Datacentres and the Energy Transition

How Datacentres Play a Dynamic Role in the Energy Transition
July 2026

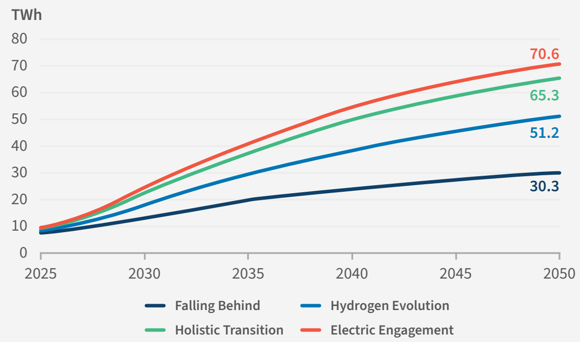
Data centres ("DCs") are becoming critical to the economy and the energy transition, supporting digitalisation while driving significant additional growth in electricity demand, beyond electrification. As developers face challenges in securing low-carbon power and grid connections, there is the opportunity to see how new DC capacity energy infrastructure, but integrating data centres in ways that accelerates generation, improve grid resilience and help deliver wider decarbonisation goals.

DCs demand is rising, increasing pressure on electricity systems

Demand for DC capacity is driven by cloud computing, AI and other data-intensive applications which are becoming more embedded in the economy. This is translating into material electricity demand growth.

DCs consumed around 1.5% of the world's electricity consumption in 2024; in the EU, this figure was around 3%,[1] and is expected to grow by a further 45 TWh, up 70% by 2030.[2] The IEA expects DC global demand to more than double by 2030.[3]

Figure 1 — GB DC demand, 2025–2050, TWh, NESO[v]



DCs are competing for power with the electrification of the economy, including transportation, heating and industry.

Forecasts for DC electricity demand display significant growth – but also variation. An example can be seen in Figure 1 from NESO, the system operator ("SO") in Great Britain, which forecasts electricity demand from DCs to rise by between 4- to 8-fold by 2050.[4] This variation in forecasts, driven by the dynamics of electrification, make it difficult to build out networks, where costs are significant and ultimately paid by consumers. DC growth is adding another layer of complexity.

DC growth is also changing where investment is directed. Established DC hubs such as Frankfurt, London, Amsterdam, Paris and Dublin remain important, but power availability, grid connection timelines and local acceptance are increasingly influencing where new DC capacity can be delivered.

DCs are sourcing renewable energy through wind and solar power purchase agreements ("PPAs") to meet bulk energy requirements…

DC demand is one component of the overall increase in electricity demand in Europe, with the EU27 forecast to rise by between 35 to 50% by 2050.[5] DCs are competing for power with the electrification of the economy, including transportation, heating and industry.

To meet energy needs and decarbonisation commitments, DC developers are increasingly seeking access to low-carbon electricity. To date, low-carbon power has come from intermittent solar and wind often through PPAs and, in some countries, nuclear.

Long-term procurement from large power consumers like DCs, can help underpin investment in renewable and low-carbon generation, giving developers revenue certainty and supporting the commercial case for new capacity. Corporate power purchase agreements ("cPPAs"), where a bilateral contracts with a corporate offtaker provides a renewable developer guaranteed revenues in return for price certainty and the ability to offset carbon emissions in ESG reporting are common. Major tech firms have used cPPAs for many years, with procurement easier in countries with high renewables supply, like Spain and the Nordics – but more difficult in countries, like Germany, where subsidies distort dynamics.[6]

In addition, DC operators in the EU are increasingly facing public scrutiny of their sustainability & ESG targets, going far beyond 100% low-carbon energy sourcing. With the introduction of a reporting scheme under the Energy Efficiency Directive, DCs with at least 500 kW of installed IT power are required to report key performance indicators annually, including data such as renewable energy share ("RES"), power utilisation efficiency ("PUE"), waste heat utilisation ("ERF") and water usage efficiency ("WUE"). On the basis of this reporting, a rating scheme will be developed, and discussions are being held on the potential introduction of Minimum Performance Standards ("MPS") further down the line.[7]

… but DCs face barriers to reducing actual emissions

DC operators often aim to match their aggregate consumption over the year to renewable sources via cPPAs. However, such renewable matching does not always reflect actual emissions because of temporal and geographical mismatches of generation sources and electricity consumption.

It has been estimated that renewable cPPAs lead to a 40-50% (solar) or 60-70% (wind) reduction in carbon emissions from electricity consumption, though under under current carbon accounting rules this can be reported at 100% with the right certificates. This is a challenge to both policymakers, DC operators and other large energy users.

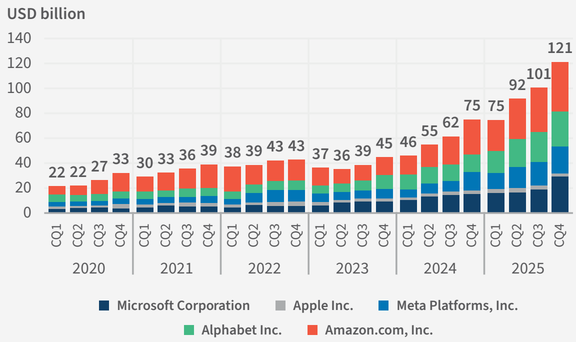
Achieving 100% real-time low-carbon power with renewables would require complex 24/7 PPA matching, or asset overbuild, which is expensive and limited by supply constraints. Possible alternatives include DCs siting closer to abundant renewable generation and using short-duration storage – or assessing how to flex consumption patterns more to better align with renewable outputs. However, such measures are challenging for many DCs to incorporate into their operations and uptime commitment to their clients.[8]

While challenges remain, the scale and predictability of DC demand can also help accelerate investment in renewable, nuclear and storage technologies that will be needed beyond the sector itself.

In the medium-term, big bets are being made on emerging technologies like SMRs and storage

The size and speed of low carbon power needs is creating opportunities for newer technologies to secure funding and opportunities to become commercially viable.

Figure 2 — Big Five hyPerscaler capex, Q1 2022–Q4 2025[9]



One example of this is the small modular reactor ("SMR"), with a capacity of under 300MW. Nuclear provides carbon-free power and, importantly for DCs, has a consistent, 'baseload' profile, with no issue of matching real-time supply to electricity consumption. SMRs are currently expensive and unproven in commercial use, but the recent surge in funding may prove to be the step change required by the sector; Google and AWS have both secured deals to develop SMRs in the US to power their DCs.[10]

The rise of DC-inspired nuclear investment in the United States have also sparked development opportunities across the Atlantic. In the UK, a consortium involving EDF, Holtec and Tritax are looking to transform the site of a closed power station into a "nuclear-powered data centre campus".[11] In the EU, the Strategy for the Development and Deployment of SMRs in Europe was launched in March 2026 to address forecasts of up to 53 GW of total installed SMR capacity by 2050.

Long duration energy storage ("LDES") – also relatively new – facilitates matching of intermittent renewables generation to consumption by storing energy for longer periods of time, and is particularly helpful for prolonged periods of low renewables generation output. The commercial viability of different LDES technologies is emerging with different levels of government support,[12] but they are a focus area alongside renewables and nuclear.

Strategic DC siting can help grid constraints and support more effective network investment

Historically, most DCs have located in or around cities for several reasons, such as lower latency and easier access to existing telecoms or transport. Cities are energy demand centres themselves, meaning DCs add to the volume of electricity at that location, usually requiring more network build or congestion costs, passed back to consumers.

The increasing numbers and sizes of DCs at the transmission and distribution network levels pose three key challenges for the grid:

— **Connection times.** New connections may require further network buildout if located in areas that are under stress. Given the amount of new demand and generation assets that wish to connect – on top of planning requirements, and other steps – waiting times can be up to, or over a decade,[13] even with flexible connection agreements.

— **Grid reliability.** More strain on the network – whether from power flows, the transition to intermittent renewables, geopolitical events or extreme weather – may degrade grid reliability.[14] Reliable power is crucial for DCs, with outages potentially leading to costly data losses, or days lost to restart operations.

— **Regulatory pressure.** The additional demand from DCs have led regulators in some European markets to tighten regulations on buildout of DCs in some areas.[15]

— **Costs increases.** There are concerns that increased DC and electrification demand puts increasing upward pressure on electricity prices to account for network and supply upgrades.

These challenges may discourage many DC developers from the established hubs, but may also incentivise some to consider other locations, greater on-site energy generation and grid infrastructure investment to accelerate connections.[16]

Connections reforms aim to reduce the time to connect to the grid

Several European countries have been seeking reforms to the grid connection process, reducing bottlenecks and also prioritising projects that can demonstrate benefits for government policy, the energy system or for local communities.

At the EU level, the European Commission launched a European grids package in December 2025 aiming at accelerating the upgrade, digitalisation and expansion of the European grid infrastructure.[17] The package also addresses cross-border grid planning and permitting for networks, renewables and storage.

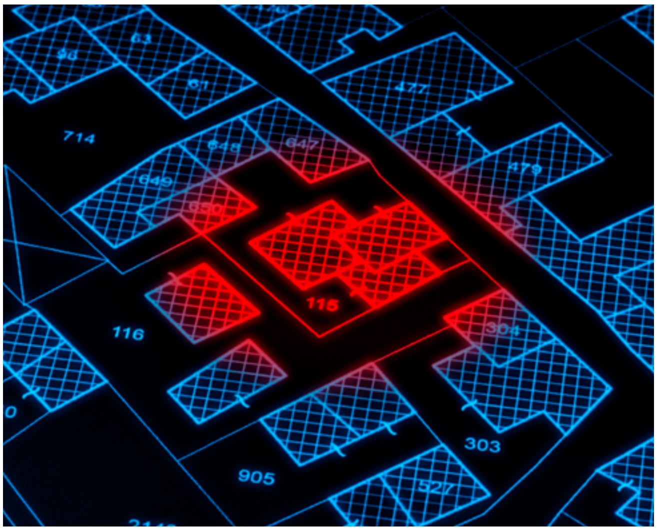
DC investments can be helped via coordinated siting decisions and an effective market design

New DCs can mitigate their impacts on the grid primarily by siting in areas that reduce system constraints. In areas of surplus generation – like the north of Scotland – DCs could consume power otherwise wasted by being curtailed or "switched off" at a cost to consumers.

Additionally, if DC investments do not lead to a trigger in significant network reinforcements, the additional DC capacity could, in certain conditions, even *reduce* consumer electricity bills by spreading out the large sunk costs of networks across a wider charging base.

Identifying the appropriate location for new DC investments is not straightforward due to complex resource considerations, such as energy, labour, infrastructure, customer considerations, as well as the level of multi-party coordination required. One options could see government coordination across departments, policymakers, network operators and both generation and demand developers – as well as in alignment with any industrial strategy and local planning – something which is starting to happen across Europe.

Tools such as capacity heat maps could be helpful to first show which precise locations are more advantageous from a grid perspective. It is likely that additional economic signals are required, for example locational wholesale pricing, which is place in Denmark, Italy, Sweden, Norway, or direct policy incentives to locate in areas with excess renewable generation.



SOs are exploring ways to incentivise DCs to provide flexibility services to help grid stability

While DCs typically require baseload generation to sustain continued operations, innovators are exploring ways where DCs can provide flexibility services to help grid operators manage intermittency.

DCs use power in a variety of different ways: to support computing tasks, to cool down server racks, or to store in case of potential outages. The components that consume power are often sophisticated, centralised and already highly monitored. This means that they could be a valuable flexibility resource, complementing other more decentralised sources of flexible demand like electric vehicles ("EVs").

One DC example is the uninterruptible power supply ("UPS"), fast-reacting batteries that provide power during a supply outage until a back-up generator can be started, or the DC can be powered down safely. Potential UPS flexible capacity in 2030 could be sufficient to meet required capacity services in European SOs for maintaining grid frequency, or for use as reserves.[18]

To realise flexibility opportunities, DCs and SOs will need to work together on incentives, such as through ancillary services, and there may be non-economic arguments for participation, such as aligning with renewable generation. DCs should also consider the extent to which they invest and deliver on projects that support the energy system to improve wider acceptability of their projects with policy makers and host communities, although there are trade offs to consider.

Ultimately, DCs are part of the essential infrastructure to enable the digitalisation required for the energy transition

The energy transition has, and will, mean millions more decentralised and digitalised energy assets, such as smart meter data, EVs, HPs and microgeneration. Data associated with these technologies, including weather, charge levels for example, help optimise these assets for consumers and the grid. The sheer explosion in data points needs processing power and this is where DCs can help.

DCs enable innovative energy retailers and SOs to optimise and automate these assets and simultaneously reward the consumer. AI applications could accelerate:

— **Optimising complex systems.** Automatically co-ordinate the smart charging of distributed EVs.

— **Use of predictive algorithms.** Better forecast demand profiles, weather and renewable generation profiles and grid needs.

— **Maximise existing grid assets.** New technologies can be used to manage flows at the distribution level, unlocking more capacity without additional infrastructure build.[19]

These are just three of the over fifty use cases of AI applications in energy systems today identified in the EU's Competitiveness Report, which estimates the market value of these applications of up to $13 billion.[20]

The better use of grid assets enabled by AI means less costly grid investments would be required – a significant benefit to consumers.

Conclusions

As the energy transition progresses, and with increased pressure on consumer bills, accommodating DCs is challenging. While the general consensus favours the need for DC deployment, varying views, particularly on a community level, give rise to potential challenges of further delays and moratoriums. DCs could anticipate these challenges, taking pre-emptive actions such as exploring innovative generation technologies, supporting electricity system resilience, or investing in strategic locations, potentially trade offs. These actions can help ensure that new DC capacity not only meets demand for digital infrastructure, but also supports wider energy system objectives.

Furthermore, DCs which provide the infrastructure for the digital transition – should pre-emptively act to prove that they are integral to the energy transition, as the energy system becomes increasingly digitalised. DCs enable cost-effective management of the huge quantities of data and enable AI applications. These have the potential to revolutionise the management of the electrification of industries, businesses and homes, as well as the electricity system, with potentially tens of millions of flexible assets managed in a synchronised and secure way.

Ultimately, the expansion of data centres and the energy transition are becoming increasingly intertwined. Low-carbon generation, efficient network capacity and new technologies can be supported by the rising demand for digital infrastructure . At the same time, those same data centres will provide much of the computing infrastructure needed to operate a more electrified, flexible and digitalised energy system.

Kerstin Duhme
Senior Managing Director
+32 2 289 09 31
kerstin.duhme@fticonsulting.com

Jason Mann
Senior Managing Director
+44 20 3727 1338
jason.mann@fticonsulting.com

Fabien Roques
Executive Vice President
+33 1 53 05 36 29
froques@compasslexecon.com

Endnotes

1 "Grids for data centres: ambitious grid planning can win Europe's AI race," Ember (2025), p. 9 https://ember-energy.org/app/uploads/2025/06/Grids-for-data-centres-in-Europe.pdf

2 "In focus: Data centres – an energy-hungry challenge," European Commission (2025) https://energy.ec.europa.eu/news/focus-data-centres-energy-hungry-challenge-2025-11-17_en

3 "Energy and AI," International Energy Agency (2025), pp. 58, 63-64 https://iea.blob.core.windows.net/assets/de9dea13-b07d-42c5-a398-d1b3ae17d866/EnergyandAI.pdf

4 FES: Data Workbook, National Grid ESO (2025), tab "F.47" https://www.neso.energy/document/364551/download

5 "TYNDP 2024: Draft Scenarios Report," ENTSO-E (2024) https://2024.entsos-tyndp-scenarios.eu/wp-content/uploads/2024/07/TYNDP_2024_Draft_Scenarios_Report_May_2024_240708_web.pdf

6 "Brussels Electricity Club: Electricity Demand in Data Centres," Eurelectric (2024)

7 "On energy efficiency and amending Regulation," EU Directive (2023), Article 12(5) https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX%3A32023L1791

8 LDES Council (2025)

9 FTI analysis based on data from S&P Capital IQ paywall https://www.capitaliq.com/CIQDotNet/Login-okta.aspx

10 The Guardian https://www.theguardian.com/technology/2024/oct/15/google-buy-nuclear-power-ai-datacentres-kairos-power

11 "Former Cottam power station to become UK's first nuclear-powered data centre,"East Midlands Combined County Authority (2025) https://www.eastmidlands-cca.gov.uk/news/former-cottam-power-station-to-become-uks-first-nuclear-powered-data-centre/

12 Ofgem (2026) https://www.ofgem.gov.uk/energy-regulation/low-carbon/long-duration-electricity-storage

13 COM/2023/757, EU Action Plan for Grids, European Commission (2023), p. 2 https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52023DC0757

14 "Data center operators will face more grid disturbances," Uptime Institute (2023) https://journal.uptimeinstitute.com/data-center-operators-will-face-more-grid-disturbances/

15 "Data centres curbed as pressure grows on electricity grids," Financial Times (2024) https://www.ft.com/content/53accefd-eca7-47f2-a51e-c32f3ab51ad5

16 "European Data Centres Navigating the new data-centric frontiers," Savills (2024), p. 27 https://pdf.euro.savills.co.uk/european/european-commercial-markets/spotlight-european-data-centres---may-2024.pdf

17 European Commission (2025) https://energy.ec.europa.eu/topics/infrastructure/european-grids_en

18 "Data Centres and Decarbonisation: Unlocking flexibility in Europe's Data Centres," BloombergNEF, Eaton, and Statkraft (2021), p. 45 https://www.eaton.com/gb/en-gb/company/news-insights/energy-transition/bnef-data-centres-and-decarbonisation-study.html

19 "World's first large-scale use of power flow technology on transmission network will unlock 1.5GW of electricity capacity," National Grid (2021) https://www.nationalgrid.com/worlds-first-large-scale-use-power-flow-technology-transmission-network-will-unlock-15gw

20 "The future of European competitiveness Part B | In-depth analysis and recommendations," European Commission (2024), p. 22 https://commission.europa.eu/document/download/ec1409c1-d4b4-4882-8bdd-3519f86bbb92_en?filename=The%20future%20of%20European%20competitiveness_%20In-depth%20analysis%20and%20recommendations_0.pdf