TWh of energy and 1.8 million tonnes of CO^2e, roughly the same as taking 400,000 cars off the road. It also found that large-scale co-location datacentres offer a much lower PUE (Power Usage Effectiveness) factor than typical on-premise facilities. Switching these to HCI architectures could potentially boost energy saving towards 30-40%. Also, next-generation co-location datacentres could provide access to renewable energy through long-term Power Purchase Agreements (PPA) and so contribute to an organisation's climate neutrality goal without having to invest in CO2 certificates.

For many CIOs, there may be a moment of reservation, where the idea of spending on new IT equipment and infrastructures may seem ludicrous in today's economic climate but think for a minute. How much does legacy tech really cost to run? How does it compare with the ROI on new equipment? How efficient is legacy tech when it comes to sharing data? Does legacy tech tie the business to certain, perhaps more expensive application licenses?

The double transformation towards climate-neutral IT operations and reduced costs is an opportunity for businesses to find efficiencies but also resilience. One thing leads to another. By getting the datacentre structure right organisations can start to realise savings across the IT estate, from digital infrastructures and workplaces, cloud services, data and applications, as well as DevOps and analytics processes. This is perhaps one New Year's resolution that's really worth making and keeping, for the sake of the business and the environment.

How organisations use datacentres, either on-premise or through co-location or hyperscalers, the reality is that as energy costs increase, so will the cost of using these services

Businesses can no longer overlook the ‘S’ in ESG

The combining of environmental, social, and governance issues into the holistic label of ESG was formalized 17 years ago at the United Nations. Since then, the world’s concern about the impact of climate change has left many business leaders stuck on the E, relegating the S and G to second-tier status.

BY ARUNA NEWTON, GLOBAL HEAD - DIVERSITY & INCLUSION, INFOSYS

THE CLIMATE’S TICKING CLOCK has justified this focus on the environment — emissions in particular. However, a broader embrace of ESG offers benefits that company leaders might not expect. Infosys research found that some social and governance initiatives boost the bottom line, in addition to making businesses better corporate citizens.

Our global ESG Radar survey of more than 2,500 business executives and managers — 17% from companies based in the UK — found several initiatives or focus areas that correlate with increased revenue or profit growth. These initiatives are not standardized training programs or off-the-shelf solutions designed to satisfy the demands of UK regulators, or investors chasing market trends. Instead, the changes are structural ones that alter a company’s mindset and approach — starting with the leadership ranks.

Governance: Low priority, big impact

Governance was rated as a lower priority than either environmental or social components among the companies we surveyed. One telecommunications industry executive pointed to the paradox here: “Governance is an area that if you do it well, no one notices. But if it goes wrong, it poses the biggest reputational risk.”

Despite this lack of urgency, UK executives were the most confident in their governance initiatives (75%) having long-term impact. This was more than 20% higher than their confidence in the impact of social initiatives (54%).

Governance also shows great untapped financial benefits. Companies perform better financially when they have all the following: a chief diversity officer (CDO), chief sustainability officer (CSO), ESG committee on the board, and also when the CSO clears capital expenditures. Analysis of survey data found that those four elements correlate with about a 2 percentage point increase in profit growth and revenue growth. Anything short of that does not help the bottom line.

This was one of the strongest correlations in our study and the most significant financial impact. However, only about 22% of leaders at UK-based firms say their company has all four elements in place. That's five percentage points lower than the average of all the companies we surveyed.

Social: People and profits

Business leaders are already well aware of the need to create a more diverse workforce — one that reflects their communities and customers. These initiatives are necessary but not enough. Our research found that this commitment needs to extend to the board.

An increase in the number of women on a company's board was linked to better financial outcomes. This is good news for UK companies since they excel in this area. The Gender Diversity Index ranks the UK as the third highest scoring country in Europe, with women making up 38% of the board seats (tied for third on the continent).

Analysis of our survey data, which included respondents' reported financial performance, found that a 10 percentage point increase in women on the board strongly correlates with a 1 percentage point increase in profit growth. This effect is likely a proxy for board diversity, which is assumed to offer broader perspectives that lead to greater innovation. Our findings add another data point to what is already a mixed picture on this subject. A large number of academic and business studies have examined how the percentage of women on corporate boards affect various financial metrics and have reached conflicting conclusions.

Our analysis also indicates that company profits increase more when their ESG efforts are motivated by how their employees view them, as compared to their reputation among customers. This correlates with about a three-quarters percentage point increase in profit growth. In the UK, companies prioritize reputation with customers (29%) barely ahead of reputation with employees (28%).

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These benefits could be a result of better engagement among employees and greater success in recruitment and retention — all of which have financial consequences. This also reflects a stronger focus on employees as a resource, perhaps fueled by companies' ongoing efforts to close their skills gaps. This is particularly critical as UK companies struggle to find the right employees and navigate what has been described as a talent "tug-of-war."

ESG strategy accelerating in the UK

Companies are moving past the lowest hanging fruit in the world of ESG. Businesses have reduced energy consumption, trained employees on ESG initiatives, and moved away from the all-male boards of the past. A stronger focus on employees and greater board diversity seems not just possible but likely.

Even so, respondents are slowing their adoption of changes that are most closely correlated with profit growth, and as a result, could limit the financial benefits of ESG.

Overall, firms that do not have these leadership positions or structures that were mentioned previously are not likely to add them in the future. However, UK companies are embracing these leadership changes to a greater extent than our sample as a whole, despite uncertainty about how post-Brexit regulations will mirror or diverge from EU regulations.

More than half of UK companies we surveyed have ESG roles in the C-suite: CSO (54%), CDO (70%), and ESG committee on the board (67%).
Not only are these companies well ahead of the global average, but they are also more likely to add these ESG roles in the future and pull further ahead of their international competitors. More than half of UK companies surveyed say they have a CSO. Among those that don't, nearly half (49%) plan to add that position in the future. Although not mandatory, the large UK companies without a ESG board committee is shrinking rapidly. More than two-thirds have such a committee, and 62% of the rest say they plan to follow.

The boldest changes will likely come from the companies that already have a CSO. About one-quarter of UK firms (27%) require their CSO to clear capital expenditures. That's slightly lower than the global average (32%).

However, half of UK companies plan to give their CSO that authority in the future — a larger increase than the one-third cited by companies overall.

This points to an approach that seeks to bring more ESG authority into the C-suite. Thirty percent of the respondents from UK companies say their firms tie executive compensation to ESG metrics. This performance was higher than any other country or region, with Germany being the closest at 25%.

It seems obvious that a strong ESG commitment in company leadership will result in greater real-world impact — a worthy goal. However, our analysis points to that commitment also being the key to ESG initiatives contributing to the bottom line, rather than just being an element of corporate compliance with minimal investment.

An unwillingness to add more ESG roles and responsibility to the leadership structure could have serious consequences if companies don't change their approach to ESG. The gap between the ESG haves and have-nots could expand — leaving some companies uncompetitive in a fast-changing, volatile market.

AI and metaverse technologies boost training and streamline onboarding for employees

With hands-on simulated training and exposure into a new setting, the latest AI and metaverse training technologies can provide businesses and employees alike the best tools to succeed.

BY REHAN HAQUE, CEO OF METATALENT.AI

WE LIVE in a world where businesses constantly reinvent themselves to remain competitive. Automation and digitisation goals feature in well over half of all today's businesses' long-term corporate strategies, according to PwC's most recent annual Global CEO Survey. Which is why artificial intelligence (AI) and virtual worlds or 'metaverse' related technologies and tools have risen to prominence, particularly in relation to improving on-the-job training and upskilling new talent.

In 2022, many businesses are now starting to benefit from the application of AI and metaverse technologies in providing streamlined training and onboarding for employees. Combining AI and metaverse technologies affords companies an incredible new opportunity to train and equip people with the necessary skills to navigate the future of work.

Indeed, the very nature of the future of work across a multitude of different sectors will be hugely impacted by new AI and metaverse technologies. It's estimated that over 23 million jobs will be impacted by virtual reality (VR) and augmented reality (AR) by 2030, and that these technologies have the potential to deliver a £1.4 trillion boost to the global economy over the next eight years, according to recent PwC forecasts.

The real value of AI and metaverse training

AI and metaverse-based tools are benefitting both new, younger staff entering the workforce for the very first time, as well as established employees with a need to constantly upskill, advance existing aptitudes, or go through certain compliance training.

In addition to this, due to the huge increase in remote and hybrid working, post-pandemic, in-person training has become far more challenging. That's why leveraging the latest virtual and augmented reality technologies can provide businesses in with lucrative advantages. For example, employees that train in VR simulations learn twice as fast as e-learners and four times faster than classroom learners, according to the PwC 2022 US Metaverse Survey.

Utilising the capabilities of the metaverse means that training can be conducted that activates employees' senses. It promotes interactive engagement methods via immersive VR, AR, and extended reality (XR) training. Virtual metaverse training environments can also be made to feel more lifelike using tactile, haptic technology, enabling individuals to learn by doing lifelike activities, and co-learning with their colleagues. Most importantly, these new virtual training environments allow the creation of a fully realised world that can be manipulated to appeal to the learning style of a specific individual. Which means that learners not only absorb and retain information faster, they get far more pleasure and enjoyment from the process. So it's little surprise that metaverse learners are 3.75 times more emotionally connected to content than classroom learners and four times more focused than their traditional e-learning peers, according to PwC's study.

Safe, secure and flexible learning environments

As the metaverse delivers a real-time setting for individuals to train in, they can immerse themselves in an environment that simulates any kind of real-world workplace situation, including high-pressure scenarios. Plus, as the environment is a virtual version of reality, it means that the learner can make mistakes without jeopardising the safety of themselves or others.

Virtual training on the latest operational processes in manufacturing, for example, can be optimised through the metaverse to perfect business processes, with huge increases in efficiency, staff productivity and noticeable increases in the elimination of waste materials and resources. In addition to improving on-the-job training processes, metaverse training environments enable far more effective onboarding processes for new employees. When done well, the use of AI and metaverse technologies to boost onboarding has the potential to contribute positively to staff retention rate. In turn, this will have an impact on overall satisfaction and thus productivity, as an employee settles in over time.

> Essentially, the metaverse can show employees what their job would be like before they even join

Overall, the use of AI and metaverse technologies for training current staff and onboarding new employees contributes positively to the recruitment process. As it can reduce training time, whilst simultaneously increasing employee motivation and willingness to participate.

Essentially, the metaverse can show employees what their job would be like before they even join.

Metaverse training improves employee engagement

Consider, for example, the fascinating experiment recently carried out by MGM Resorts, in partnership with the VR firm, Strivr, to allow job seekers try out roles using virtual reality to reduce employee churn. Not only did this pilot study show how metaverse training can improve employee engagement, Strivr CEO Derek Belch also noted that the data gathered from using VR "can be very powerful for both the employee, as part of their candidacy for a role, as well as for the employer to make better data-driven decisions".

Time and money (through training and resources) can be saved on both ends if an employee isn't suitable for a role. Now, more than ever, we have the power to connect candidates with roles they're suited for and passionate about. This is key, considering, during the recent so-called 'great resignation' many people quit jobs with which they were not enthralled about. The metaverse allows job candidates to try careers they're likely to excel in, leading to greater job satisfaction, and therefore higher levels of productivity.

With hands-on simulated training and exposure into a new setting, the latest AI and metaverse training technologies can provide businesses and employees alike the best tools to succeed. Equipping employees with the necessary skills they need in order to navigate the future of work.

Skills intelligence – why certification visibility is critical in your workforce planning

The world is changing – paradigms are being dismantled as we must adapt to the new environment brought about by the events of the last two years.

BY PETER OLIVE, CEO, VORTEX 6

Whether it's pandemics, wars, inflation, unstable government, fuel shortages, looming predictions of recessions or just the ever increasing innovation in technology – we are facing more challenges now than at any time since 1945.

Yet, amongst all of this, we are experiencing probably the greatest skills shortages in our lifetime, which seems counter intuitive when looking back on previous periods of turmoil when jobs were scarce and unemployment high.

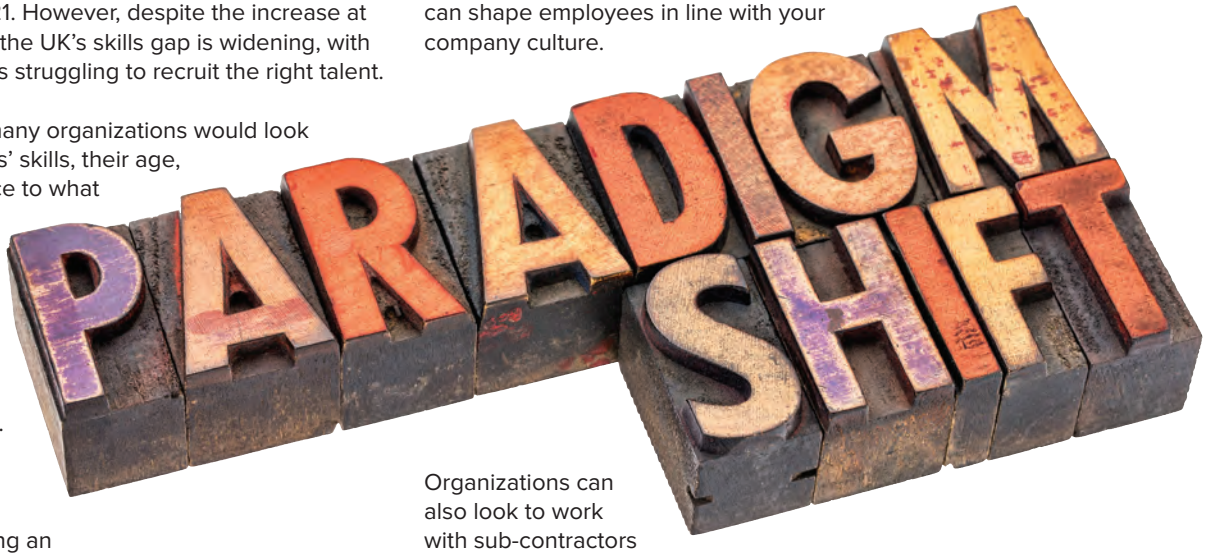
This is the case in all industries from manufacturing, logistics, hospitality, agriculture and IT. It is affecting all countries in Europe, the US, Canada Australia and others.

There are many theories about why this is and I'm not going to repeat what others have already said, but it is real. I've worked in IT for nearly 40 years and this is the biggest skills gap I have seen.

I recently read an article in IT Pro that emphasized how, despite an increase in computer science students, the IT skills gap is at an all-time high.

The article went on to say that tech vacancies are at a 10-year high across the globe, with a 191% year-on-year increase in the UK alone. That said, the article also outlined that the number of students taking diploma or undergraduate courses for computer science has risen year-on-year. In fact, UCAS data indicates that there were 16% more applications for undergraduate computing courses, and that 81,210 students sat the UK GCSE exams in 2022 compared to79,964 in 2021. However, despite the increase at a student level, the UK's skills gap is widening, with some employers struggling to recruit the right talent.

Until recently, many organizations would look at an employees' skills, their age, cost or relevance to what the business needs to deliver its business plan and replace them by going to the external market. I've never fully understood this approach, the costs of replacing an employee can be three times their salary when you take into account management time, recruitment costs, distraction from running the business, the loss of company knowledge, training and development investments, disruption to client relationships and so on. But now that there are more jobs than people, companies must compete when recruiting, resulting in higher salaries and sometimes still not being able to find the skills, attitude and knowledge that they need.



So what should they do?

Many organizations are now looking at the talent they have today and - instead of replacing employees - are investing in developing their skills. The conversation is changing to one that is skills based. This is why it is so important for organizations to understand what skills, resources and certifications they currently have within their business and to better manage their skills intelligence. I say this because, for most organizations, acquiring more people with the skills customers need is critical for ensure growth. But with the current skills shortage facing organizations, this is clearly not an easy task and if not addressed it will hinder future expansion plans.

Overcoming talent shortages

Therefore, as organizations try to grapple with this talent shortage, what are the options that they can explore?

Companies can look at ways to move employees around, particularly where there are pockets of skills that are underutilized and less in-demand in certain areas of the business than others. They can look at programs to reskill and cross-skill employees across the organization, encouraging existing teams to develop skills where they have identified a gap. Of course, they can still try to recruit, but in my experience more senior hires are costly and hard to integrate into organizations quickly enough to bring value. Hiring at the more junior level and out of university is a slower route in terms of realizing immediate value, but on the plus side you can shape employees in line with your company culture.

Organizations can also look to work with sub-contractors and consultants, but this is an expensive route, and often the knowledge gained is not transferred into the organization, leaving when the consultant does. Companies can also team up with others in strategic partnerships where there are strong synergies to tap into other resource pools, but the chances are that partners are in a similar situation with a lack of skills and resources. And finally, organizations can look to grow through acquisition and buy capacity and capability, but again this brings downsides along with its positives. Many companies may need to adopt all of these strategies to grow or adapt their workforce. That said, regardless of where the talent is coming from, there is a need to calibrate the skills that exist within an organization and to find a way to do this that will clearly signpost these skills to customers.

Managing your workforce - Understanding what certifications and skills you have in the business

The next question most organizations are looking to answer to better understand their skills intelligence is "What certifications do we already have in our

Many organizations are now looking at the talent they have today and - instead of replacing employees - are investing in developing their skills

business today, who has these certifications and how utilized are our skills?" Simple questions, but often we find there is no central collection mechanism where employees or employers can go to find this single source of truth.

Certification data comes from HR systems, the vendor organizations that set the certification programs and CV's, quite often coming from up to 30 sources in which the data is inconsistent and often incomplete. Certification data is held in spreadsheets within different departments and are inconsistently maintained. This means they are rarely up-to-date, making it hard to get a quick view on the skills within an organization.

Why is this important?

- Organizations typically only know 50% of the certifications their employees hold
- These organizations may not be bidding for business because they don't think they have the skills.
- They may not be projecting their true capabilities to customers and partners potentially opening the door to competitors
- They are spending money on training when they already have the skills internally

So how do companies solve this underlying problem? Organizations need a single source of truth to manage their certifications that is always current and comprehensive. Such a solution also needs to get validated certification data from their employees, who know more about their qualifications than anyone.

All this sounds relatively straight forward, but when you consider the size and complexity of the data it is harder than it at first appears. There needs to be an easily configurable, on-demand way of reporting skills certification, capacity planning and strategy resource that enables companies to compare what they have versus what they think they need to grow the business. This is where our solution V6 ProFusion enables businesses to manage and track all their employees' IT certifications across over 450 vendors in a single software platform. It uses a database of IT skills intelligence to provide a true understanding of an employees' capabilities and how they can support new and existing projects, clients and the overall business strategy.

These insights are essential to helping organizations not only overcome the skills shortage but to grow their businesses by using a platform to efficiently and effectively manage, support, and develop vital talent resources, for both the organization and the employee's benefit. Today, a clear and comprehensive view of the breadth and depth of the existing skills within a business is critical to its success. If businesses don't have the right data, all they can do is guess. But do they really want to bet their business growth and future aspirations on guesswork?

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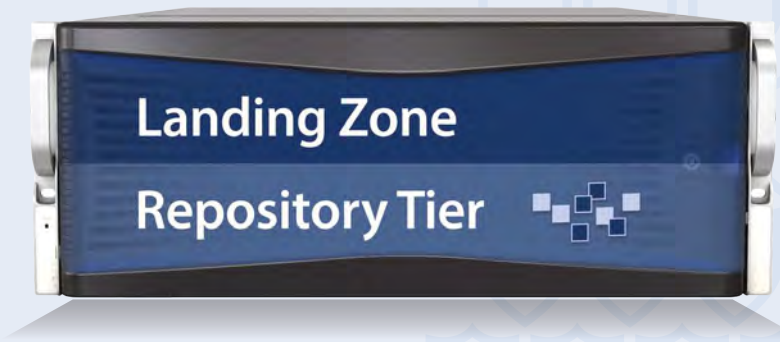

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Data centre outlook for 2023

Some of the developments – for good or ill – that we can expect to see in the data centre sector during 2023 and beyond.

BY CIARAN FORDE, DATA CENTRE SEGMENT LEADER, EATON

TO SAY that 2022 has been a disruptive year is an understatement. Much of last year's outlook for the data centre sector was concerned with balancing the growth in digitalisation with more sustainable practices. But we had no way of knowing about the impact the ongoing massive disruption to the geopolitical landscape would have – not least that we'd be facing a severe energy crisis.

The current situation brings a sharper focus on the importance of addressing the issues raised last year, as well as highlighting new challenges. It's not all doom and gloom, though - ongoing digitalisation, for example, represents new opportunities for the sector.

Here, then, are some of the developments – for good or ill – that we can expect to see in the data centre sector during 2023 and beyond.

1 – Energy uncertainty

The biggest issue we face right now is the extraordinarily high price of energy. The cost has skyrocketed to the point where it becomes a real concern for large energy users, such as data centre owners. Can they pass these costs on to their customers? Will the prices continue to rise? Do they have the cashflow to manage this in their business model? While the argument for a renewable generation strategy has always been around sustainability and the environment, today

we need in-region renewables to protect supplies for European countries primarily for reasons of energy security and cost. Microsoft is taking a step in this direction, for example. Its Dublin data centre features banks of lithium-ion batteries approved for connection to the grid to help grid operators provide uninterrupted power should renewable sources such as wind, sun, and sea be insufficient to meet demand.

This need to accelerate the generation of renewable energy is, effectively, an extension of last year's outlook. But it's much more acute now. It should serve as a wake-up call to governments across EMEA that they can no longer rely on traditional energy sources.

2 – Broken supply chains

COVID-19 had a tremendous impact on global supply chains across many sectors. However, once the pandemic receded, businesses everywhere were lulled into something of a false sense of security, believing they'd been through the worst. No-one was expecting a second body blow, a geopolitical crisis that's proven to be even more disruptive to some supply chains - particularly the semiconductors and base metals vital to data centre construction – than COVID. As a high growth market, the data centre industry is highly sensitive to supply chain disruption, especially at a time when it's looking to scale up.

The industry as a whole is still struggling with supply chain disruption. And the current geopolitical landscape means this is only likely to continue.

3 – Tackling growing complexity

The requirement for digital growth has reached an unprecedented level. Every possible avenue has been explored to fulfil that need more simply, more cost-effectively, and in the shortest possible time. But doing so can be contradictory to the nature of many highly complex, mission-critical environments.

A data centre is home to a wealth of different technologies – from HVAC systems to mechanical and structural engineering, IT and compute. The challenge is trying to accelerate such highly complex, interdependent types of environments to maintain the current trends for digitalisation. To this end, data centre designers, operators, and vendors are fashioning systems that will reduce this complexity while respecting an application's mission-critical nature. The industrialisation, or modulisation, of data centres, where prefabricated, pre-engineered, and pre-integrated units, are delivered to site, is one way of making the design and construction of a data centre less complex while ensuring faster time-to-market.

4 – Moving beyond traditional clusters

Until now, London, Dublin, Frankfurt, Amsterdam, and Paris have been the traditional data centre clusters, either because companies are headquartered in these cities, or because they're natural economic clusters with a wealth of telecom connectivity and ideal client profiles.

To provide quality of service and to be in closer proximity to centres of population and economic activity, it's becoming more favourable to build data centres in the secondary cities of the main economic nations and in the capitals of smaller economic nations. Competition amongst the data centre providers is strong, so many of these Tier II cities and nations provide for growth for existing operators or low point of entry for new operators. For this reason, you will see increased activity in cities like Warsaw, Vienna, Istanbul, Nairobi, Lagos, and Dubai. But this expansion is not without its challenges.

Considerations around the availability of appropriate sites, power, and engineering labour all add complexity to an organisation's overall operations, for instance. And many of those countries may not have a lot of experience or personnel to help with the design, construction, and operation of a new data centre.

Overcoming such challenges will require data centre owners to relearn the industry each time they move into a new geography. Regardless of such challenges, though, new markets continue to open up, with many operators trying to achieve first mover advantage into developing secondary markets. In fact, many jurisdictions are welcoming data centre operators with open arms, with some even offering incentives and subsidies to entice them.

One thing this year has proved is that we can't be certain about anything. The after-effects of COVID and the current geopolitical system have left the sector facing a series of unprecedented challenges. But growth opportunities exist. Trends would indicate that more forward-looking operators will be able to weather the storm, to face whatever the future holds.

To provide quality of service and to be in closer proximity to centres of population and economic activity, it's becoming more favourable to build data centres in the secondary cities of the main economic nations and in the capitals of smaller economic nations

Q: “Will data centre cooling failures become more common?” A: “Yes.”

Heatwaves are changing the risk appetite for data centre operators when thinking about a safe operating temperature

BY LUKE NEVILLE, MANAGING DIRECTOR, I3 SOLUTIONS GROUP

MORE EXTREME WEATHER patterns resulting in higher temperature peaks, such as the record 40oC experienced in parts of the UK in the summer of 2022, will cause more data centre failures. However, while it is inevitable that data centre failures will become more common, establishing a direct cause and effect is difficult as factors to consider include the growing number of sites and an aging data centre stock that will statistically increase the number of outages.

What the increasing peak summer temperatures are doing is shifting the needle and changing conversations both about how data centre cooling should be designed and what constitutes “safe” design and operating temperatures. Since the beginning of the modern data centre industry over two decades ago, the design of data centre cooling system capacity has always been a compromise of installation cost vs risk.

Designers sought to achieve a balance whereby a peak ambient temperature and level of plant redundancy is selected so that should that temperature be reached the system has the capacity to continue to support operations. The higher the

peak ambient design temperature selected the greater size/cost of the plant, with greater resilience meaning further cost for plant for redundancy. It came to down the appetite for risk versus the cost for the owner and operator. It is a fact that whenever the chosen ambient design temperature is exceeded, the risk of a failure will always be present and increases with the temperature.

So, what is the right ambient and peak temperature set point?

ASHRAE publish temperatures for numerous weather station locations based on expected peaks over 5-, 10-, 20- and 50-year periods. Typically, the data for the 20-year period is used for data centre ambient design.

However, this is a guideline only and each owner/operator choses their own limit based on what they feel will reduce risks to acceptable levels without increasing costs too much. Hotter summers have seen design conditions trending upwards over the last twenty years.

Legacy data centres were traditionally aligned with much lower temperatures from say 28oC - 30oC to latterly accepted standard design conditions of 35 - 38oC. Systems were often selected to operate past these points, even up to 45oC (based on the UK – all other regions will have temperatures selected to suit the local climate). The new record temperatures of +40oC in the UK will sound the warning bell to some data centre operators who may find themselves in a situation where dated design conditions, aging plant and high installed capacity will result in servers running at the limits of their design envelope.

All systems, have a reduced capacity to reject heat as the ambient temperature increases and also have a fixed limit irrespective of load, at which they will be unable to reject heat. Should these conditions be reached, failure is guaranteed. More commonly, low levels of actual load demand versus the systems design capability mean typically data centres never experience conditions which stress the systems. However, that requires confidence that IT workloads are either constant, 100% predictable, or both.

For now, the failure of data centre cooling is most likely to be the result of plant condition impacting heat rejection capacity rather than design parameter limitations. This was cited as the root cause of one failure during the UK's summer heatwave when it was stated that cooling infrastructure within a London data centre had experienced an issue. Coupled with an increase in data centre utilisation, should temperatures outside the data centre continue to rise this will change.

Know your limits

Inside the data centre the increasing power requirements of modern chip and server designs also mean heat could become more of an issue.

manufacturers say about acceptable ranges, it has been the case that traditionally data centres and IT departments remain nervous about running their rooms at the top end of the temperature envelope. Typically, data centre managers like their facilities to feel cool.

To reduce the burden on the power consumption and over sizing of plant, it is common to integrate evaporative cooling systems within the heat rejection. However, there has been much focus recently on the quantity of water use for data centres and its impact on the sustainability of such systems. Whilst modern designs can allow for vast water storage systems and rainwater collection/use, should summers continue to get longer and dryer, more mains water use will be required to compensate and the risk of supply issues impacting the operation of the facility will increase. In every sense, a paradigm shift away from cooling the technical space towards a focus on cooling the computing equipment itself may present the answer. The adoption of liquid cooling systems, for example, can eliminate the need for both mechanical refrigeration and evaporative cooling solutions. In addition to some environmental benefits and a reduction in the number of fans at both room and server level, liquid cooling will help increase reliability and reduce failures generally as well as at times of extremely high temperatures.

Liquid cooling seems to be gaining traction. For example, at this year's Open Compute Summit, Meta (formerly Facebook), outlined its roadmap for a shift to direct-to-chip liquid-cooled infrastructure in its data centres to support the much-heralded metaverse. However, one of the limitations of liquid cooling designs is that they leave little room for manoeuvre during a failure, as resilience can be more challenging to incorporate into these systems.

But for now, without retrofitting new cooling systems, many existing data centres will have to find ways to use air and water to keep equipment cool. And as the temperatures continue to rise inside and outside the facility, so too will the risks of failure.

Hot aisle containment: Keeping data centers cool

Flooding the data center with cold supply air, in combination with an appropriate hot aisle containment solution, makes for a cost-effective, energy-efficient and environmentally-friendly facility.

BY GORDON JOHNSON, SENIOR CFD ENGINEER AT SUBZERO ENGINEERING

DATA CENTER DESIGNS are continuing to evolve, and recently, more facilities are being designed with slab floors and overhead cabling, often in line with Open Compute Project (OCP) recommendations. Rather than install expensive and non-flexible ducting to supply cooling from overhead diffuser vents, engineers are seeing high efficiency and sustainability gains by flooding the room with cold supply air from either perimeter cooling units, CRAC/CRAH galleries, or other cooling methods (rooftop cooling units, fan walls, etc.).

Hot aisle containment (HAC) then separates the cold supply air from the hot exhaust air and a plenum ceiling returns the exhaust air back to the cooling units. As such, this design is also gaining popularity due to its simplicity and flexibility.

Containment options

An optimized containment system is designed to provide a complete cooling solution with a sleek supporting structure that serves as the infrastructure carrier for the busway, cable tray, and fiber. Such a system should be completely ground-supported and for that, a simple flat slab floor is all that is needed.

The goal of any containment system is to improve the intake air temperatures and deliver cooling efficiently to the IT equipment, thereby creating an environment where changes can be made that will lower operating costs and increase cooling capacity. Ideally, the containment system should easily accomplish this while allowing both existing and new facilities, including large hyperscale data centers, to build and scale their infrastructure quickly and efficiently.

Traditional methods for supporting data center infrastructures such as containment, power distribution, and cable routing can be costly and time-consuming. They require multiple trades working on top of each other to accomplish their work. An optimized containment structure provides a simple platform for rapid deployment of infrastructure support and aisle containment. For example, all cable pathways and the busways can be installed at the same time as the containment, allowing the electricians to energize the busway when needed, such as when as the IT equipment gets installed, or as the IT footprint expands.

The containment system should also give the end user the ability to deploy small, standardized, and replicable pods. This helps to limit the amount of upfront capital spent compared with building out entire data halls by providing all the infrastructure necessary, while allowing for almost limitless scaling should the situation require it.

When selecting a containment solution, the seal or leakage performance (typically a percentage) of the system is essential, it's often stated that leakage

is the nemesis of all containment systems. Users should reasonably expect a containment solution to have no more than approximately 2% leakage. This reduces and practically eliminates both bypass air and hot recirculation air that raises server inlet temperatures on IT equipment - the result being superior efficiency of the cooling system. There's another important element to this design, the plenum ceiling return. The ceiling and grid system chosen should have minimum leakage to reduce and even eliminate bypass air where cold supply air enters the plenum ceiling return instead of contributing to the cooling of the IT equipment.

Maximize energy efficiency and sustainability

We've mentioned the importance of maximizing energy efficiency and sustainability. Flooding the data center with cold supply air for the IT equipment and containing the hot aisles so that hot exhaust air returns to the cooling units (or is rejected by some other method) is a simple, easy, and flexible design. All new data centers should consider this for future deployments.

Another benefit of this (and most HAC designs) is that it's easier to achieve airflow and cooling optimization. In a perfect world, we would simply match our total cooling capacity (supply airflow) to our IT load (demand airflow) and increase cooling unit set points as high as possible. However, there's inherent leakage in any design, including within the IT racks. The goal is to minimize the leakage as much as possible which is why the containment and ceiling structure is crucial.

The lower the overall leakage, the less cold supply air is needed, therefore, to maximize energy efficiency, we want to use as little cold supply air as possible while still maintaining positive pressure from the cold aisle(s) to the hot aisle(s). When this is achieved, there will be consistent supply temperatures across the server inlets on all racks throughout the data center.

Because HAC is used, the data center is essentially one large cold aisle, so the total sum of cold supply airflow should only be slightly higher than the total sum of demand airflow (10%-15% should be the goal). This percentage is easily attainable if leakage is kept to a minimum by using a quality containment and ceiling solution, along with good airflow management practices such as installing blanking panels and sealing the rack rails.

To drive further efficiencies, operators can raise the cooling set points while maintaining server inlet temperatures at or below ASHRAE (American Society of Heating, Refrigeration, and Air-Conditioning Engineers) recommended specifications for cooling IT equipment (80.6°F/27°C)! This also results in higher equipment reliability and lower MTBF (Mean Time Between Failures). It's been said that the best energy saved is the energy we don't consume, and that's especially true in the data center industry – even more so as we continue to progress towards our goal to become more sustainable and lower our carbon footprint.

Conclusion

The data center industry is constantly evolving, and so should our designs. Energy efficiency should continue to be a top concern for data centers operators, both now and in the future. Data center designers and owners should carefully evaluate all options rather than just relying on or selecting from old projects. The saying "that's just the way it is because it's always been that way and there's no reason to question it" has no place in the industry.

Further, flooding the data center with cold supply air and utilizing a containment system, regardless of the cooling system, results in a simple, flexible design that's both extremely energy efficient and sustainable. This will make both new and legacy data centers greener and more environmentally sustainable, and an environmentally friendly data center is always a cost-effective data center.

The lower the overall leakage, the less cold supply air is needed, therefore, to maximize energy efficiency, we want to use as little cold supply air as possible while still maintaining positive pressure from the cold aisle(s) to the hot aisle(s)

The DCA - Data Centre Sustainability SIG

An Introduction from DCA CEO Steve Hone

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

Outcomes result in best practice guides, collaboration between group members, participation in research projects, this includes clarification and guidance for decision and policy makers.

Members find these groups are a great way to ensure their opinions and views are considered in a positive and cooperative environment.

The DCA currently facilitates nine Special Interest or Working Groups. DCA members can join any of the groups and contribute find out more here: https://dca-global.org/groups

The DCA Sustainability SIG is chaired by Astrid Wynne, Head of Sustainability at Techbuyer
The purpose of the Sustainability Special Interest Group is to develop best practice in the UK data centre industry with respect to materials usage, energy efficiency, skills development and workforce retention in an operational data centre environment.

The group aims to achieve this through:

- Optimising energy efficiency at use phase
- Expert insight into IT hardware and the effect on energy draw
- Insight into the role of IT load with respect to this, including:
  a. the effect of full utilisation on efficiency as measured by compute power over energy.
  b. the ability of software to dematerialise hardware.
  c. minimising data transfer and storage, potentially leading to a sector Code of Conduct
- An understanding of the importance of Scope 3 emissions (also known as embodied energy) in the hardware, facility and building.
- Circular solutions for the IT hardware and other infrastructure
- Circular solutions for heat, power and IT load
- Use of renewable energy in the sector.
- New technologies that can aid this.
- Existing and upcoming standards relating to this.
- Education of workforce with respect to sustainability insight and practice

The group work very closely with the Energy Efficiency SIG to provide DCA members with an entire overview of data centre energy efficiency and sustainability.
To request to join this group please contact the DCA - mss@dca-global.org

The circle of life - re-new, re-cycle, re-use, repeat: Strategies for a fully sustainable DC

By Simon Harris, Head of Critical Infrastructure at BCS

THE SUSTAINABILITY of data centres is attracting more attention as a matter of concern, as global computing capacity continues to rapidly increase. The European Commission has estimated that by 2030 electricity consumption in data centres will exceed 3% of global energy consumption. In response, industry bodies and individual businesses are committing to initiatives designed to improve the performance of their assets including the areas of energy consumption, carbon impact and water use aligned with their ESG imperatives.

The race for power and space

For the development of new sites the challenge is primarily focussed on the race for space and power that is playing out across Europe with power availability a key consideration for data centre location selection. However, a significant risk exists that rapidly growing demand for information services and compute-intensive applications will begin to outpace the efficiency gains that have historically kept data centre energy use in check. Potential remains for substantial efficiency gains, but investments in next-generation computing, storage, and heat removal technologies will be required to avoid potentially steep energy use growth later this decade, and parallel investments in renewable power sourcing will be required to minimize the climate implications of unavoidable data centre energy use.

Working with what you have

However, the challenges are more complex for the stock of data centres spread throughout Europe

around 60% of which are in excess of eighteen years old. Consistent with buildings in other real estate sectors, there is a material and differentiated challenge in dealing with the existing stock of data centres built from the early noughties onwards which are either partially or fully occupied.

By 1st January 2030, The Climate Neutral Data Centre Pact (CNDCP) requires signatories to make a binding commitment to achieve Power Use Effectiveness (PUE) of between 1.3 and 1.4 in sites built up to 2025, reflecting the increased challenges of interventions within operational environments. Amongst these the older data centres will have often been constructed with PUEs of 2.0 or more.

In their current form they could be significantly distant from the required standard and in breach of their owners CNDCP commitments. They will also look increasingly unattractive to tenants pursuing socially responsible energy and carbon agendas. These operational sites will be challenging to upgrade, especially those with high availability requirements. They will require experienced design and construction teams, working closely with operational teams, in order to effect the changes to the engineering infrastructure that are required without service interruption.

Rebuilding is not the best answer

The simplified response to this problem would be to demolish and reconstruct at a convenient point before the deadline through a manged vacation and migration of IT processing. The simplified answer is not necessarily the best answer. The original design and financial plans for these sites were often authored with the structural and architectural elements having a life expectancy of sixty years. There is also a significant embodied carbon penalty to pay in demolition and rebuilding. A substantial amount of the construction work involves the use of energy dense concrete and steel to such an extent that refurbishing an existing facility can save in the order of 70% - 80% of the carbon cost of a new build.

An upgrade and refresh to critical infrastructure could liberate trapped electrical capacity for deployment to serve higher density and growing IT loads, for example through UPS replacement or cooling solution changes. These types of interventions will be more easily accommodated in Tier III facilities having two concurrently maintainable power and cooling paths, although the work will require careful planning and right first time execution. Nevertheless, such a solution overcomes the power availability challenges and takes the facility down a path towards better PUE performance.

However, the PUE thresholds are not the only challenge embedded the CNDCP. The pact requires data centre electricity demand to be matched by 75% renewable energy or hourly carbon-free energy by the end of 2025 and 100% by end 2030. These requirements are to be delivered in a period when demand for renewable resources will be universally increasing as a result of competing demands from the growth in big data, the decarbonisation of industry, commerce, transport and domestic consumers.

Financial support might be available

The solutions are there which is good news however, none of this is cheap so we advocate that the full project financial picture is considered, inclusive of the tax position. Government tax Incentives in the form of capital allowances are available to support and encourage businesses to undertake capital investment. These incentives are obtained through savings in Corporation Tax. With expenditure on qualifying plant and machinery likely to be substantial, Corporation Tax paying UK based data centre owners should ensure that capital allowance benefits are maximised in order to improve their return on investment. Obtaining the relief is not an automatic process and the tax rules are complex and often misunderstood. As a result, many businesses miss out on the tax relief available to them. Appointing a specialist capital allowances consultant with complex engineering systems experience will deliver tangible benefits.

Conclusion

At BCS we have seen significant improvements to sustainability delivered as part of a general refreshment of assets that are beyond their economic life as we look to renew, re-use, refresh and repeat rather than rebuilding.

With expenditure on qualifying plant and machinery likely to be substantial, Corporation Tax paying UK based data centre owners should ensure that capital allowance benefits are maximised in order to improve their return on investment

As Enterprise IT transforms into the third age, an opportunity emerges for cio's to grasp sustainability

By Mohan Gandhi, Senior Sustainability Consultant, STG Advisors

"SUSTAINABILITY IS A DATA PLAY". I've been banging that drum for a while.

Enterprise Sustainability is the act of getting the right data into the right hands at the right time to make the right decisions - what I call data fluency.

However, data fluency requires an enterprise to be somewhat IT mature. How else does one create, combine, deliver and act on the necessary data? Only when an enterprise becomes IT mature can it begin to measure, then improve, sustainability. Long story short, IT maturity enables CIO's to grasp the sustainability agenda, and we're on the cusp of a new age of IT maturity - the Third Age of Enterprise IT.

So, what is this third age? What were the first and second ages? How is this relevant to Sustainability? This article outlines the enterprise IT maturity journey, and why it will prove beneficial to the environmental agenda.

THE FIRST AGE:
Siloed and subservient
First age IT saw individual functional groups contribute their own expertise to different project phases. Silo's made sense because they created accountability, and this approach served the enterprise well.

However, projects became rigidly sequential and trapped in one speed. This model encouraged "over the wall" engineering, where team members worked locally on immediate tasks without knowledge of upstream or downstream strategic or business context.

Different teams used a myriad of tools to monitor and manage application and infrastructure performance, user experience, conversions etc. As a result, there was no single and consistent source of truth. Hence it was difficult for teams to identify the full context behind the data, or collaborate with others to improve business outcomes.

THE SECOND AGE:
New priorities, old delivery model
As businesses became more reliant on digital services, enterprise IT became more critical to an organisations' ability to drive new revenue, enhance customer relationships, keep employees productive, and safeguard business operations. Over the last 20 years CIO's have continuously transformed their IT to keep pace with both technological advancements and changes to IT priorities.

The Second Age saw the role of enterprise IT transform from back-office support to essential business enabler. What once merely enabled the company strategy now actively defined it. CIO.com's 2022 State of CIO research found that 85% of IT leaders devoted time to transformational responsibilities, including modernising infrastructure and applications (40%), aligning IT initiatives with business goals (38%), and cultivating the IT/business partnership (30%).

Fundamentally the second age saw the CIO transform the role of IT within the business, without transforming how IT was delivered. It's an incredible sleight of hand that is worthy of applause. CIO's transformed capabilities, aligned IT with business units, modernised infrastructure, optimised traditional cost models and found or freed budget for digital transformations. But they're still fundamentally using the same traditional operating model, which have thrown up challenges of their own.

CIOs caught in the Second Age contend with resource struggles, conflicting priorities and difficult trade-offs. This approach creates IT integrity and security risks. Piper Sandler's 2022 CIO survey found Security remains the top concern for 78% of CIOs and Gartner's 2022 study found 74% of technology purchases are funded at least partially by business units outside of IT, creating conflict and complexity for CIO's.

THE THIRD AGE:
New priorities, new delivery model
It's becoming increasingly difficult for IT teams to meet new demand for faster innovation under the traditional operating model of siloed teams. Second Age IT is insufficient for the needs of the modern "digital first" business. The Third Age puts IT at the centre of both business strategy and operational delivery. As a result, changes are coming:
C-Suite dynamics: As technology dominates strategic business priorities, company executives will require improved technological understanding. In 2011, only 1 in 5 CIOs ranked themselves as a critical enabler of business success. Now, CIOs rank in the top three of C-suite executives most critical to organisational success.

CIO role evolution: "The role of the CIO is becoming less of a tech leader and more of a business leader. It's how you apply the technology that makes a difference." says John Gibbs, CIO at International Airlines Group (parent to British Airways). CIO's will

Seamless alignment with business priorities: Value stems from the ability to bring assets, resources, insights and opportunities together. Aligned IT and business goals, and aligned financial and operational incentives will help companies deliver this value.

Blurring of IT and business: The boundaries between IT and business will blur significantly. Business analysts will configure business rules and functionality that would have previously required IT teams to develop, test, and deploy code.

Breaking down of silos: As a result of aligned priorities and blurred boundaries, the third age will see the creation of multifunctional teams across IT and business - what Gartner call "fusion teams". Technology will become an integrated part of business processes.

IT SLAs will become business KPIs: IT will define success based on the function's ability to support the business's key objectives. Metrics hierarchies that reflect the technical and business outcomes will help deliver dividends and identify the chain of accountability. Note, this doesn't mean that IT abdicates responsibility for uptime, scalability, resilience etc.

IT governance will change: IT will decide where it can relax "ownership" of applications. Governance will transform to balance the business's desire to move quickly, whilst mitigating operational or security threats. This will require overhaul of models, processes, and supporting systems.

Unilever have already begun their third age transformation. "Everything we're trying to do and every choice we make as a business is to be as data-informed as possible. We want to surface data at every decision point—the right data at the right time to the right person, when it matters most." Steve McCrystal from Unilever.

Sustainability enabled

I'm sure at some point you asked "what does this have to do with sustainability"? The third age is not the age of sustainability. However, it's the age where the CIO has the ability to impact sustainability. As IT becomes part of daily business operation and delivery, it embeds itself in every business activity. Thus it becomes possible to conduct activity based environmental accounting using data that is already being collected and used for activity based performance and monitoring. The third age creates the right environment for data-based decision making, data-based reporting, data-based accounting, hence CO2e accounting, benchmarking, and auditing, and so on.

Conclusions, caveats and calls to action

I appreciate that I have taken a great many liberties in summarising IT transformations into three distinct ages. In reality, enterprise IT has and will continue to evolve at an uneven pace. I also acknowledge that I use the term CIO as though it had a common job description. CIO roles vary more than any other C-suite role and often include partially or wholly, the role of the CTO. I only had a 1000 words. Mea culpa.

Nonetheless I think the argument carries that a) as enterprise IT matures, it embeds IT further into the business and b) the further embedded, the exponentially easier it is to measure, track, reduce, report and improve enterprise sustainability performance. If you're interested in assessing or improving your IT sustainability performance, or would like to incorporate an assessment into your current IT transformation plans, feel free to reach out to us.

Can DCs Ever be Carbon Neutral? Truth vs Green Wash

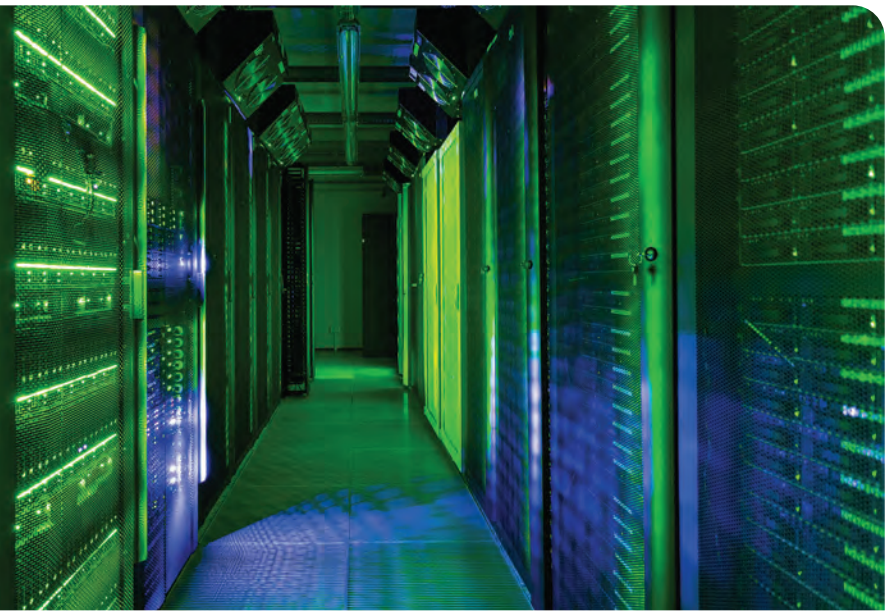
By Ian Bitterlin, Portman Partners Associate

THE 'EFFICIENCY' of nearly all data centres is zero unless you define them as heaters. They are 100% efficient as heaters, as they turn all the incoming energy to heat and >99% of them reject that into the environment. That is why the most common metric of PUE (ISO/IEC 30134) uses the term 'effectiveness', not 'efficiency'. Very few offer low-grade waste heat to adjacent use/processes, but it can be difficult to engineer unless you have a district cooling/heating system passing your door, especially if your facility runs at partial load. There is not enough heat generated to pay for the recovery and make a profit.

The question refers to 'carbon neutrality' and 'greenwash', which are inextricably linked, but we are trying to achieve Sustainability, so I will start there. By definition, Sustainability is achieved in three steps that must be taken in order:

- Reduce consumption
- Improve the process
- Use renewable energy

The data centre industry has turned this on its head. Today, it goes straight for renewable energy, even from other countries and continents, and claims that the data centre is 100% green, sustainable, or zero-carbon. In terms of greenwashing, this claim, in isolation, is a perfect example, mainly because all forms of energy production (including hydro, wind, solar, and nuclear) has a carbon content, and IPCC 2014 sets down the internationally agreed kgCO2/kWh. Luckily wind and nuclear (one each of intermittent and continuous) are the lowest carbon sources at ~14gCO2/kWh. If you are unsure why wind has a carbon expenditure, consider the energy used to manufacture turbine blades, masts, foundations, installation, connection, service, substations etc. The life is 15 years, and a high proportion of the turbine cannot be recycled; hence the embodied carbon is amortised over the service life. So, 'zero' or 'neutral' isn't possible, but don't get me wrong, low-carbon sources must supplant fossil fuels as soon as possible to check the rate of climate change.



Step 1: Reduce Demand.

Data centres have grown exponentially in response to data traffic growth, despite the exponential increase in ICT hardware capacity per watt.
Data traffic in Europe has been increasing at an exponential rate of 4% per month for more than 20 years. This is in the order of 60%CAGR, whilst ICT hardware has been improving at 40-50%CAGR. Thus, data centre power has been growing at a net -15%CAGR. Of course, the detailed growth and capacity curve have been step-functions over time, but the trend line has been inexorably steady. Currently, personal use such as HD video streaming and social networking is the dominant driver of that growth. Even through the pandemic with the correlative move to remote working, daily traffic continued to peak at 10 pm, unlikely caused by work meetings on Zoom.

The improvement in ICT capacity/watt has largely exceeded that forecast by Gordon Moore's law. Still, we are just on the cusp of graphene replacing silicon and reaching 1.5nm. That could be the last gasp of Moore's Law when we will have no choice but to constrain data traffic growth. We probably can't get the lid back on Pandora's Box, so if we want to talk about 'sustainable' data centres, we must dislocate demand and view the data centre in isolation. I disagree with doing that, as it is sweeping the environmental problem under the carpet. Still, if we don't do so, then ICT is not sustainable in any form as demand will continue to grow unfettered. Let's not forget that more than 40% of the global population doesn't have an internet connection, but in the future, they could be streaming 4K movies to their mobile phones whilst the floodwater passes their chins. I regret that I am not optimistic about us solving this problem until well after the 11th hour.

Step 2: Improve Process

Here we have three opportunities to reduce energy demand, manage the ICT hardware, the PUE, and reuse waste heat. Managing the ICT hardware is both behavioural and practical. First, we need to purchase hardware with capacity/watt as the main factor for the application. Then, we need to utilise the hardware to the maximum possible extent (including virtualisation if applicable and at >60%), ending our long-term under-utilisation in colocation

and enterprise facilities (even today at 10-15%). Finally, whilst the effect of Moore's Law et al. are available to us, we then need to refresh hardware regularly to take full advantage of increasing capacity/watt.

An argument can be made to shift all load to hyperscale facilities – what you may call the cloud, but I would not – where utilisation is maximised, but that must not come with lower availability, reducing attractiveness to the user. Cloud, just another data centre, should be viewed with the energy used in data transport, not just in the data centre - the advantage of 'Edge'. There is a stronger argument for regulating the demand for social networking via taxation and restricting the video definition to save energy, particularly on mobile devices. In the face of climate change, anything that saves energy that is nice to have but not essential should be regulated, most probably by taxation, as was recommended in 1865 by WS Jevons and his Paradox.

In Step 2, we must include reducing PUE to improve the process, but here we run into a problem highlighting some of our dirty washing. Reducing the PUE in new facilities is easy. However, it usually requires the client to agree to take increased risks to his availability of ICT service by reducing M&E redundancy and investigating various ways to manage the ICT hardware thermally. In climates like those of London, Frankfurt, Amsterdam, and Paris, reaching a PUE of 1.30 without water consumption and 1.20 with is not hard.

So, why has the reported PUE (EU CoC Participants Scheme) hardly reduced in the last five years and is still higher than 1.75? The reason is that data centres are built to serve a purpose in a location to suit the business plan. They are rarely fully loaded, and only a very few use evaporative or adiabatic cooling, and PUE largely depends on climate, cooling efficiency and load.

The high PUE reflects the preference of most data centres to achieve high availability before low energy. Even the innovative Google (1.12) and Facebook (1.07) don't shout about their PUE anymore. The greatest opportunity to reuse waste heat will be 'edge' single cabinets in city centres, local hotels that can use 15-20kW of low-grade hot water 24/7.

Step 3: Renewable energy

Operators can buy any blend of power they want where the data centre is in the same grid network in an acceptable Power Purchase Agreement (PPA). The grid then has to balance supply and demand when the fuel/source mix varies. That is why places like Dublin, Frankfurt and Amsterdam have occasionally placed moratoriums on new data centres - because their grid emissions rise when the wind doesn't blow hard enough. But Virtual PPAs should be better explained.

Plenty of large operators have data centres located in 100% fossil-fuelled grids that claim to be '100% green' (renewably powered) by purchasing the Renewable Certificates in distant grids with no power connection.

In sum, energy efficiency and carbon neutrality is a big subject that can only be addressed when the audience is fully aware of what is really happening at this time – First-Class Greenwash!

DCA Sustainability Special Interest Group Update

By Astrid Wynne, SIG Chair

DCA SUSTAINABILITY SPECIAL INTEREST It is eight months since the DCA Special Interest Group on Sustainability (SIG) released its best practice whitepaper. It focused on five steps organisations in the sector can take today to improve their sustainability performance in a low cost, high impact way. Our five steps were not the only ones to take – and by no means an exhaustive list – but the direction they represent has been borne out by recent conversations amongst large companies, investors and academics looking at sustainability in the data centre sector.

Work on Greenhouse Gas Emissions

Despite the increased pressure to reduce operational energy usage because of the conflict in Ukraine, the importance of supply chain emissions is being highlighted by those in the industry. Equinix and Infrastructure Masons amongst others have funded a short film on the importance of Scope 3 emissions associated with the use of concrete and steel in the buildings as well as the metals in the equipment they house. "How much faster could we accelerate decarbonization and scope 3 emissions if the digital infrastructure ushering in the 4th Industrial Revolution, worked directly and strategically with their supply chain to revolutionize industrial processes?" the film asks. It makes a strong case for assessing and reducing travel miles as well as extending product lifetimes in order to do this.

Making a Net Zero Pledge was the first of the five actions suggested by our whitepaper, and something we are continuing to articulate to the market this year. The first stage of a net zero plan is to reduce energy usage. Without stepping on the toes of our energy efficiency SIG, we have been looking at this over recent months.

One talk discussed the impact of running servers hotter on facility energy draw and an upcoming talk with examine the role of software. The next step is decarbonising energy supply by signing green electricity contracts and also finding alternatives to diesel back-ups. We will be welcoming any organisations that can give an insight into this over the coming months.

We are also hoping that a growing industry awareness of Scope 3 will support movement in the direction of a our second of our five actions, which is to Address environmental impact with Circular Economy. Circular Economy is the process of designing out waste and moving towards a system that is regenerative by design. This can come in the form of combined heat and power, as David Gyulnazaryan articulated beautifully at DCW London last March as well as in an article Intelligent Data Centres in June, or Work on social impacts
Until now, a lot of the social impact assessments would focus on the supply chain – the impact of mining on landscapes and communities and the ethics of sourcing materials from areas with political instability or less than satisfactory health and safety laws.

Our sustainability best practice whitepaper addressed this in one of our five steps last year, with our advice to the sector on creating a Code of Conduct.

There is also work being done on social impacts of data centres with studies being conducted by a PhD student at MIT. This study is different and examines the social impact of a data centre on the local community. What effect does low level background noise have on the quality of life of residents? What are the results of having diesel generators kept warm ready to kick into action in the event of electricity failure?

Practical steps towards addressing this would be something like a B Corp Impact Assessment, which was another of the recommendations the Sustainability Best Practice whitepaper. B Corp as an organisation has come under fire recently as some of its members are criticised for plastic pollution and other negative activities. However, the B Impact Assessment is the most widely available, most accessible free of charge resource to address the areas of Governance, Workers, Communities, Environment and Customer relationships.

One talk discussed the impact of running servers hotter on facility energy draw and an upcoming talk with examine the role of software. The next step is decarbonising energy supply by signing green electricity contracts and also finding alternatives to diesel back-ups

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