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Sustainable infrastructure for the digital age:
Data centres and renewables

OPINION PIECE. PLEASE SEE IMPORTANT DISCLOSURES IN THE ENDNOTES.

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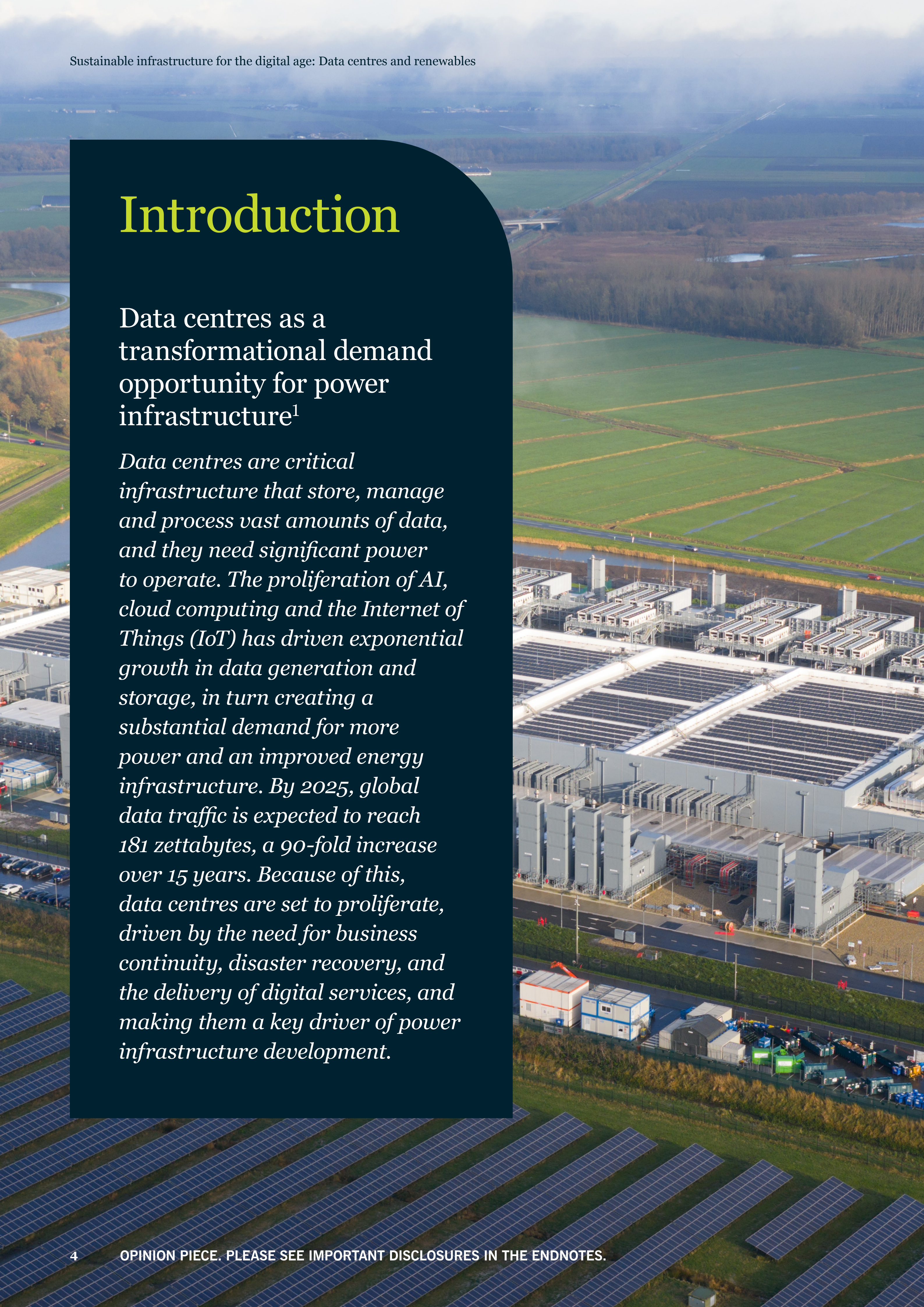
Executive summary

Data centres are becoming indispensable to the global digital economy as AI, cloud computing and IoT drive exponential growth in data creation and storage. This surge is creating extraordinary power demand, with global data traffic projected to reach 181 zettabytes by 2025, making data centres a major catalyst for new energy and grid infrastructure. However, power scarcity in traditional FLAP-D hubs (Frankfurt, London, Amsterdam, Paris and Dublin) has emerged as the principal constraint on new deployments.

Some regions face moratoriums, delayed substations, and multi year connection queues, pushing developers toward secondary markets with available capacity. As securing energy access becomes a gating factor for investment, existing grid connections are rapidly becoming strategic assets that materially influence feasibility, valuations and development timelines.

Simultaneously, data centre load profiles are shifting due to the rapid expansion of AI workloads. These workloads create high density, always on demand patterns that strain existing infrastructure and emphasise the need for better solutions. To overcome grid congestion, operators are increasingly adopting renewable integrated strategies, including co located solar and wind, battery energy storage systems (BESS), behind the meter configurations and long term PPAs, to provide both reliability and sustainability benefits. In markets such as Iberia, where renewable resources are abundant and power is inexpensive, these strategies are enabling new growth hubs that bypass the constraints of traditional FLAP D markets.

With ESG scrutiny intensifying, operators face rising regulatory expectations around decarbonisation, energy efficiency, water use and environmental disclosure. Regulations, combined with tightening local constraints on power use and cooling, are reshaping competitive dynamics and siting decisions for hyperscalers and co-location providers. Ultimately, renewable infrastructure emerges as the strategic foundation of long term digital growth, enabling operators to secure cost efficient, 24/7 clean power while reducing exposure to grid limitations, energy volatility and regulatory pressure, and positioning unconstrained markets to capture the next wave of AI driven expansion.



Introduction

Data centres as a transformational demand opportunity for power infrastructure[1]

Data centres are critical infrastructure that store, manage and process vast amounts of data, and they need significant power to operate. The proliferation of AI, cloud computing and the Internet of Things (IoT) has driven exponential growth in data generation and storage, in turn creating a substantial demand for more power and an improved energy infrastructure. By 2025, global data traffic is expected to reach 181 zettabytes, a 90-fold increase over 15 years. Because of this, data centres are set to proliferate, driven by the need for business continuity, disaster recovery, and the delivery of digital services, and making them a key driver of power infrastructure development.

European grid constraints: bottlenecks creating strategic value

European data centre growth is constrained by limited power availability in traditional FLAP-D data centre hubs (Frankfurt, London, Amsterdam, Paris and Dublin). For example, bottlenecks include:

- **Amsterdam:** Temporary bans on new data centre permits in certain municipalities.
- **Dublin:** Eirgrid (Ireland's transmission operator) has stopped accepting applications for new power in the city. The CRU (Commission for Regulation of Utilities) is regulating DC growth in Ireland by requiring that new data centers have at least 80% of their annual power demands met through additional generation by renewable projects within six years of term.
- **London:** Delays in introducing new substation capacity until the early 2030s.

These constraints have led developers to explore new locations with better power availability, creating strategic value in emerging markets. However, risks such as lower connectivity in new geographies remain a challenge.

The competitive advantage of renewable energy operators

Renewable energy operators have a competitive edge in the data centre sector due to the increasing focus on sustainability and ESG objectives. Data centres consume vast amounts of electricity, and the shift toward renewable energy sources aligns with both government regulations and corporate sustainability goals. Operators leveraging renewable energy can attract hyperscalers and enterprises that prioritise green initiatives, improving their market position and long-term viability.

Market fundamentals: AI, cloud computing, and the step change in power demand

The data centre market is experiencing a significant transformation, driven by advancements in technology.

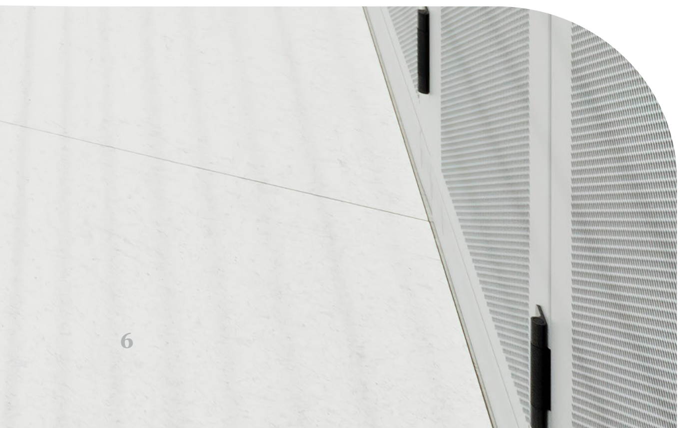
AI: The growing adoption of AI is expanding the demand for co-location data centre capacity, as more processing power is required to train and deploy AI models. Global AI revenues are projected to grow from less than USD 100 billion in 2021 to near USD 1.4 trillion by 2029.

Cloud computing: Hyperscalers such as Amazon Web Services, Microsoft and Google are the largest purchasers of data centre capacity in Europe, driven by the advantages of off-site hosting.

IoT and big data: The proliferation of connected devices and data analytics has significantly increased data generation, further driving demand for data centres.

These factors are contributing to a step change in power demand, with FLAP-D markets leading the way in capacity demand and supply growth.

Data centre power economics and demand characteristics[2]



Load evolution: traditional IT infrastructure vs. AI-driven workloads

In 2025, traditional workloads accounted for 77% of global data centre workloads. By 2030, this share is expected to decrease to 50% due to the rapid growth of AI-driven workloads. These represented 23% of data centre activity in 2025, with AI training being the primary driver. By 2030, AI workloads are projected to account for half of all data centre activity, with inference surpassing training as the dominant AI requirement by 2027. AI inference is the process where a trained AI model uses what it has learned to make predictions or decisions. Inference workloads will require distributed regional hubs for low latency and scalability. Latency is the delay caused by the time it takes for data to travel from one point to another.

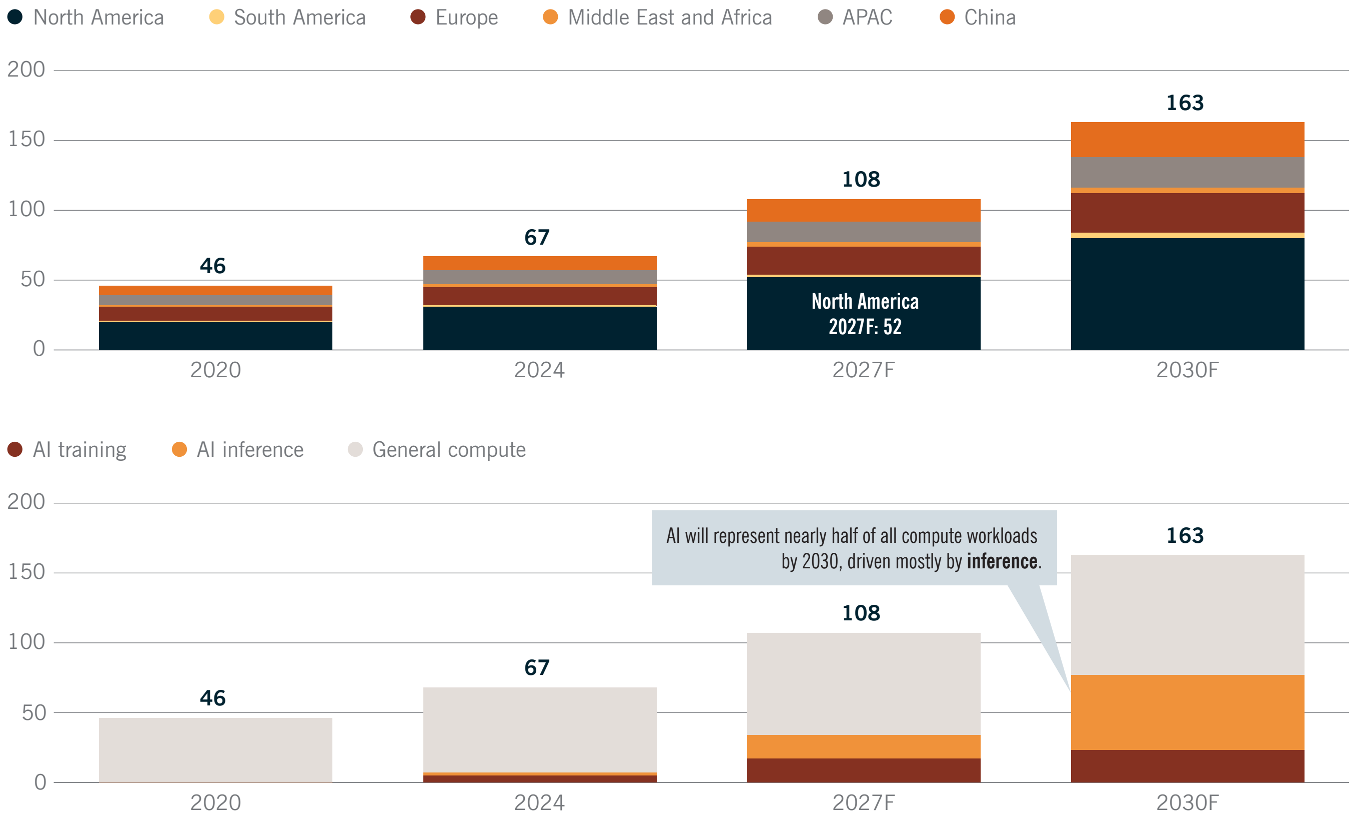
Continuous baseload requirements: the 24/7 demand profile

Data centres face continuous demand due to the growing reliance on cloud services, internet traffic and AI applications. AI inference workloads, in particular, require real-time responsiveness and geographical distribution to reduce latency and serve users effectively. The sector is constrained by grid limitations, requiring behind-the-meter generation, BESS and renewable energy solutions to ensure uninterrupted power supply and to meet sustainability goals.

Mission-critical reliability standards and redundancy architecture

Data centres are designed to meet mission-critical reliability standards, with redundancy architecture ensuring uninterrupted operations. Redundancy architecture is a design approach in computing (especially in data centres) that ensures a system keeps working even if part of it fails. In this case, it includes advanced cooling systems, battery storage, and back-up power solutions. Data centres rarely become obsolete, as they have regular systematic upgrades. After 10 years, 65% of facilities undergo significant renovations, and nearly all buildings receive refresh cycles after 15 years. Cooling and power systems are the most common upgrades.

Figure 1: Global data center capacity by compute type (gigawatts)



Data source: Jhttps://www.bain.com/insights/ai-data-center-forecast-from-scramble-to-strategy-snap-chart/. Published in October 2025.

Market segmentation: hyperscale, co-location and edge — growth trajectories and investment implications

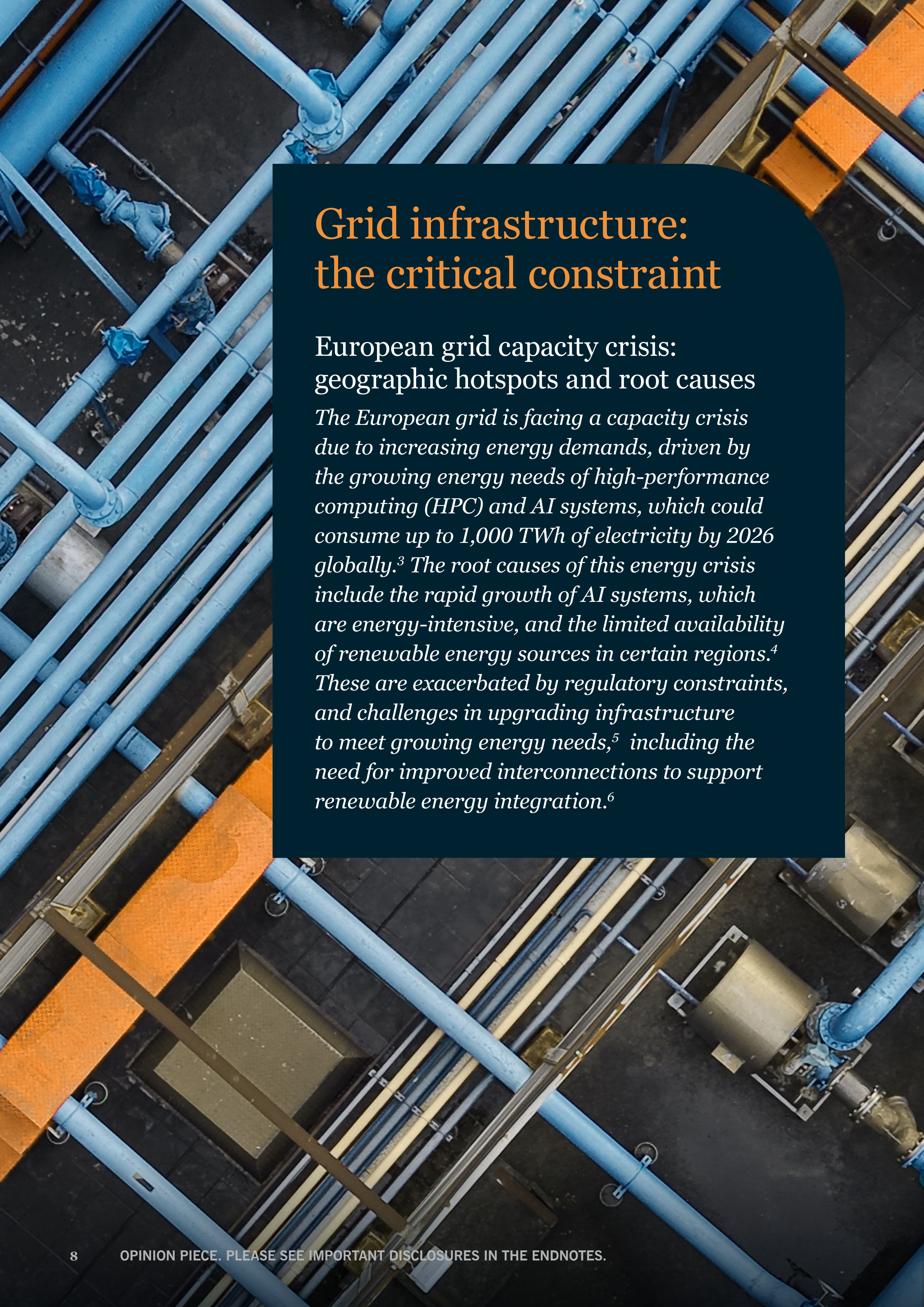
The data centre sector is in a capital-intensive supercycle, with up to USD 3 trillion in combined real estate and tenant capex by 2030. Hyperscalers are expected to spend USD 1 trillion on data centre infrastructure between 2024 and 2026, while modular systems and micro data centres are projected to reach USD 48 billion in annual sales by 2030, supporting faster deployments and geographic expansion.

Hyperscalers: Hyperscalers are driving sector growth, executing a dual strategy of leasing and self-building. Hyperscale owner-occupied capacity is expected to grow at a 19% CAGR, reaching 70 GW by 2030. Hyperscalers are also partnering with neocloud providers — a new class of cloud computing companies that are built specifically to support high performance AI workloads.

Co-location: Leased data centre segments, including co-location and build-to-suit facilities, are projected to add 62 GW by 2030, growing at a 20% CAGR.

Edge: Edge refers to running computing resources closer to where data is generated or where users are located, instead of relying entirely on centralised data centres. The shift to AI inference will drive demand for edge deployments to reduce latency and serve users more effectively. Edge intelligence will evolve into embedded systems, creating opportunities for smart cities and device collaboration.

Liquidity structures are diversifying; ABS and CMBS issuance is emerging as a critical financing channel beyond traditional bank debt. However, barriers to entry are increasing, with power access, financing and execution capability increasingly concentrated among fewer players. Development risk is also shifting and sites without secured power are increasingly stranded, regardless of zoning or demand. Regulatory and community risk affects valuations, as community opposition and sustainability compliance now materially influence timelines and returns.



Grid infrastructure: the critical constraint

European grid capacity crisis: geographic hotspots and root causes

The European grid is facing a capacity crisis due to increasing energy demands, driven by the growing energy needs of high-performance computing (HPC) and AI systems, which could consume up to 1,000 TWh of electricity by 2026 globally.[3] The root causes of this energy crisis include the rapid growth of AI systems, which are energy-intensive, and the limited availability of renewable energy sources in certain regions.[4] These are exacerbated by regulatory constraints, and challenges in upgrading infrastructure to meet growing energy needs,[5] including the need for improved interconnections to support renewable energy integration.[6]

The crisis is particularly acute in traditional data centre hubs such as Frankfurt, London, Amsterdam, Paris, and Dublin (FLAP-D markets), where long grid connection lead times can exceed four years.[7] These regions are experiencing high grid congestion, due to their concentration of data centres, which have large, localised loads that operate continuously and ramp up operations quickly. In some areas, such as Dublin, data centres consume up to 80% of electricity demand, leading to moratoriums on new data centre developments.[8] Authorities have also restricted specific new data centre permits in Amsterdam and delayed substation capacity in London.[9]

Some European regions, such as Southern Europe and the Nordics, show strong fundamentals for data centers. These regions are attracting more data centre investments due to better grid availability and shorter wait times for connection, partly driven by specific regulatory mechanisms unlocking new grid access.[10] Secondary markets such as Warsaw, Madrid, and other regions in Spain are emerging as alternative markets, as power sourcing is becoming a top priority for data centre operators across all regions (North America, Europe, Latin America and Asia-Pacific).[11]

Connection queue dynamics and development timeline implications

The surge in demand for energy-intensive data centres has increased demand for grid connections, leading to longer connection queues and delaying new data centre development. This dynamic impacts project timelines and increases development costs, creating challenges for investors and operators in securing timely access to the grid.[12, 13, 14]

In legacy hubs, it can take 7–10 years, or even up to 13 years, to connect a data centre to the grid. This delays deployment and deters investment. Countries with shorter connection times, such as Italy, Norway and Belgium, are attracting more data centre growth. Smarter grid connection agreements, such as phased or non-firm connections, can significantly reduce wait times, enabling faster deployment and increasing market competitiveness.[15]

Global power shortages have also extended construction timelines for data centres by 2–5 years, impacting market growth. The saturation of grid capacity, supply chain constraints and rapid sector growth have created bottlenecks in connection queues. Fast-track processes and new capacity tenders are being implemented to address these delays and facilitate access and connection for new developments.[16] Developers are preordering materials up to 24 months in advance and holding strategic inventory to mitigate delays.[17]

Grid access as a strategic asset: valuing existing connections

Existing grid connections are becoming a strategic asset due to the increasing difficulty of securing new connections.[18] Grid access has become a critical factor in attracting data centre investment, often outweighing other considerations such as land costs and regulatory incentives.[19] Investors and developers should consider the value of established connections when evaluating data centre projects, as they can provide a competitive advantage and reduce operational risks.[20] In regions with constrained energy resources, having established grid access provides a competitive advantage, enabling operators to meet growing energy demands without delays.[21]

Hyperscalers and data centre operators are targeting secondary markets with abundant energy supplies to mitigate risks. Existing connections are highly valuable, as they provide proven infrastructure and reduce the risk of migration or re-letting. Once established, the difficulty of replicating connections and power infrastructure elsewhere makes these assets critical for long-term operations.[22]

Countries with proactive grid planning, such as Norway, Denmark and Belgium, are leveraging their existing grid infrastructure to attract developers. These countries have implemented forward-looking strategies, such as building high-voltage substations and publishing grid capacity maps, to optimise grid access and attract high-value industries.[23]

Unlocking data centre development through renewable infrastructure

Renewable energy infrastructure is becoming a key enabler for data centre development. As power availability becomes a critical constraint, developers are exploring renewable solutions to secure sustainable and reliable power sources for their facilities, reducing dependency on traditional grid systems.[24] Power

Figure 2: DC pain points

Lack of ready-grid capacity to connect new "data centerloads" drive long waiting time varying across geographies

		YEAR									
Jurisdiction	**Average time in queue**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Queensland (Australia)	More than 2 years										
United States	1-3 years										
Malaysia	Under 3 years										
Italy	Under 3 years										
California (United States)	3 years										
Spain	3-5 year										
Kanto (Japan)	More than 5 years										
United Kingdom	5-7 years										
North Virginia (United States)	Up to 7 years										
Germany	Up to 7 years										
Netherlands	Up to 10 years										
Ireland	In Dublin, paused until 2030		Paused until 2030								

Source: IEA world energy outlook – 2025 – special report on Energy & AI

Purchase Agreements (PPAs) and investments in renewable energy sources, such as solar, wind, and battery storage, can mitigate risks associated with electricity availability, reliability and costs, while also reducing environmental impacts.[25]

In some regions — such as EMEA — private wire transmission and renewable projects can reduce power costs by up to 40%. BESS are also being leveraged to handle AI load spikes, firm up renewables for 24/7 clean power and accelerate grid connection timelines.[26]

The Iberian market is becoming increasingly attractive for data centre development due to its abundant low-cost renewable energy sources, reliable grid infrastructure and extensive fibre connectivity. Data centres in Iberia currently account for around 2.8 TWh of power demand, with major growth hubs in Madrid, Zaragoza, Barcelona and Lisbon.[27]

Co-locating data centres with renewable generation and storage assets minimises transmission grid impact and lowers network charges. Countries such as France, the UK and Italy are piloting initiatives to cluster data centres in areas with abundant clean energy and available grid capacity.[28]

Regulatory framework: connection rights and priority access mechanisms

Regulatory frameworks play a significant role in determining connection rights and priority access mechanisms for data centres.[29] Regulatory frameworks in Europe are evolving to address grid access challenges[30] and to ensure fair and efficient allocation of grid capacity.[31] Governments and regulators are increasingly recognising grids as strategic infrastructure for economic growth and competitiveness. Priority AI zones and spatial planning can help direct data centre developments to areas with better grid availability, reducing congestion in traditional hubs. Regulatory frameworks aim to support anticipatory investments, smarter connection agreements, and flexibility mechanisms to fast-track data centre deployment and attract AI investments.[32]

Investors should be aware of jurisdiction-specific policies and regulations, including the following:

- EU AI Act
- UK AI principles[33]

Co-locating data centres with renewable generation and storage assets minimises transmission grid impact and lowers network charges.

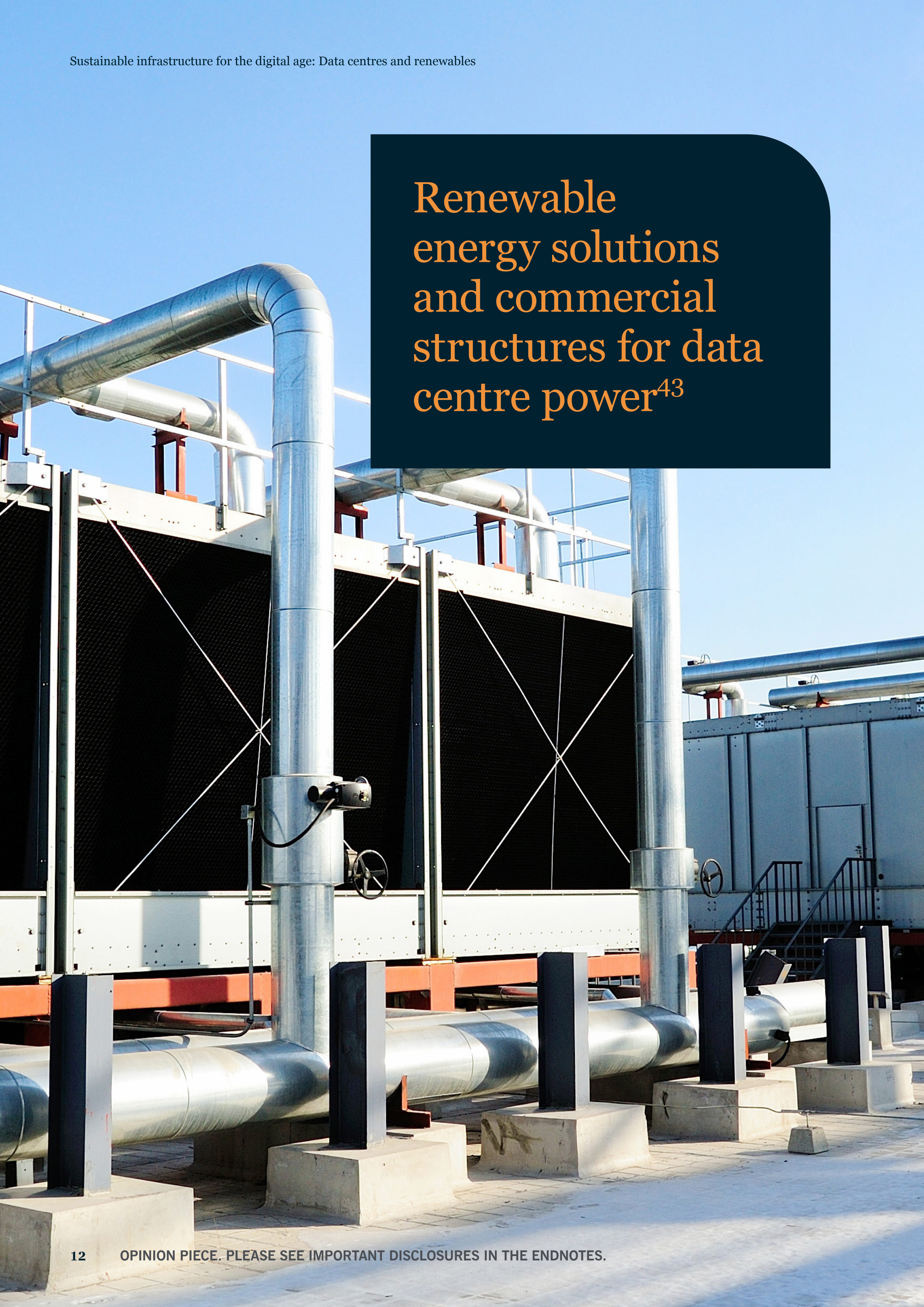
- Germany's Energy Efficiency Act, which mandates specific power usage effectiveness (PUE) levels for new and existing data centres, aiming to promote energy efficiency and prioritise sustainable operations.[34]
- Royal Decree Law 8/2023 in Spain, which provides mechanisms for priority access to grid connections.[35]

Germany and Ireland have implemented mandatory renewable energy procurement and "bring your own power" mandates. Policies are also targeting water usage, cooling efficiency, and carbon credit participation, reshaping the criteria for data centre siting and operations.[36] Governments are also implementing policies to address data sovereignty, environmental concerns, and power usage restrictions. These regulations can impact the ability of data centre operators to secure connections and expand their facilities.[37]

Enabling concepts: powered land and powered shell development models

Powered land and powered shell development models are emerging as solutions to address grid access challenges. Powered land refers to sites with pre-secured grid access and energy infrastructure, while powered shell models involve pre-built facilities with essential infrastructure ready for customisation.[38] These models involve pre-developed sites with established grid connections and infrastructure, enabling faster and more efficient data centre development. This can mitigate risks for investors, reducing the cost associated with grid timelines,[39] accelerating project development[40] and increasing sustainability.[41] France and the UK are already exploring such models to optimise their grid planning and to attract AI investments.[42]

Renewable energy solutions and commercial structures for data centre power[43]



Co-location strategies: integrating renewable generation with data centre load

Data centres present a unique opportunity to integrate renewable energy generation due to their high energy consumption and ESG requirements. Co-location strategies involve deploying renewable energy projects alongside data centres to optimise energy efficiency and reduce costs. Self-consumption models allow renewable energy facilities to connect directly to data centres without surplus, improving energy efficiency and reducing reliance on external grids.

Firming and dispatchability: battery energy storage system integration

Battery energy storage systems (BESS) are critical for ensuring energy reliability and dispatchability in data centres. BESS can mitigate curtailments and support high energy-demand profiles, ensuring uninterrupted power supply for data centres. The integration of BESS serves to increase operational efficiency and while also aligning with sustainability goals and data centre ESG requirements.

Long-term offtake agreements: PPA structures with data centre operators

Power Purchase Agreements (PPAs) are essential for securing renewable energy supply for data centres. On-site and off-site PPAs provide flexibility and efficiency in energy consumption, enabling data centres to meet ESG standards. Contracts can be structured to optimise costs and mitigate market risks, ensuring long-term energy security for hyperscalers and co-location operators.

On-site PPAs articulated through private-wire agreements avoid grid transmission delays, tolls and taxes, providing a more competitive power supply to data centres while improving the economics for power generators. Data centre operators are strongly attracted to this type of agreement as supply from renewable energy assets improve the green and ESG credentials of data centres, helping to mitigate some critical ESG aspects of the business.

Financial hedging mechanisms: virtual PPAs and financial risk management

Virtual PPAs offer financial risk management by allowing data centres to hedge against energy price volatility. These virtual agreements enable data centres to benefit from renewable energy credits without direct physical energy delivery. Virtual PPAs are particularly useful for operators seeking to align with sustainability goals while managing financial exposure.

Configuration: behind-the-meter vs. grid-connected solutions

Behind-the-meter solutions involve direct energy generation and consumption within data centre premises, offering greater control and efficiency. Grid-connected solutions allow data centres to access external renewable energy sources, leveraging existing infrastructure for scalability. The choice between configurations depends on factors such as location, energy demand, and regulatory frameworks. As data centers require 24/7 energy supply and a high degree of reliability, behind-the-meter solutions are complementary to grid supply configurations.

Backup generation and ancillary grid services: hybrid revenue optimisation

Data centres rely on backup power systems, such as diesel generators or gas turbines, to ensure uninterrupted operations during grid outages. These systems are critical for maintaining uptime and protecting sensitive equipment. Centres can provide grid support by offering ancillary services, such as frequency regulation, voltage control and reserve capacity, which help stabilise the grid during peak demand or disruptions. By integrating backup generation with renewable energy sources and battery storage, data centres can optimise revenue streams and reduce reliance on fossil fuels. This hybrid approach allows operators to sell excess power back to the grid, participate in demand response programs and reduce operational costs.

European market landscape and investment opportunities

Market overview: aligning grid capacity with data centre demand

The data centre sector is gaining traction in Europe, with growing investment over the last year. However the European market faces significant challenges in aligning grid capacity with the growing demand for data centres. Constrained networks have made grid access a critical factor for data centre development across Europe. This challenge is driving the adoption of on-site generation and hybrid solutions to meet immediate power needs while balancing long-term decarbonisation goals.[44]

FLAP-D markets: established hubs facing severe capacity constraints

Established data centre hubs in Frankfurt, London, Amsterdam, Paris and Dublin (FLAP-D markets) are facing severe capacity constraints due to limited grid availability, with grid interconnection timelines ranging from 36 to 48 months.[45] Amsterdam has seen a temporary ban on new permits in certain areas, Dublin also saw a halt on new power applications (now easing with conditional approvals)[46] and London has faced delayed substation capacity.[47] This has made grid access a top priority for data centre developers in these regions.[48] Renewable PPAs and hybrid solutions are increasingly being adopted to address these issues.[49]

Southern Europe: emerging markets with solar potential and development momentum

Southern Europe, particularly Iberia, is emerging as a promising market for data centres.[50] In Spain, the activity is concentrated around 3 regions: Madrid with co-located and cloud demand, Aragón as a hub for hyperscalers driven by AWS and Microsoft, and Barcelona with smaller neocloud developments. In the case of Portugal, Lisbon and Sines are the main hubs. Demand in Italy is focused on Milan and Lombardy.

Southern Europe benefits from low power prices, high fibre connectivity, and plentiful availability of land, which are the key elements for data centre attractiveness. Additionally, the region's abundant solar potential and increasing renewable energy deployment provide further opportunities for investment in sustainable energy projects.[51] Specific regulatory mechanisms supporting self-consumption for renewable assets are unlocking new data centre developments across these countries.

Nordic region: abundant low-carbon power and natural cooling advantages

The Nordic region offers significant investment opportunities due to its abundant low-carbon power sources and natural cooling advantages. These factors make it an ideal location for energy-intensive industries and data centres, which benefit from reduced cooling costs and access to renewable energy.[52] The Nordics and Berlin are seeing increasing activity from neocloud providers.[53]

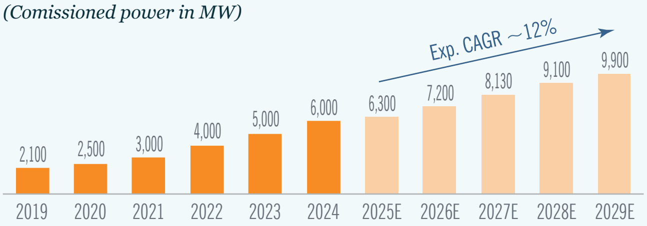
Figure 3: Data Center sector is gaining traction in Europe

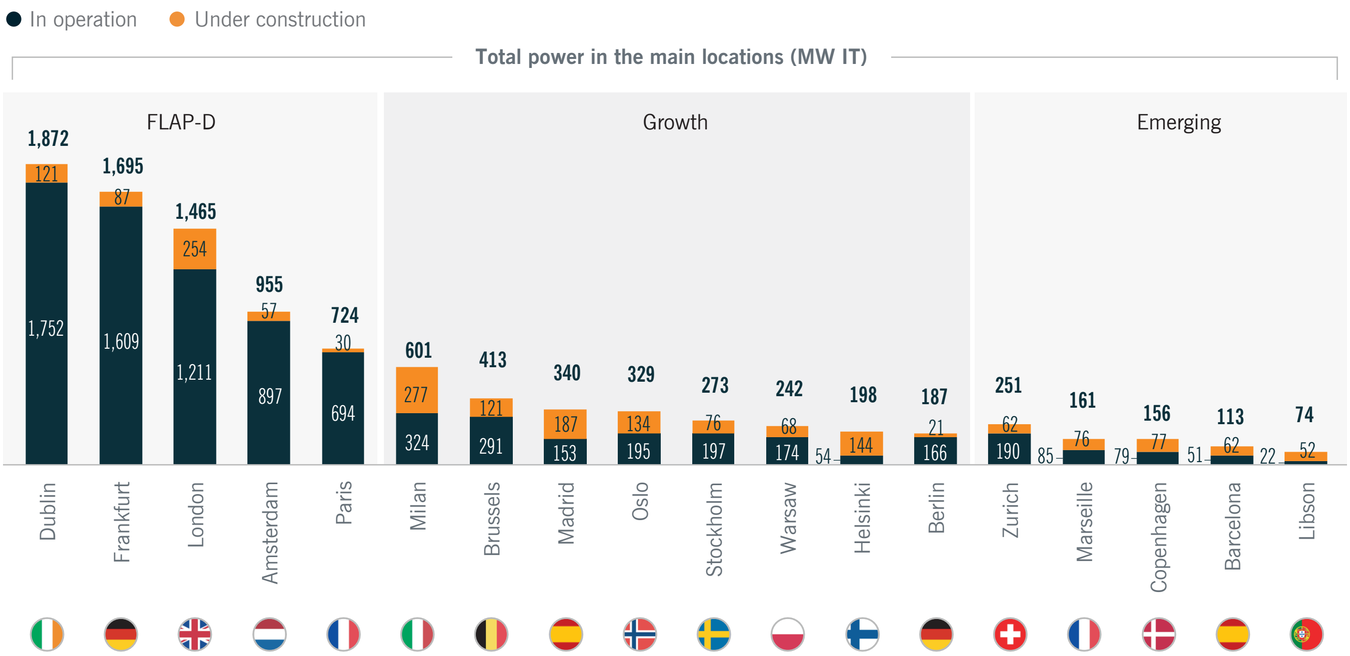
The scale of the AI investment gap

Data Center power capacity is **expected to grow at a compound annual rate of 12% through 2029, reaching ~10 GW of commissioned capacity.** This expansion highlights an important trend to meet continuously rising digital demand.

European Data Center supply 2019–2029

(Comissioned power in MW)





Data source: Colliers Research, DataCenterHawk.

ESG and sustainability imperatives[59]

Carbon emissions management and 24/7 decarbonisation strategies

Carbon emissions management and 24/7 decarbonisation strategies are critical for the data centre industry as it faces increasing scrutiny over its environmental impact. Effective carbon emissions management involves tracking and reducing Scope 1, Scope 2 and Scope 3 emissions through measures such as transitioning to clean energy sources, improving operational efficiency and adopting sustainable construction practices.

The data centre industry, which includes data centre providers and hyperscale platforms, has made progress in reducing average emissions per GWh of energy consumption, which fell from 366.9 mtCO2e/GWh in 2019 to 312.7 mtCO2e/GWh in 2024. 24/7 decarbonisation strategies focus on ensuring that data centres operate on clean energy around the clock, rather than relying on carbon offsets or intermittent renewable energy. This includes investments in renewable energy projects, PPAs, and exploring nuclear energy as a carbon-free alternative. Additionally, innovations such as low-carbon concrete for construction and waste heat recovery systems further contribute to decarbonisation efforts.

Energy efficiency: power usage effectiveness and operational optimisation

Data centre providers reduced average power usage effectiveness (PUE) from 1.44 in 2019 to 1.38 in 2024, driven by better technology and design. Hyperscale platforms maintained a lower PUE of 1.22 during the same period. There were regional variations: U.S. hyperscalers achieved lower PUEs (1.10–1.12) compared to Chinese hyperscalers (1.34–1.28), reflecting differences in energy infrastructure and regulations. Providers aim to achieve fleet-wide PUEs between 1.2 and 1.3 within the next decade, with some regions like Germany mandating stricter PUE levels for new and existing facilities.

Renewable energy certification: RECs, Guarantees of Origin and additionality

Renewable energy credits/certificates (RECs) and Guarantees of Origin (GOs) are increasingly used to demonstrate ESG and sustainability commitments.[54] RECs represent 1 Mwh of renewable energy generated and are tradeable in the U.S. and some international markets. Guarantees of Origin are the European equivalent of RECs, issued under the EU Renewable Energy Directive.[55]

Resource intensity: water usage and environmental footprint

Water consumption in data centres has significantly increased due to the growing demand for high-density workloads, particularly for AI applications. Data centre providers increased water consumption from around 19.5 million m3 in 2019 to 39.7 million m3 in 2024, growing at a 5-year CAGR of 19.5%. Hyperscalers also increased water consumption, from 46.5 million m3 in 2019 to 87.1 million m3 in 2024, a 5-year CAGR of 17.0%.

As rack densities exceed 20kW, traditional air cooling systems are often insufficient, leading to the adoption of more water-intensive liquid cooling systems. This shift has raised concerns about water sourcing, especially in water-scarce regions, prompting data centre operators to explore sustainable solutions such as closed-loop systems, recycled water, and non-potable water for cooling. Many companies have committed to becoming water positive by replenishing more water than they consume, through initiatives such as restoring aquatic habitats.[56]

However, new cooling technologies are evolving towards closed-loop solutions that avoid evaporation and therefore require a lower water consumption. These developments have decreased the criticality of water supply in data centre areas overall.

Community integration and social licence to operate

Data centres are increasingly focusing on community integration and earning a social licence to operate, particularly in regions where operations may impact local resources. This involves engaging with communities to address concerns about water usage, energy consumption and environmental impact. As well as working to ensure sustainable water sourcing in water-scarce areas, waste heat from data centres is being repurposed to heat nearby buildings, such as homes in Finland and the Olympic Pool in Paris during the 2024 Olympics.[57]

Corporate disclosure requirements and investor expectations

Corporate disclosure requirements for ESG in Europe have increasingly moved from voluntary frameworks to mandatory regulatory obligations. At the core of this is the Corporate Sustainability Reporting Directive (CSRD), which replaces the earlier Non Financial Reporting Directive and significantly expands the scope, detail and rigour of ESG disclosures for companies operating in the EU.

ESG leaders are increasingly publishing sustainability reports, with 27 data centre providers and 9 hyperscale platforms releasing reports in 2023. However, transparency varies significantly across companies. Companies are incentivised to disclose comprehensive environmental metrics, including carbon emissions, energy usage and water consumption, to meet growing investor and regulatory demands. New laws, such as Germany’s Energy Efficiency Act, mandate stricter PUE levels for new and existing data centres, pushing companies to improve operational efficiency and sustainability.[58]

Conclusion

Renewable infrastructure as the foundation of digital growth

Data centres underpin the rapid expansion of AI, cloud computing and data rich applications that increasingly shape global productivity. Yet the sector's growth is now inseparable from the challenges of power scarcity and grid congestion. Europe's traditional data centre hubs face lengthy connection queues, capacity bottlenecks, regulatory hurdles and escalating energy intensity, all of which place pressure on operators, developers and investors.

Against this backdrop, renewable infrastructure emerges not only as a solution to these systemic pressures, but as the strategic cornerstone of long term digital expansion. Co located generation, hybrid renewable storage system and innovative commercial structures such as PPAs and synthetic hedging allow data centres to secure reliable, cost efficient, 24/7 clean power, while reducing exposure to volatile energy markets and grid limitations. Markets with unconstrained grids and strong renewable resource potential (Southern Europe, the Nordics and other secondary hubs) are becoming increasingly attractive for scaling digital infrastructure.

At the same time, the sector's accelerating ESG requirements — from carbon free energy procurement to water stewardship, efficiency mandates and community integration — are reshaping what constitutes a competitive data centre. Operators that can demonstrate credible decarbonisation pathways, invest in energy efficient technologies and align with evolving regulatory frameworks will be best positioned to capture demand from hyperscalers.

Ultimately, the convergence of digitalisation and decarbonisation represents a significant opportunity. By integrating renewables, storage and advanced grid solutions into the core of data centre development, Europe can unlock the power capacity needed for AI driven growth, support greater regional competitiveness, and build a digital ecosystem that is both scalable and sustainable.

Endnotes

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