



EMEA | Q2 2021

# **Powering Change:** Sustainability in the European Data Centre Sector



# Foreword

One of the key lessons learned from the ongoing COVID-19 global pandemic has been the enormous dependence on the digital infrastructure. Almost every facet of our life has in some way been intertwined with digital technology. Data has in some way been the golden thread directly or indirectly impacting our lives in the past 12 to 15 months like no other time in our history.

In a strange and unexpected way, the pandemic has heightened the focus on two other phenomena, and these are potentially conflicting and diametrically opposed actors. **Climate Change** and the exponential growth in the **Demand for Data**.

Lockdowns across the World's megacities saw a substantial change in air quality. Air pollution plummeted in Beijing, which is among the world's most polluted cities, resulting in a 40% decline in NO2 and visibly clear blue skies over the city. COVID-19 has given us a physical reminder of the importance of sustainability and the urgent change that is needed.

This paper looks at the surge in the demand for data, the role of data centres and the parallel urgency in the need to address climate change. The common thread is **sustainability** and **the environmental impact** of data centres and the questions that must be addressed today to ensure a sustainable tomorrow. I hope you enjoy the report.

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**Colm Shorten**  
Senior Director,  
JLL Data Centres EMEA





# The Rapid Rise of Data

The amount of **data** created each year is growing faster than ever before. In 2020, every human on the planet was creating 1.7 megabytes of information each second. By 2025, the amount of data generated each day is expected to reach **463 exabytes globally**.

In today's world we are living through constant digital transformation. Increased advances in technology such as artificial intelligence (AI), advanced robotics, cloud computing, big data, smart devices/cities/buildings and 5G have restructured how people interact, work and behave.

The growth of data has been driven predominately by consumer demand. As their digital world overlaps with their physical realities. Consumers expect to access products and services wherever they are, over whatever connection they have, and on any device. By 2030, nine out of every ten people aged six and above will be digitally active.

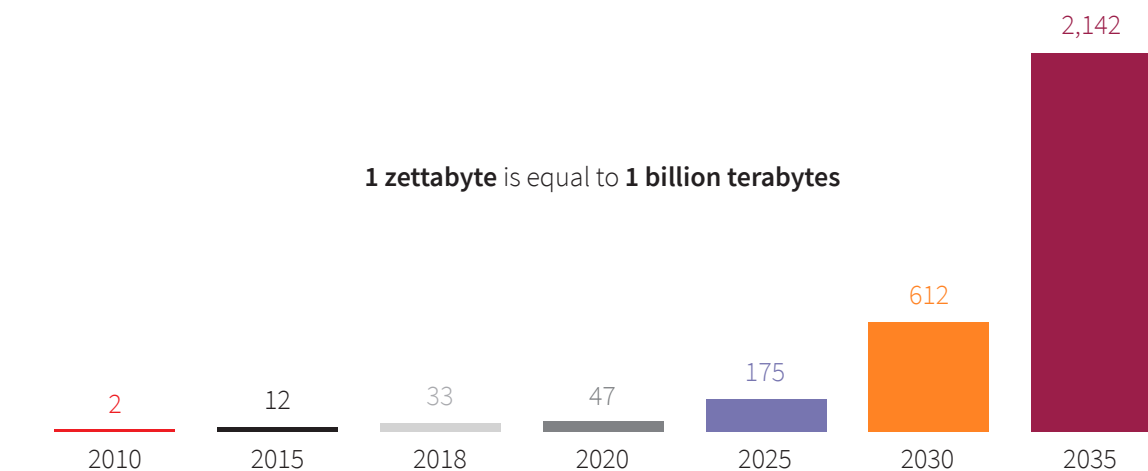
## Globally per day



Source: Techjury – How much time do people spend on social media in 2021

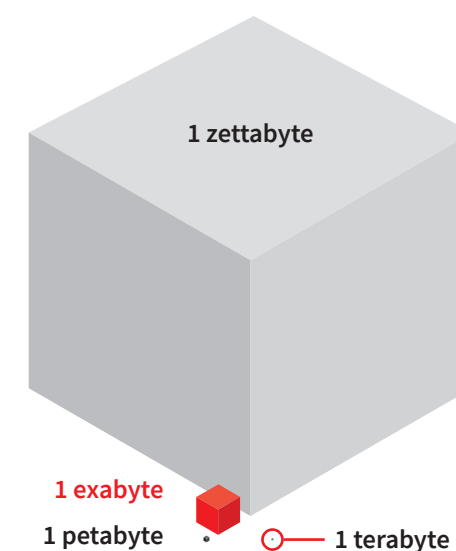
Of the 150 billion connected devices that will be connected across the globe by 2025, most will be creating real-time data, according to the IDC. The global datasphere is expected to grow from, circa 60 – 70ZB (zettabyte), growing to 175 ZB by 2025.

## Global Data Creation: Actual vs. Forecast (zettabytes)



Source: Statista Digital Economy Compass

## Data Defined



**Kilobyte:** 1,000 bytes. The Apollo guidance computer aboard the Apollo 11 mission has the equivalent of 72KB of storage.

**Megabyte:** 1,000,000 bytes. The IBM 3.5 inch floppy disk had 1.44MB of storage space

**Gigabyte:** 1,000,000,000 bytes. The SanDisk Cruzer Micro USB pen drive introduced in 2011 had 4GB of storage capacity

**Terabyte:** 1 trillion bytes

**Petabyte:** 1 quadrillion bytes

**Exabyte:** 1 quintillion bytes

**Zettabyte:** 1 sextillion bytes (global internet traffic exceeded 2ZB in 2019)

# Data Centres Growth and Outlook

The growth in demand for data translates into a direct demand for data centres.

The Covid-19 pandemic demonstrated our dependence on the digital infrastructure, when globally the vast majority of people were working remotely and relying on digital tools or platforms like Zoom and Microsoft Teams to stay connected. In addition, on-demand entertainment streaming services and gaming subscriptions increased in popularity due to households looking to keep themselves and children occupied during lockdowns.

With flexible working and hybrid working models looking set to be the new normal for many people and organisations, the demand for data will remain elevated for the foreseeable future. We expect to see substantial growth and innovation in the sector driven by increasing demand.

Data centre investment worldwide has ratcheted up during the pandemic. Like other regions, data centre demand in Europe, Middle East & Africa is largely driven by hyperscalers and technology players. One example is the recent purchase of 33 acres of land from a hyperscaler in London. Additionally, TikTok will build a US\$500 million facility in Ireland.

In Europe, major markets like London, Frankfurt, Amsterdam, Paris and Dublin continue to dominate. But as a broader range of investors pile in, markets such as Madrid, Berlin and Warsaw are coming into focus. With pricing high in the more established markets, there's a logical step being taken by investors into areas where there is less competition and evidence of potential for growth.

## How many data centres are there?

It is estimated that by the end of 2021 there will be circa 7.2 million data centres in the world, an overall reduction from 8.4 million in 2020. However, the average footprint / IT capacity is significantly higher, meaning there are less data centres producing higher IT capacity and more larger facilities commonly referred to as hyperscale.

# Data Centre Sustainability

With demand for data centres set to increase and in conjunction with the urgent need to address climate change it becomes clear that the data centre sustainability agenda is of critical importance. Furthermore, this process will not be a one-off project but a lifelong journey, which is only going to intensify.

**Data centre sustainability is now at the top of the agenda** for operators, customers and stakeholders. The Covid-19 pandemic has not only highlighted the increasing demand for digital infrastructure, but also reinforced the role real estate must play in the fight against climate change. The built environment is estimated to account for nearly 40% of total direct and indirect CO2 emissions, meaning the real estate sector has a large role to play in leading the way to making net zero commitments and addressing sustainability.

***At Yondr we have a goal to be an ethical and sustainable business. We are targeting a 50% reduction in carbon emissions from data center construction by 2025 and to providing 100% renewable energy to our clients to become a net zero carbon business.***

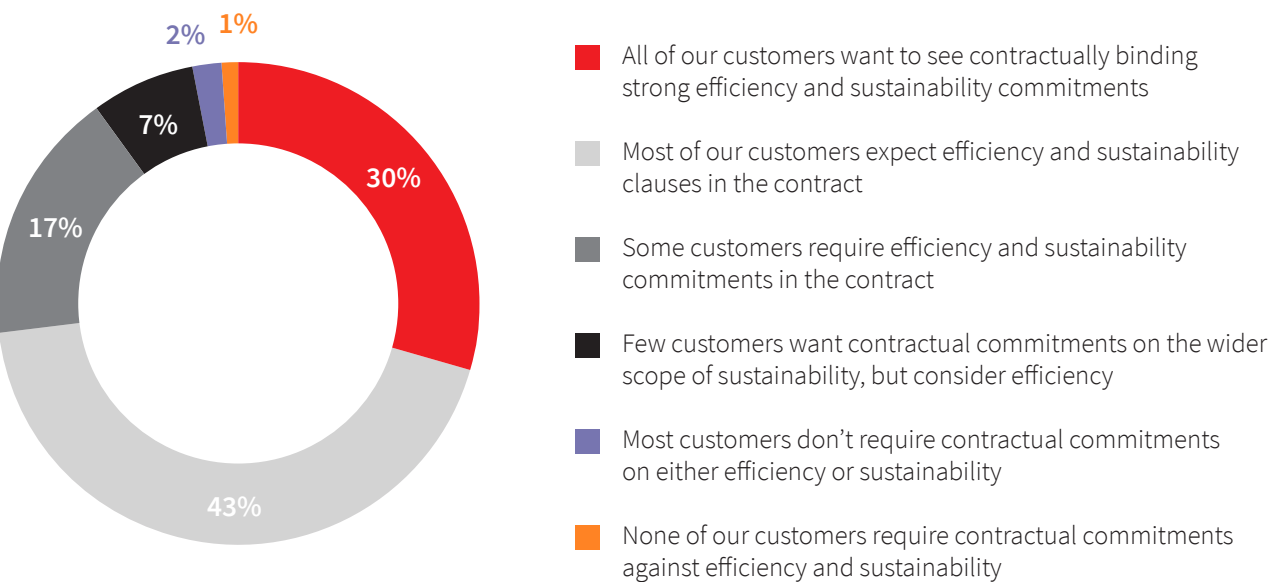
**Neil Winch**  
Development Director, Yondr Group Limited

The sector has witnessed exponential growth in the last five years, which has attracted institutional interest. Potential investors will want to make sure that Environmental, Social and Governance (ESG) concerns are fully met, with no ethical concerns.

In a recent survey of 825 Multi-Tenant Data Centre (MTDC) operators by S&P, about 43% said they have a strategic sustainability initiative in place to improve their data centre builds and operations in a comprehensive fashion. The results show that sustainability is clearly a customer driven focus.

**Importance of efficiency/sustainability to customers**

*Q: Which of the following best characterises how important efficiency and sustainability is today for your customers?*



Source: 451 Research (S&P Global Market Intelligence)

# The Legacy Data Centre Environment

Legacy data centres, which were built over ten years ago, were built in an era where availability and uptime (the guaranteed annual availability of a data centre) were at the top of the agenda. Fast-forward to today, and that agenda has shifted to one of sustainability and corporate responsibility. Addressing sustainability is now more widespread, urgent and front and centre for many organisations.

Many of the so-called legacy data centres will still be in operation in the next ten years, which raises some important questions around how to achieve new industry targets and more importantly, are these targets achievable? If the current data centre sustainability targets are to be achieved, it will require a great deal of investment and innovation.

The challenge will be a fine balance to drive energy efficiency while maintaining availability, while at the same time developing an increased focus on other important sustainability factors such as water conservation and the circular economy.

Looking forward, the industry faces the added challenge of decarbonising legacy data centres and end-of-life emissions associated with the building materials used. Building new data centres creates the opportunity to build more sustainably from the outset, allowing considerations for sustainable design, development and materials.

During the life cycle of these facilities, the primary focus was on operational-energy efficiency (cooling, consumption and continuity) or the “cradle-to-gate”. The move to the circular economy has shifted the narrative to 2025 and 2030 targets which are fast approaching, however, given the difficulty for a legacy data centre to “pivot” it is not clear how these more mature facilities can achieve these targets.

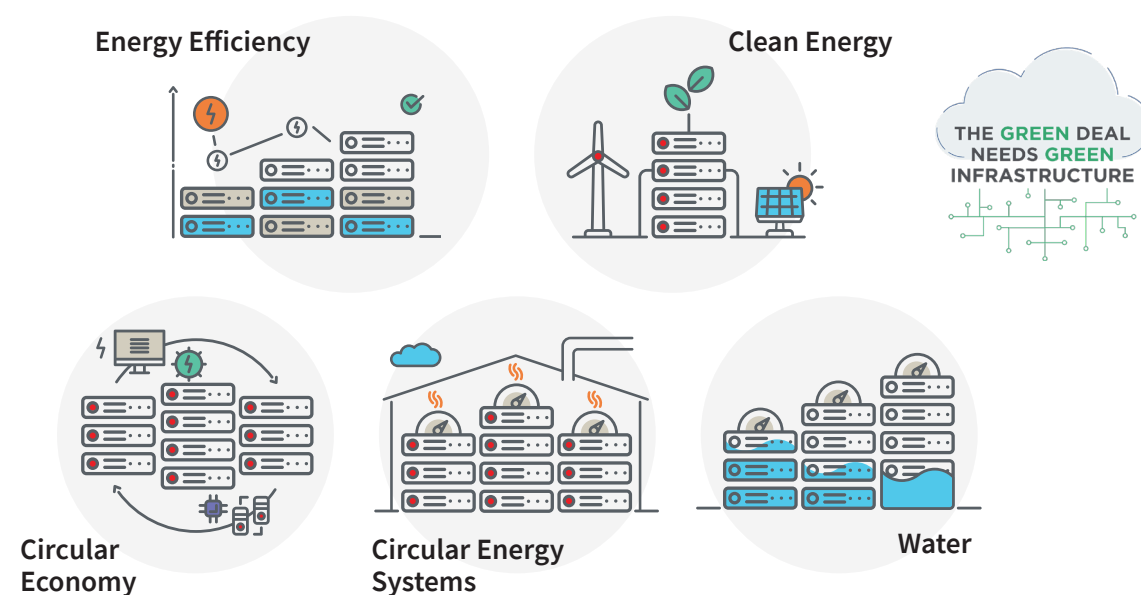
# Today's Data Centre Environment

The green data centre is at the forefront of every operator's mission statement as a key business objective. Data centres by nature are complex, resource hungry buildings that require lots of cooling, but they must adapt to the growing pressure to reduce CO2 emissions, reduce water consumption and address waste across the complete data centres ecosystem.

Currently 17 industry bodies have backed the **Climate Neutral Data Centre Pact**, a pledge of industry players and trade associations of cloud infrastructure services and data centres in Europe to achieve climate neutrality by 2030. Europe has an ambitious target of being the first climate-neutral continent by 2050.

The European Commission estimates that data centre energy consumption will rise from 2.7% of all electricity demand in 2018, to 3.2% in 2030, so this pledge sets out a key road-map to drive transformational change in the sector.

## The Five Action Points



Source: European Data Centre Association (EUDCA)

# Accountability and Transparency

As the data centre sector continues to grow, so too will the obligation to manage the growth in a far more sustainable way. The data centre community are proactively taking steps to address the critical requirement to produce sustainable solutions and many of the world's largest technology companies are committed to driving the climate change agenda with the industry. Regardless of the driver, sustainability is now at the core of the entire data centre industry.

***The Climate Neutral Data Centre Pact is an unprecedented commitment by leaders within our industry and a major step in the right direction towards a sustainable future and establishing Europe as the first climate neutral continent in the world by 2050.***

***Our London I, London II, London III and Amsterdam data centres are running on 100% renewable energy, and we're on track to have this metric met across our whole European portfolio in the near future.***

**Matthew Pullen**  
EVP, Managing Director Europe at CyrusOne

# Reporting

Publishing sustainability data is becoming a key element to the data centre providers annual reporting. It sends a clear message to its key stakeholders that there is a genuine commitment to ESG responsibility.

The JLL score card framework below is aligned with both the Climate Neutral Data Centre Pact (industry), corporate targets (business unit), and sustainability development goals (global targets). Although companies report on different metrics, or put greater emphases on specific goals, these key metrics are often used and are getting bolted into procurement contracts and Service Level Agreement’s (SLA’s).

Sustainable Development Goals		Data Centre Sustainability Score Card		Series of Standardised KPIs ISO/IEC 30134 2017/8 EN 506001-3	
SDG Alignment		Description	Metric	General Requirement	
7 AFFORDABLE AND CLEAN ENERGY	13 CLIMATE ACTION	Energy Consumption	(GWh) mtCO2e	CUE Carbon Usage Effectiveness	
9 INDUSTRY, INNOVATION AND INFRASTRUCTURE	12 RESPONSIBLE CONSUMPTION AND PRODUCTION	Renewable Energy	%	REF Renewable Energy Factor	
12 RESPONSIBLE CONSUMPTION AND PRODUCTION	13 CLIMATE ACTION	Power Usage Effectiveness	(PUE)	PUE Power Usage effectiveness	
6 CLEAN WATER AND SANITATION		Sustainable Water	(WUE)	WUE Water Usage Effectiveness	
12 RESPONSIBLE CONSUMPTION AND PRODUCTION		Waste Management	(ton) %	ERF - EDE Energy Reuse Factor Electronics Disposal Efficiency Reuse - Repair - Recycle	

CUE : Carbon Usage Effectiveness - ITEUsv : IT Equipment Utilization for Servers - ITEEsv : IT Energy Efficiency for Servers

# Metrics that Matter

## Self-Regulatory Initiative

The **Climate Neutral Data Centre Pact** sets out clear direction on some of the key areas in which they provide support to the European Green deal, in setting time-based deliverables. They set a number of targets and agreed to develop additional specific metrics in the coming months.

The Climate Neutral Data Centre Pact					
Metric	PUE	CUE/REF	WUE	EDE	ERF
	Energy Efficiency	Clean Energy	Water Conservation	Circular Economy	Circular Energy System
Target	PUE 1.3 & 1.4 New DC : 2025 All DC : 2030 New DC Efficiency Target effective 2030	75% Renewables 2025  100% Renewables 2030	WUE Target 2022  New DC : 2025 All DC 2030	Reuse Repair Recycle Target 2025	Explore District Heating
Initial Measurement Period: Jan - Dec 2022: Certify Adherence July 2023					
To Make Data Centres Climate Natural by 2030					

PUE : Power Usage Effectiveness - CUE : Carbon Usage Effectiveness - REF : Renewable Energy Factor - WUE : Water Usage Effectiveness - EDE : Electronics Disposal Efficiency - ERF : Energy Reuse Factor

Source: European Data Centre Association (EUDCA) / JLL

What is PUE?

Power Usage Effectiveness (PUE) is a ratio used for measuring the energy efficiency of a data centre. It is calculated by the total facility energy divided by the energy delivered to the IT equipment. A PUE score of 1.0 would indicate 100% efficiency whilst a score of 2.5 or above would indicate a very low level of efficiency.

What is WUE?

Water Usage Effectiveness (WUE) is a ratio that measures the amount of water used by data centres for cooling, temperature, humidity control and producing on-site electricity. The metric is calculated by taking the annual water usage in litres by the IT power energy usage.

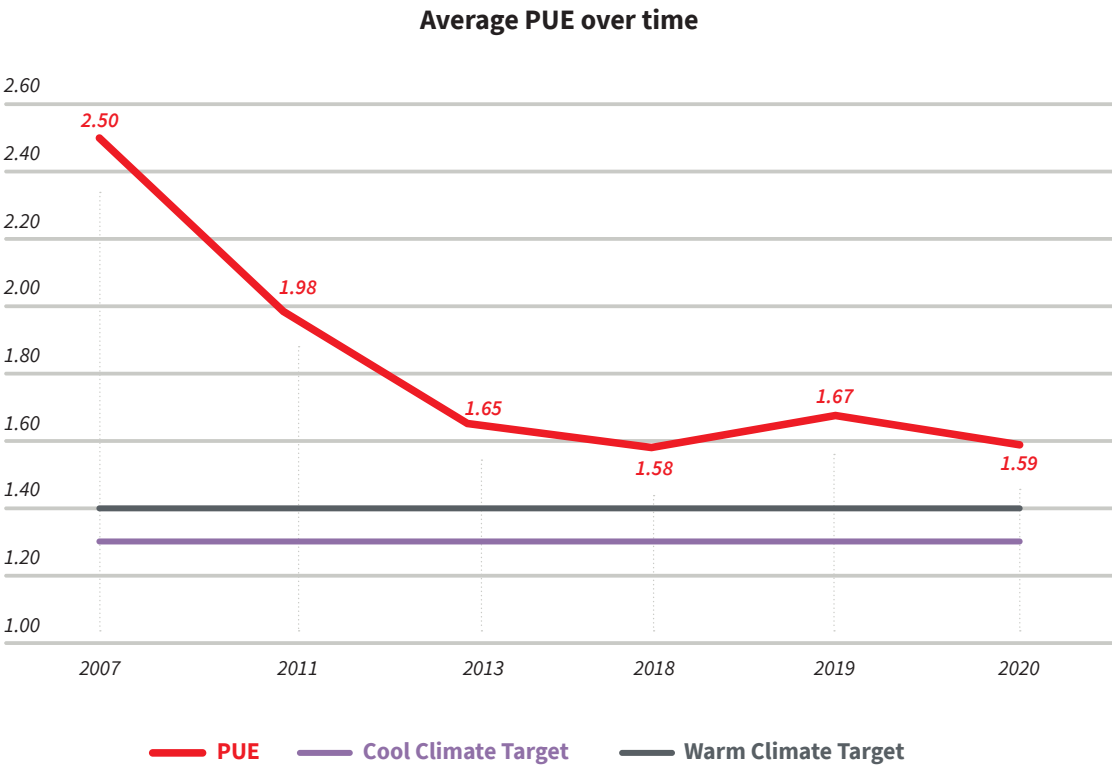
# The Transition to Reach Targets

Energy optimisation is a key focus for existing Data Centre infrastructure. Although PUE is a good indicator, it is critical to focus on **Air Flow management**, regardless of the cooling strategy. It is of paramount importance to lower the energy consumption as data centres, which are big producers of heat and need to be cooled. Roughly 30% of energy consumed in a data centre is allocated to cooling systems, so centres in colder climates will typically have lower PUE's than those in warmer ones.

Reaching PUE and WUE targets is more complex given the considerable number of legacy centres currently operational in the market. As PUE drives very different behaviours between legacy and new data centres it is often viewed as contentious. However, we will continue to see PUE as the industry benchmark metric for sustainability until the industry agrees on an alternative.

The Uptime Institution Global Data Centre Survey 2019 reported that the average PUE of its 624 participants actually rose from 1.58 in 2018 to 1.67 in 2019, but has stayed relatively level over the last couple of years.

In many cases the PUE data is bundled into bubbles or multiple data centres, rather than granular data on single facilities. This is further weakened by the inconsistent publication of the actual data across the board. This lack of transparency may lead questions of lack of accountability and undermine the purpose of the Climate Neutral Data Centre Pact if not addressed.



Source: Uptime Institute Global Data Centre Survey

Key for charts

PUE	Level of efficiency
3.0	Very inefficient
2.5	Inefficient
2.0	Average
1.5	Efficient
1.2	Very efficient



# A Sustainable Future for Data Centres

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## Sustainable Data Centres: Now Top of the Agenda

Data centre sustainability is now at the top of the agenda for operators, customers and stakeholders. Industry pressures are likely to increase as corporate sustainability evolves and regulations are enforced as the world moves forward in trying to reach net zero carbon. Customers will continue to demand green solutions from operators to help achieve their sustainability commitments.

## Big Data Growth = Greater Demand for Data Centres

The growth in demand for data translates into a direct demand for data centres. In today's world of constant digital transformation, the amount of data created each year is growing faster than ever before and not expected to slow down. With flexible working and hybrid working models looking set to be the new normal for many people and organisations, the demand for data will remain elevated for the foreseeable future.

## Compliance around the Emerging Regulatory Environment

European data centres need to meet PUE commitments by 2025 (new data centres) and 2030 (legacy data centres). If operators fail to meet these commitments, it could result in being less favourable to other organisations during the procurement process, as they too will have stringent ethical and sustainability obligations to meet across the value chain.

# Next Steps

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## Define a Sustainability Strategy

Europe has an ambitious target of being the first climate-neutral continent by 2050, set out in the European Green Deal. Organisations will require clearly defined strategies to support them when navigating the long road ahead to reduce emissions and meet net zero commitments.

## Develop a Clear Roadmap for Achieving Commitments

Data centre operators and owners have an obligation to define, develop and implement a clear roadmap for achieving PUE commitments by 2025-2030. Data centres are a complex sector and not "Not One Size Fits All", but there is guidance and support available around setting time-based deliverables.

## Reporting, Accountability and Transparency

Publishing sustainability data is becoming a key element to the data centre providers annual reporting. It sends a clear message to its key stakeholders that there is a genuine commitment to ESG responsibility.

## About JLL Data Centres

In this age of digitisation and disruption, the data centre has never been more critical. JLL's dedicated data centre team is here to help you at every stage of the data centre lifecycle with a comprehensive suite of solutions. From advisory, investment, acquisition, construction management, through to operational management, and disposal. We'll help you to drive returns, operational efficiency and profitability, and deliver on critical sustainability goals.

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# Closing Thoughts

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The road to Net Zero is challenging and we will need a set of agreed metrics to provide a “Direction of Travel”. Today across the data centre sector there are a number of working groups set out to develop data centre efficiency metrics. Although PUE has been the general efficiency metric quoted it is not without flaws, and sometimes applied incorrectly (see ISO/IEC 30134-2:2018). Given the level of complexity, and the need to be open and transparent, it is critical that we develop a universally standard set of KPI’s which can be published. Failure to do so may lead to a set of metrics being imposed, which will be far from desirable.

The data centre community need to develop a set of science based targets, which are challenging yet attainable. That way we are driven by the data in our decision making and behaviour, and not just focused on compliance to meeting a minimum standard. But rather setting high standards and best practice right throughout the data centre life cycle, from ‘cradle to grave’.

# Data Centre Solutions Leads

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