

RESEARCH PAPER

Data centre expansion: conflicting ambitions

*Potential backlash against
a strategic asset*



Council of the European Union
General Secretariat

— SEPTEMBER 2026 —



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For most of the past 15 years, the twin transitions – climate and digital – have proceeded along parallel paths with a number of intersecting points. **The relationship between the large technology companies and the energy markets has been relatively straightforward.** The main actors of the industry, including Google, Microsoft, Amazon and Meta, have consumed large and growing volumes of electricity. In particular, they have purchased renewable energy certificates or signed power purchase agreements (PPAs) with wind and solar farms, announcing that they were aiming for net-zero or carbon-neutral. At the time, the energy system absorbed the demand without any structural disruption.

However, **this model is becoming increasingly obsolete.** The expansion of the artificial intelligence (AI) infrastructure has produced a qualitatively different situation: energy demand at a scale and a speed that the existing grid infrastructure cannot match, a requirement for round-the-clock, stable power that variable renewables alone cannot provide, and an investment appetite – tens of billions

of dollars per quarter – that has **transformed tech companies from passive energy customers into active participants in the energy sector itself.** The proliferation of data centres is a tangible manifestation of this trend that brings additional structural challenges to the energy market and the digital infrastructure landscape.

This involvement of tech companies in the energy landscape is accelerating against a backdrop of energy tension, as well as public questioning and concern – and even hostility – regarding the implications of the AI revolution for society and the economy, and by extension market operators. Beyond this, the challenges surrounding the establishment and geographical distribution of the infrastructure enabling the creation and development of AI applications are as much a matter of **competitiveness**¹ as they are of **sovereignty**. Both those factors will only grow in importance in the coming months, since the announced ambition is to at least triple the EU's data centre capacity within the next five to seven years, prioritising highly sustainable data centres².

Thus, understanding the pace and scale of the development of data centres is critical, as it will be a key determinant of future electricity demand and competitiveness. This paper focuses on the challenges facing and generated by data centres. As the primary tangible physical component of a virtual revolution, that infrastructure symbolises in public discourse both an urgent need to remain at the forefront of the digital revolution and a fear of its consequences.

The change is not incremental. It is structural, and its political consequences are beginning to emerge as energy, technology and geopolitics are positioned squarely at the heart of the political agenda³.

AI is driving an energy boom

In recent years, energy demand from data centres has grown rapidly. After a decline in the late 2000s, when improvements in operational and hardware efficiency offset the rising levels of electricity consumption driven by internet adoption and digital services, the emergence of cloud computing, streaming services and social media platforms from the mid-2010s onwards led to a rebound in data centre electricity demand. This trend has accelerated sharply, **driven primarily by the massive rise of artificial intelligence**, which requires phenomenal computing power, adding to the growing demand for traditional digital services. While public debate has largely centred on the energy required to train advanced AI models, day-to-day usage (also known as inference, when the finished model is deployed into a live environment to process real-time

requests) accounts for roughly 80 to 90% of total energy demand from data centres.

The shift from conventional workloads to **AI inference and training is transforming the energy intensity of computing**. Where a traditional cloud server rack consumes a certain amount of power, its AI equivalent consumes ten times as much electricity⁴. The consumption of the AI sector has grown at roughly 12% per year over the past five years – more than four times faster than the growth of total electricity consumption from all other sectors combined⁵. In terms of power draw, a conventional data centre may be around 10-25 megawatts (MW) in size. A hyperscale, AI-focused data centre can have a capacity of 100 MW or more, consuming as much electricity annually as 100 000 households.

As a result, global data centre electricity consumption is poised for **an unprecedented structural transformation**. It rose to approximately 485 TWh in 2025, representing around **1.5% of total global electricity use**, and could almost double to 950 TWh by the end of the decade, representing **3-4% of global power demand by 2030**⁶. AI's share in that load is expected to surge from 14% of data centre consumption in 2025 to 27% by 2027, while cloud computing's share will decline and traditional workloads will shrink even further. By 2030, the electricity consumption of AI-related data centres will have tripled, with new energy-intensive uses and updates in AI likely eradicating any improvements in energy efficiency.

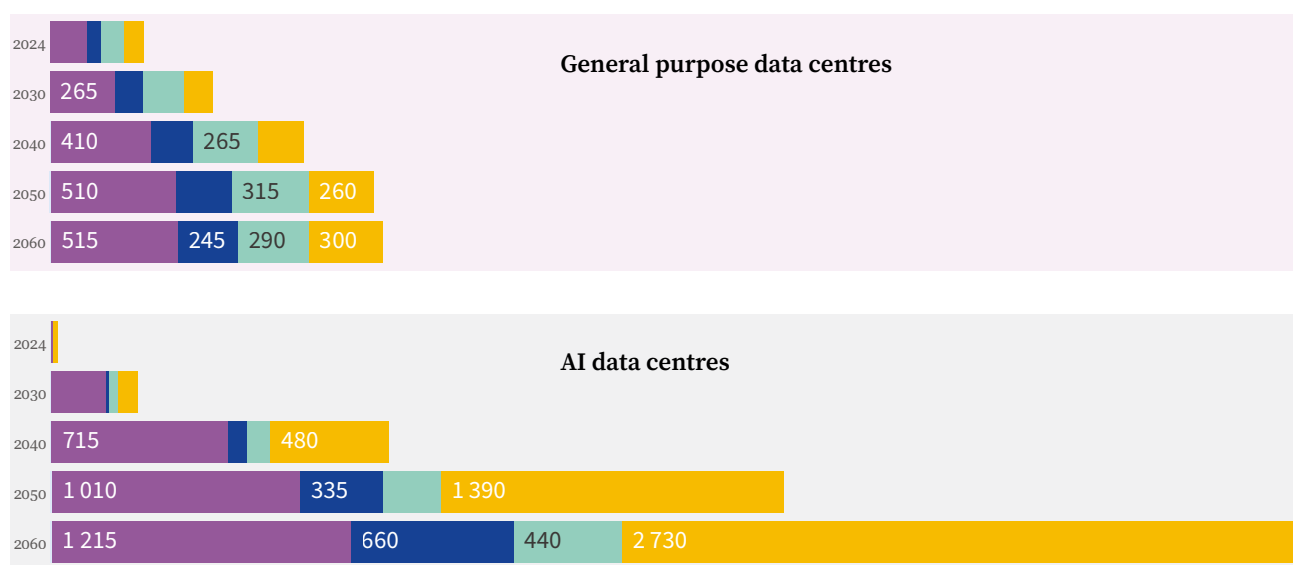
The AI boom is also adding to an acceleration in electrification⁷ that was already being boosted by the energy transition and digitalisation. Electricity consumption in

accelerated servers (which include highly specialised hardware) is projected to grow by 30% annually in the base case, while conventional server electricity consumption will grow more slowly at 9% per annum.

Projected data center energy demand, by type (2024-2060)

In terawatt hours (TWh)

■ North America ■ Europe ■ China ■ Rest of world



Source: [Axios](#) Adapted from DNV

Skyrocketing growth of western data centres

The competition for leadership in AI has turned into a global race to build data centres. As of late 2025, only 32 countries hosted AI-specialised data centres with the high-performance chips and cooling systems required for advanced AI workloads⁸. While countries are adopting different but complementary strategies based on their respective strengths – energy infrastructure, climate and geography, connectivity and networks, a skilled workforce and a legal and economic framework – the number and scale of data centres serve as an indicator

of the ongoing investment and priorities. Although there are differences in terms of how data centres are defined and counted, the current US lead on data centre investment is unmistakable⁹. As of today, the US hosts almost 4 000 data centres, which represents more data centres than the next 14 countries combined. In Europe, data centres tend to form in clusters, with the United Kingdom, Germany and France in the forefront, while Asia's footprint is growing (China, India and Japan).

When it comes to future investments, the US still largely dominates the race to develop AI infrastructure, capturing the largest share of

the projected increase ahead of China. Taken together, both are set to account for nearly 80% of global growth up to 2030. This will have consequences for electricity demand. By the end of the decade, data centres are expected to account for nearly half of total growth in US electricity demand. According to the US Department of Energy¹⁰, peak demand (or demand during periods where energy use is at its highest) is expected to increase by around 100 GW by 2030 (rising from around 800 GW to 900 GW). **US data centres will consume more electricity than all of the country's heavy industries combined**, including the production of aluminium, steel, cement, chemicals and all other energy-intensive goods.

Albeit data centres currently account for only a fraction of total electricity consumption, they will make up a disproportionate share of new power generation capacity to be built in the US by 2030. As a result, the entire US energy value chain is already undergoing a process of adaptation. For instance, in response to the current boom in investment, referred to as the 'digital gold rush'¹¹, massive consolidation is taking place among US power companies, including a recently announced merger that would create the world's largest electricity distribution company¹². This shift in energy priority illustrates the significant transition from a traditional industrial economy towards one centred on digital infrastructure in the US¹³. Data centres and related high-tech investment activities have already become a key driver of US growth. Current estimates suggest that 80% of the growth in final private domestic demand (GDP minus net exports, government and inventory) in the first half of 2025 came from data centres and high-tech-related spending¹⁴.

Although the US maintains a major lead over China, the gap between the two countries might be narrowing. As long ago as 2021, China launched an ambitious data centre construction effort, and its latest Five-Year Plan features ambitious AI adoption goals. By 2030, China's data centre capacity is expected to double, and electricity demand from its data centres is projected to increase by 300-500 TWh, accounting for 18% of total electricity demand growth¹⁵. Electricity is much cheaper in China than in the US, and due to its massive expansion of renewables, China reportedly already has an unused electricity generating capacity surplus of up to 100 TWh¹⁶. However, despite abundant electricity, China's AI buildout is constrained by inflexible electricity grids, internet transmission bottlenecks and a shortage of energy-efficient high-end chips, although it aims to compensate for the latter by using more of its less efficient domestic chips¹⁷. While China might have an advantage over the US when it comes to ensuring reliable electricity for AI-focused data centres, analysts doubt that this will be enough to win the data centre buildout race¹⁸.

For the European Union, the growth figures of data centre energy use are striking in their own right, despite the absence of any precise consumption data, according to the European Commission¹⁹. As of today, data centres already account for roughly 3% of total EU electricity demand²⁰. This figure varies significantly between Member States, with data centres consuming 22% of electricity in Ireland in 2024²¹ but 2% in France. A 45 TWh increase in data centre electricity consumption is projected between 2024 and 2030 – a rise of roughly 70% – pushing EU consumption from approximately 70 TWh

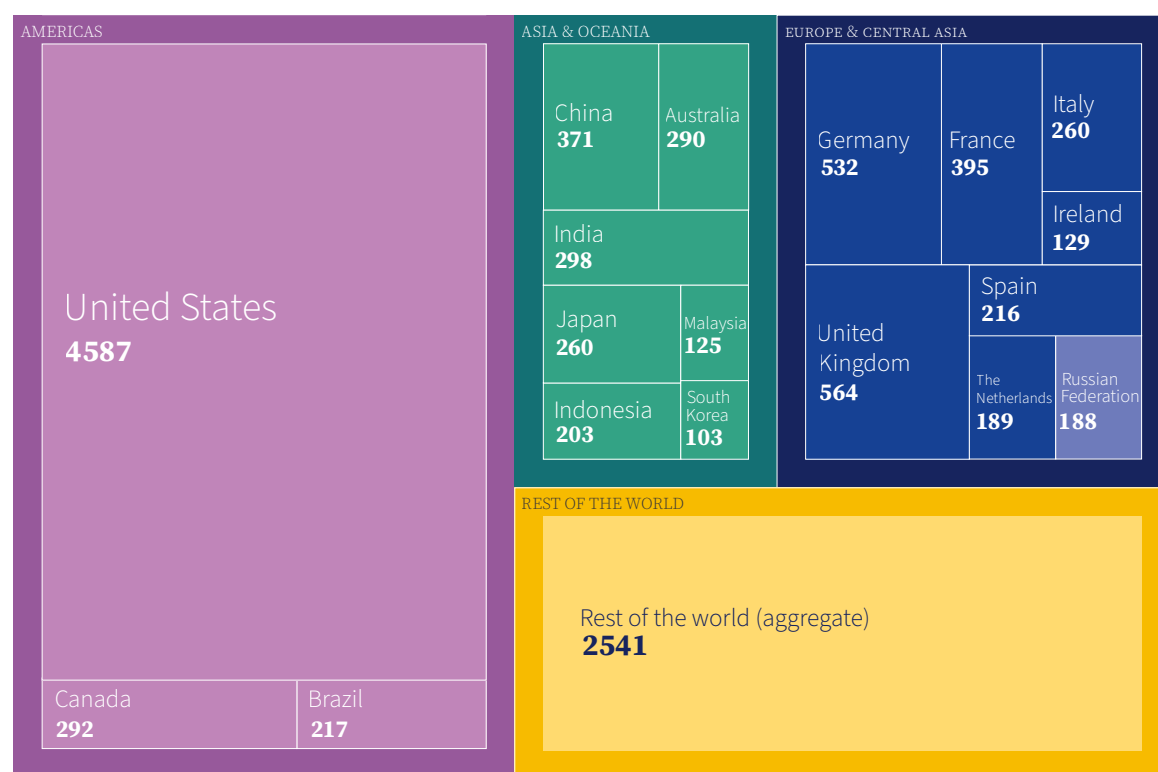
to 115 TWh. Goldman Sachs experts have noted that modifying power demand is a **‘monumentally important’ challenge for the EU**, because electricity demand from industry had been declining for 15 years²². By 2030, according to a ‘high’ scenario, European data centres alone might need as much electricity as Portugal, Greece and the Netherlands currently consume combined²³.

Beyond 2030, uncertainties increase due to technological evolution and the potential energy efficiency of future processors. Nevertheless, baseline scenarios anticipate a continued rise. Global consumption could

thus climb to around 1 200 TWh by 2035, from around 565 TWh in 2026. This trajectory poses **major challenges in terms of production capacity, grid stability and decarbonisation**. As tech companies strive to achieve carbon neutrality, pressure on renewable energy sources and distribution infrastructure will continue to grow, making **data energy management one of the strategic economic pillars of the coming decade**.

Global distribution of data centers

In 2026



For clarity, only the countries with the highest numbers of data centers are displayed individually. The category "Rest of the World" aggregates all remaining countries across all continents.

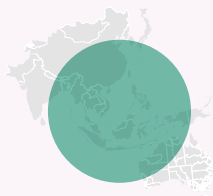
At the time of analysis, the global total amounted to 11 994 data centers. As the number of data centers changes over time, the most up-to-date figures for each country and world region can be consulted on the Data Center Map website.

Source: [Data Center Map](#)

Global overview

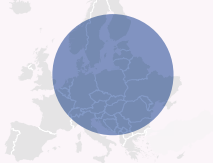
Regional analysis

Asia-Pacific



Asia-Pacific is experiencing rapid datacenter growth, presenting challenges related to power availability in major cities. Singapore implemented a temporary moratorium on new datacenters from 2019 to 2022, subsequently offering limited power access. This led to growth in alternative locations such as Johor, Kuala Lumpur and Jakarta. China's Eastern Data, Western Computing initiative aims to support datacenter expansion while balancing power consumption across the nation. Australia encourages datacenter development through its Industrial Energy Transformation Studies and Clean Building Management Investment Trust, promoting sustainability.

Europe



Europe is shifting toward sustainable growth in the datacenter sector, as evidenced by legislative amendments mandating a minimum share of renewable energy in electricity consumption. New developments are increasingly contingent on contributions to grid security, with the rapid expansion of renewable infrastructure straining electricity networks. High electricity prices, exacerbated by the transition away from Russian gas, may deter investment in datacenters.

Middle East & Africa



The Middle East and Africa remain underdeveloped in terms of datacenter infrastructure. In the Middle East, economies like the UAE and Saudi Arabia are promoting datacenter growth through favorable land deals and competitive power prices as part of their economic diversification strategies. South Africa is advancing digital transformation via incentives in special economic zones, although it faces energy challenges that hinder datacenter development.

Latin America



Latin America features emerging datacenter markets with minimal regulatory barriers, particularly in Brazil, Mexico and Chile. However, challenges such as inadequate transmission infrastructure persist, especially in Mexico. Conversely, Brazil benefits from a largely green energy mix. Chile has introduced a National Datacenter Plan to attract \$2.5 billion in investments, while Brazil and Colombia are fostering national AI initiatives that may boost the datacenter sector.

United States



The US leads the world in datacenter development. Policy generally promotes datacenter expansion, mostly via tax credits, despite mounting power management concerns and some local opposition in some of the country's densest server-housing facility hubs. Additional energy challenges include red tape, an aging grid and the clash between power needs and corporate green energy goals. More than 30 US states have enacted or proposed legislation specific to the datacenter sector, including development incentives, regulations around energy use and sustainability considerations.

The vulnerability of digital infrastructure

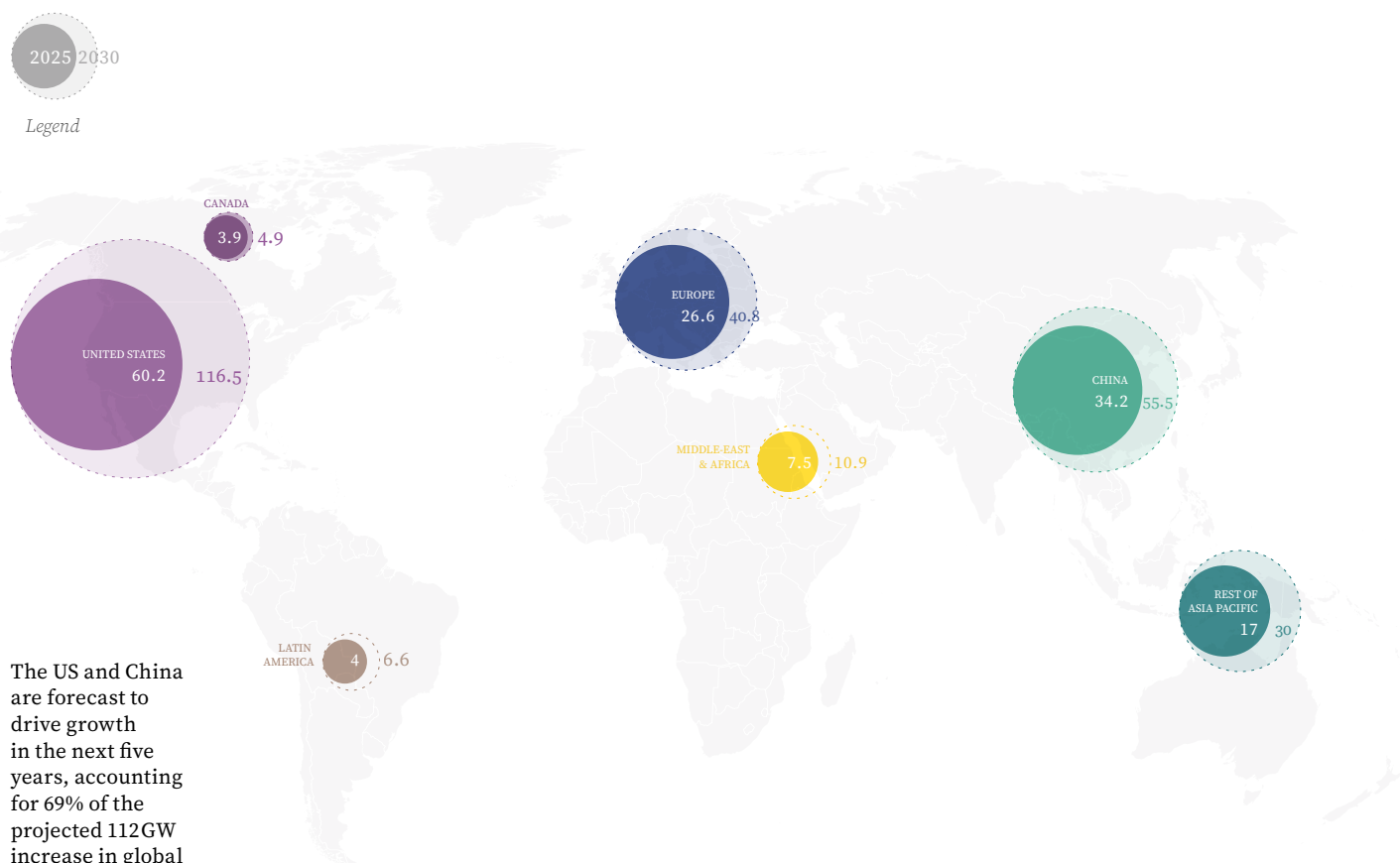
a pillar of strategic autonomy

Global connectivity relies on infrastructure that is far more fragile than most societies and citizens realise. Modern **societies depend on dense interdependencies that they do not fully control**. Heatwaves, floods or power outages can rapidly trigger cascading disruptions. The global digital system is built on a fragile architecture, vulnerable to accidents, natural disasters and acts of sabotage that can affect submarine cables, satellites, data centres/hyperscalers or power grids. In particular, the extreme concentration of digital services in a handful of giant data centres creates critical points of failure. Worldwide digital **infrastructures are increasingly exposed to environmental, technical and geopolitical** pressures that heighten their vulnerabilities and **create new forms of systemic risk through increasing interdependence, all of which could lead to ‘digital pandemics’, according to United Nations agencies.**²⁴

Recent tensions in the Persian Gulf and the Strait of Hormuz and the targeting of digital equipment also highlight the systemic risks facing the world’s digital infrastructure.

Estimated and forecast power usable at the rack for IT equipment, in Gigawatts (GW)

In 2025 and 2030



The US and China are forecast to drive growth in the next five years, accounting for 69% of the projected 112GW increase in global data centre power between 2025 and 2030.

As of Sept. 22, 2025. Source: [S&P Global Energy](#)

451 Research's Datacenter Services & Infrastructure Market Monitor & Forecast.

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No competitiveness without energy security

Experts have identified power availability – and not chip supply, or the availability of land – as the most important chokepoint for data centre expansion²⁵. To address this critical bottleneck, the **energy mix is an essential component for business competition**.

Banking sector analysts describe a transition in which tech giants moved in renewables ‘beyond virtual power purchase agreements to support the acquisition and life-extension of nuclear, gas and renewable assets directly, creating a new class of ‘behind-the-meter’ infrastructure deals’.²⁶ The passive customer has become an active underwriter of generation capacity.

The numbers are staggering. Microsoft has surpassed Amazon as the largest single corporate buyer of clean power, with 34.7 GW contracted globally as of the end of September 2025²⁷. Meta and Amazon together contracted 20.4 GW in clean energy in 2025 alone, including 4.7 GW in nuclear power²⁸. Across the four major hyperscalers – **Amazon, Google, Microsoft and Meta – combined contracted renewable capacity exceeds 50 GW, roughly equivalent to Sweden’s total generation capacity**.

With its high demand for electricity, the tech sector is a major client for energy producers. Data centre deals alone covered around half of that sector’s current electricity use. Customers from the tech sector made up around 40% of all corporate power purchase agreements for renewables signed in 2025²⁹. Nevertheless, while many tech companies are using renewable energy, the sheer scale of the

demand, which requires 24/7 operation and high-density power, also means that fossil fuels (natural gas or coal) will still provide a significant proportion of power by 2030. Some estimates suggest that **40-60% of new global capacity will be fossil-fuel-based**³⁰.

For the EU, initial data from the Commission’s new energy performance database indicate that European datacentres may be using more renewable energy than competitors elsewhere: in 2024, on average 87% of energy consumed came from renewable sources. However, as only 36% of EU datacentres participated in the first reporting period, this trend is still preliminary³¹.

To meet reliability requirements, there is a **renewed interest in nuclear power** for baseload generation, with tech companies signing contracts for more than 10 GW of new nuclear potential over the past year, and some SMRs (Small Modular Reactors) expected to come online after 2030.

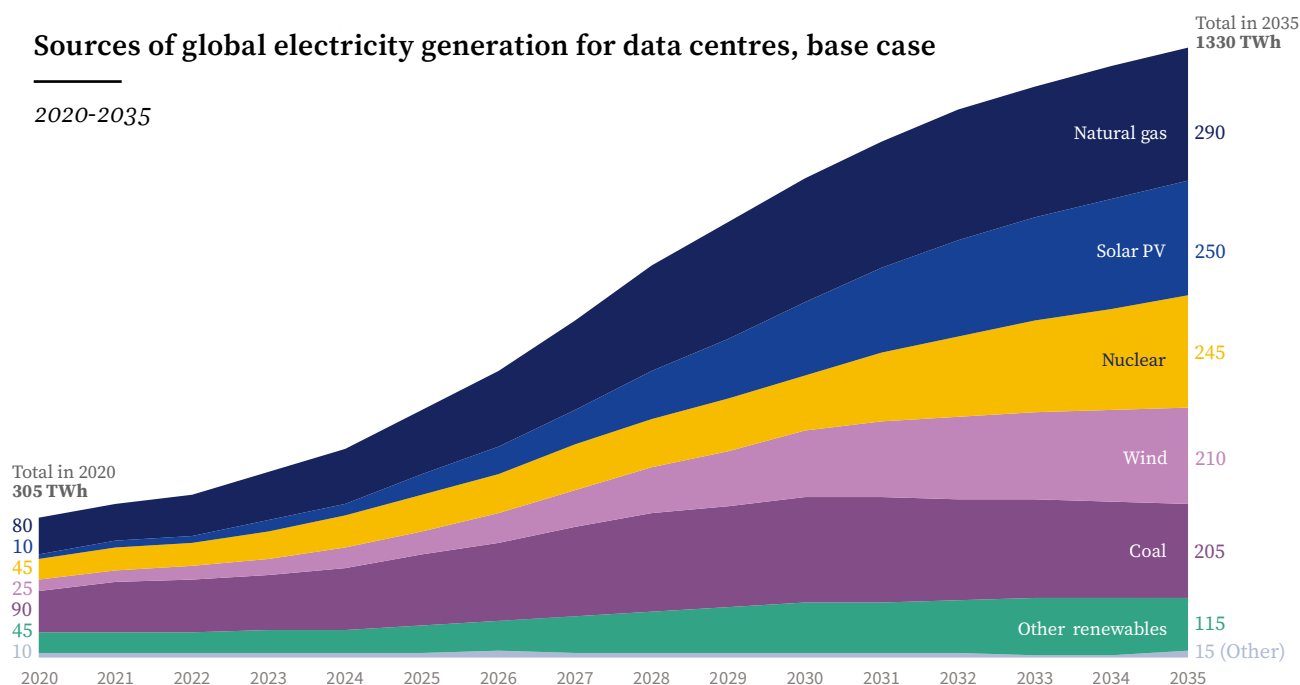
The International Energy Agency confirmed the trend at scale³²: the pipeline of conditional offtake agreements between data centre operators and small modular reactor projects had grown from 25 GW at the end of 2024 to 45 GW. Some data centres were already exploring on-site or co-located gas, nuclear and solar-plus-storage specifically ‘in order to avoid interconnection queues’, a form of grid bypass driven by the bottleneck in transmission infrastructure³³. In addition, unlike traditional data centres, AI operations cause large, rapid power swings that require critical energy storage in order to ensure a reliable supply. By 2030, data centres globally could host 20-25 GW of battery storage, potentially serving as a grid asset under the right incentive structures.

In the same vein, data centres could be the first cost-insensitive offtakers of clean firm power, with next-generation geothermal³⁴

benefiting from cold underground thermal energy storage (Cold UTES) that can reduce data centre cooling loads³⁵.

Sources of global electricity generation for data centres, base case

2020-2035



Source: IEA, 2025 (Paris), Licence: CC BY 4.0

Energy access as a conditionality for investment

When energy availability is the key factor that determines whether a data centre can be built at all, energy strategy becomes inseparable from corporate strategy. A McKinsey analysis of the European market stated that, ‘in the past two decades, no technology has driven the need for accelerated power infrastructure development in Europe more than AI’.³⁶ The corollary is that regions unable to provide reliable, competitively priced low-carbon electricity will bear the brunt of the infrastructure race. Power infrastructure is thus becoming a location determinant in the same way that fibre connectivity was in the 2000s.

In Europe, the so-called FLAP-D cluster (Frankfurt, London, Amsterdam, Paris and Dublin³⁷) hosts the majority of installed data centre capacity, but several of those **cities are hitting their physical limits**. Dublin and Amsterdam have imposed moratoria on new data centre construction, citing grid unavailability. Grid connection wait times in FLAP-D hubs average from seven to ten years³⁸. Direct grid congestion costs across the EU amounted to EUR 4.3 billion in 2024, and this figure excludes the economic consequences of project delays.

The commercial response is to **diversify investment flows**. Hyperscalers are redirecting attention towards locations with available grid capacity, such as in Poland,

Spain or the Scandinavian countries, and towards countries accelerating permitting, grid priority and energy deals structured around large-load requirements. The European Commission's AI Continent Action Plan (April 2025) aimed to triple EU data centre processing capacity over the following five to seven years, partly in response to this displacement dynamic. The EU's competitive position in the AI economy depends, in part, on its ability to offer **hyperscalers what they actually need: energy infrastructure and abundant, stable and affordable low-carbon electricity**. This creates pressure that could accelerate ongoing developments, such as a renaissance in nuclear technology. It also creates a dynamic in which very large, foreign-headquartered technology companies are, in effect, setting energy-related terms for their European investment decisions in conversations with national governments, as well as by prioritising a certain type of energy. Tech companies are not passive recipients of whatever energy policy governments choose to implement; they are increasingly contributing to shaping it.

Water stress: an additional source of tension

The growing threat of **water scarcity** is jeopardising essential industries and projects, including semiconductors, data centres, renewable hydrogen and the production of batteries for electric vehicles³⁹. The EU's ambitions in the field of AI risk being founded on a scarce and unevenly distributed resource. This constitutes a competitiveness issue not only for the EU, but also for the world as a whole.

Water consumption by data centres **could ultimately undermine both the continent's digital sovereignty and its climate resilience**. Globally, direct and indirect data centre consumption amounted to 560 billion litres in 2023 – a figure that could rise to 1.2 trillion litres by 2030 if current trends persist. This growth is primarily **driven by server cooling**: data centres evaporate approximately 80% of the water they draw, returning only 20% to wastewater treatment systems. It should be noted that 60% of data centres' water consumption stems from indirect use, linked to the electricity generation required for their operation. Recent studies show that this indirect consumption can be up to four times higher than direct consumption⁴⁰. The average water consumption of a large data centre can be equivalent to that of 100 000 households, according to the International Energy Agency comparison. The largest centres currently under construction are estimated to consume the equivalent of 2 million households.

The **geographic concentration** of data centres generates **intense local tensions**⁴¹. This concentration also creates **risks of conflict over water use**, particularly in regions already experiencing water stress, where demand from data centres competes directly with agriculture, industry and domestic use. On average, around 30% of EU territory and 33% of the population are affected each year by water scarcity⁴².

Several factors make managing this risk a particularly challenging issue to address. The lack of any distinction between AI and non-AI workloads in data centre operators' environmental reports complicates any accurate assessment of AI's environmental impact⁴³. Furthermore, economic incentives

remain insufficient: the low cost of water in relation to other operational expenses, combined with heavy reliance on water-intensive air cooling, severely limits the financial relevance of water management for operators. China is one of the few countries to have incorporated water use efficiency (WUE) performance standards into its data centre building code. The EU has strengthened its response to water use efficiency, scarcity and pollution through a multiannual, cross-sectoral plan setting targets for 2030 and 2040. There is also a requirement to monitor and report on the energy performance and water footprint of data centres, with the aim of introducing a resource efficiency label for datacentres.

However, from a technological standpoint, **the innovations are promising**. New research shows that data centres could become ‘water-positive’ and carbon-negative by using their waste heat to power water purification and carbon capture systems⁴⁴.

Growing opposition

AI backlash

Recent analyses of fears and expectations regarding the development of artificial intelligence and its impact highlight a paradoxical situation⁴⁵: on the one hand, there is widespread adoption of AI, but on the other, there is growing mistrust regarding its societal risks. **The potential impact on the labour market and algorithmic manipulation are significant sources of concern**. Comparative data reveal that Europe is one of the most sceptical regions in the world. Indians have also registered the sharpest rise in concern around AI usage in recent years⁴⁶. While Asia

shows significant enthusiasm (e.g. 80% in Thailand), Europeans are mostly cautious, with 66% of Europeans believing that AI will destroy more jobs than it will create⁴⁷. Chinese respondents tend to view AI as a driver of personal and professional progress, and more than 80% believe it will change their work for the better⁴⁸. For respondents in Western countries, major concerns about privacy and political disinformation also reveal societal fears⁴⁹. The issue of strategic dependence also contributes to public worries regarding a major technological and economic shift that is redefining how nations produce, compete with one another and exert influence. North American cloud providers with Amazon, Microsoft and Google hold more than 70% of the European market, compared to just 15% for European players (29% in 2017)⁵⁰. All of this could have consequences for the ongoing data centre expansion.

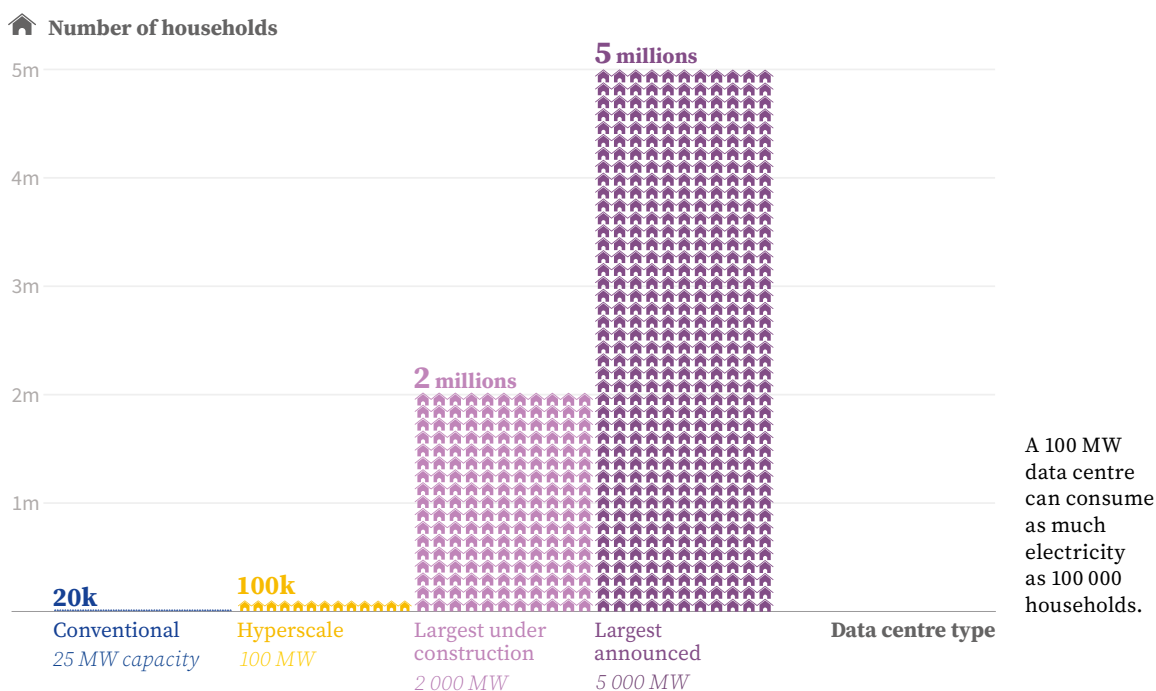
‘Not in my backyard’

Public scrutiny of data centre implementation, particularly on a local level, is increasing due to the rise in energy prices and concerns about the environmental impact and social consequences of AI growth.

Public concerns surrounding data centre deployment have intensified across Europe as communities grapple with the rapid expansion of energy-intensive facilities driven by AI and cloud computing. Gigafactories that are the next sectorial development might face similar worries. While data centres promise digital infrastructure and economic activity, the backlash underscores a **growing ‘not in my backyard’ sentiment** rooted in tangible fears over resource scarcity and environmental impact.

Data centre electricity consumption in household equivalents

In number of households



Source: [IEA](#), 2025

Residents frequently voice fears over soaring electricity consumption that places a strain on national grids and delays the energy transition, massive water usage for cooling that competes with local needs, noise and visual pollution. The impact on local jobs is another concern. While the construction of AI gigafactories or industrial parks has a positive impact on the labour market during the construction phase, long-term job creation remains limited, particularly when compared to the scale of the land and resources involved. For example, in France, investment in this physical infrastructure amounted to EUR 67 billion in 2025, supporting a total of 2 800 direct jobs⁵¹.

If data centre expansion in Europe were to reflect the US dynamic, the impact on communities across rural areas could also increase. Data centres, once clustered around cities and towns, are moving into farming country in search of cheap land, energy access and tax incentives⁵². In the US, 67% of planned data centres are in rural areas, while 87% of existing data centres are located in urban regions⁵³. As the industry has expanded, public opinion has hardened against it, and people are far more likely to view data centres as harmful than beneficial in terms of environmental impact, domestic energy costs and quality of life in nearby communities⁵⁴. This forces operators to offer more innovations to limit the environmental impact⁵⁵.

Opposition to data centres mainly takes the form of legal challenges and moratoria aimed at establishing stricter regulations governing their construction, giving authorities more time to assess their impact on water resources and noise pollution, or even preventing new facilities from being built for a certain period of time. In the US, a growing backlash is emerging at state level. For instance, Maine has passed a moratorium preventing the construction of any new infrastructure for the time being. Virginia (12% of global capacity in the massive data centres essential for artificial intelligence) is considering revising its tax policy, which currently favours hyperscalers⁵⁶.

These worries have also translated into concrete **blockages and moratoria in several countries in the EU in recent years**. In Ireland, pressure from citizens and grid overload warnings led to a multiannual freeze on new data centre connections in the Dublin area, with critics arguing that the sector undermines national climate targets. In January, the government published a Large Energy Action Plan aimed at enabling the further development of energy-intensive facilities, including data centres – a sector that accounted for 22% of electricity usage in Ireland in 2024, up from just 5% in 2015. It followed the lifting of an effective moratorium on new data centre connections⁵⁷. Some companies⁵⁸ with microgrid-connected data centres in Ireland could mark the region's first step towards a privately powered ecosystem, limiting the impact for private customers⁵⁹.

In the Netherlands, strong opposition from local residents and farmers, citing nitrogen emissions and environmental damage, forced the cancellation of Meta's massive Zeewolde project⁶⁰, while Amsterdam

imposed zoning restrictions and pauses on new developments. The German Federal government aims to double data centre capacities and quadruple artificial intelligence and high-performance computing (HPC) capacities by 2030⁶¹. To address the concerns raised by multiple stakeholders – which must be addressed at various levels of governance, from federal to local level – the most recent strategy implements measures to speed up planning, the issuing of building permits and connections to the power grid. Overall, it encourages decentralisation away from the historic Frankfurt hub, whose grid is expected to reach capacity in the short term. Such alignment comes in order to avoid situations such as that seen recently in Groß-Gerau, Hesse, where the city council rejected a EUR 2.5 billion data centre development project by Vantage Data Centres, citing its potential impact on air flow and heat exposure, the low number of jobs created, uncertainties regarding future trade tax income and the potential risk of terrorism⁶². In France, multiple local collectives have mobilised against projects, leading to petitions, public inquiries and a participatory map tracking oppositions, often citing conflicts with climate goals and territorial planning.

While most opposition to the construction of data centres makes use of procedural channels, there has been a notable rise in anti-tech activism, with some individuals even resorting to violence. As the most visible manifestation of AI, data centres and their related infrastructure have been the target of a growing number of extremist attacks. Between November 2025 and April 2026, several attacks and plots targeted technology-related infrastructure and individuals across

Europe – in France, Italy and Germany – and included shooting incidents in the US⁶³.

As of today, specific data on the prevalence of this phenomenon are still absent, mostly due to anti-technology violence being included in other categories of extremism. Despite choosing similar targets, there appears to be little coordination between the perpetrators of recent anti-tech incidents. The US government fears that the emergence of anti-technology ‘extremism’ over the next five years could fuel large-scale protests that could escalate into civil unrest and violent activities⁶⁴. However, although they expect more acts of sabotage and high-profile attacks to occur in future, many analysts warn against any criminalisation of overwhelmingly peaceful anti-data centre activist groups and AI-sceptic movements⁶⁵.

What’s next? New frontiers?

The data centre industry faces a fundamental tension in future in terms of how to scale up without exhausting land, water and energy resources. Two unconventional frontiers are attracting serious attention from engineers, investors and ultimately policymakers alike: outer space and the deep ocean.

Recent announcements, such as SpaceX’s development of ‘Starlink’, a massive orbital data centre constellation powered by free solar energy in space, underscore the **ambition of establishing data centres in space**. This idea is driven by the desire to harness unlimited solar energy, as well as ideal temperatures for cooling those massive digital farms. Space-based data stations could offer data availability to remote locations on

earth, connectivity during natural disasters and – theoretically – unlimited physical space for expansion. Data centres in orbit could significantly reduce energy consumption and carbon emissions compared to traditional earth-based infrastructure^{66 67}. The main barrier seems to be both technical and economic, with future launch costs acting as a key determinant. The challenges are significant: radiation-hardened hardware, the absence of any on-site maintenance and orbital debris management all remain unresolved at scale. Space data centres also give rise to important questions as regards data and orbital regulation and sustainability, which may mean updating or clarifying existing digital and space treaties and legislation⁶⁸.

Other projects aim to harness ocean resources by using ocean water as a natural cooling resource. The ocean could help reduce pressure on land **and permitting in dense coastal hubs**. Proximity to coastal populations also reduces network latency (the time delay between a command being sent from a control system and the physical response or data feedback being received from an energy asset), representing a genuine competitive advantage for cloud services⁶⁹.

While Microsoft’s 2015 Project Natick, which pioneered subsea data centre research, deploying a 40-foot sealed module off the Scottish coast containing 864 servers, was ended in June 2024⁷⁰, several initiatives and technologies are currently being tested. China has launched an underwater data centre powered by **offshore wind energy**⁷¹. The facility is located 10 km off the coast of Shanghai and is situated on the seabed at a depth of 35 metres. It houses nearly 2 000 servers. A conventional data centre uses

about one-third of its electricity for cooling; underwater, that ratio drops to one-tenth. Electricity from wind turbines is transmitted directly to the submerged modules via undersea cables, bypassing the onshore grid. According to the Chinese government⁷², the datacentre reduces power consumption by more than 20% compared with land-based datacentres. US startup Panthalassa⁷³ is building data centres off the coast of the North Pacific. These 85-metre-tall steel structures would generate electricity using wave motion. The servers would be installed inside and cooled by seawater, and the data would be transmitted via satellite⁷⁴.

In Nantes, France, a network of floating data centres on the river, cooled by flowing water without the need for pumps or air conditioning, is being developed⁷⁵. Building and deploying underwater facilities requires specialised marine engineering, offshore installation vessels and complex grid connections. Overall, the technical challenges remain considerable, and include corrosion, waves, maintenance, power supply, connectivity and limited on-site staff. This makes the costs far higher than those for conventional data centres. As the EU is among those political entities with the longest maritime border in the world, it certainly has a role to play in the floating cloud sector.

Conclusions

The Draghi report already pointed out the significant increase in power demand as a key future challenge for the deployment of AI⁷⁶. The only certainty is that we are just at the beginning of the adoption of artificial intelligence, whose growth is set to be

exponential. In an energy-intensive digital industry, this technology stands out for the sheer amount of computing power it requires for each query. If we consider only the current load on data centres within energy networks, the burden remains limited. But when we add cloud service providers and the manufacturing of advanced semiconductors to the mix, the pressure on the energy system becomes much greater. This growing impact is reflected in the unprecedented surge in investments by AI giants in data centres: EUR 529 billion by 2026, according to Morgan Stanley, which is already nearly four times more than in 2023. The corollary is an explosion in energy needs. By way of illustration, Japanese firm SoftBank's EUR 75 billion megaproject in France's Hauts-de-France region could potentially consume as much energy as five nuclear reactors.

Tension is mounting between the stated ambition of massively expanding the infrastructure needed for AI and the physical constraints which that entails: energy availability, trade-offs in the electricity mix and pressure on water resources. Competition among regions seeking to boost their appeal is set to intensify. While the debate in the EU is less contentious and less politicised than in the US, it raises the same fundamental question: the actual capacity of European countries to sustain this race without undermining other energy (and environmental) priorities. Data centres are at the centre of those tensions, serving as the embodiment – the most tangible physical expression – of an artificial intelligence revolution.

The debate is no longer simply between supporters and opponents of data centres, but rather between several visions of sovereign interest, ranging from industrial acceleration

and territorial management of resources to ‘macroeconomic’ benefits and tangible local economic impact. While the public generally views AI as a tool for performing tasks, it is nevertheless becoming a structural component of society’s and the economy’s infrastructure – an invisible foundation.

Thus, while energy shortages could become one of the biggest brakes on AI’s growth, so could public acceptance. Both crunches are forcing a reckoning among key AI players such as data centre operators, hyperscalers, chip makers and power equipment producers, and ultimately policy-makers. As they are all scaling up, they are having to reimagine how data centres are designed, built and powered.

Big tech bets on energy

Overview of selected investments by major technology companies in energy systems – nuclear, renewables, acquisitions, and direct infrastructure – in response to AI-driven power demand growth

Company	Location	Type	Description & objective	Amount/scale
Amazon⁷⁷ March 2026 	Aragón, Spain 	 Solar + wind	Amazon Web Services announces EUR 33.7 billion total investment in Spain, including 100 solar and wind energy projects. AWS data centres in Aragón have matched 100% of electricity use with renewables since 2022. Objective: to power AI and cloud infrastructure expansion across Europe with renewable energy.	EUR 33.7B
Amazon⁷⁸ 2022/2025 	Germany (Baltic Sea) 	 Offshore wind	Amazon invested in the Baltic Eagle offshore wind farm – one of the largest in Germany – with a commitment to offtake 189 MW of capacity. Objective: to supply clean power to AWS European data centres and to reduce grid carbon intensity in one of Europe's most coal-heavy power systems.	189 MW
Microsoft⁷⁹ 2025 	Aragon, Spain 	 Solar	Microsoft signed a 95.7 MW PPA with Zelestra for two solar projects in Zaragoza, supporting its new cloud data centre in Aragon region (EUR 6.69 billion data centre investment planned). Also signed 6 VPPAs with Repsol covering three wind + three solar farms (230 MW total) and a 150 MW wind PPA with Iberdrola. Objective: to ensure a renewable supply for AI cloud operations in Spain.	475 MW total
Microsoft⁸⁰ 2024 	France / Germany 	 Solar + wind	Long-term strategic collaboration with ENGIE has enabled 26 renewable energy projects in France and seven in Germany, totalling 416 MW currently online. Contracts provide ENGIE with the revenue certainty to develop new wind and solar assets. Objective: to deliver new low-carbon electricity to European grids hosting Microsoft data centres.	416 MW
Microsoft⁸¹ 2024 	Denmark / Sweden 	 Solar + wind	180 MW PPA with European Energy covering a mix of solar and onshore wind projects in Denmark and Sweden, announced in June 2024. Microsoft is one of the most active corporate buyers in the Nordic market. Objective: to support 24/7 carbon-free energy goal for data centres by 2030 using Nordic renewable abundance.	180 MW
Google⁸² 2022-2025 	Hamina, Finland 	 Wind	Google is the most active corporate PPA offtaker in Finland, with five PPAs totalling ~446 MW, including the Piiparinmäki wind farm (211 MW) and the Maevaara wind farm in Sweden. Objective: to operate at near 100% carbon-free electricity on the Nordic grid.	446 MW total

Company	Location	Type	Description & objective	Amount/scale
Google⁸³ 2022-2025 	Fredericia, Denmark 	 Solar	Google signed a PPA covering the Rødby Fjord solar project (54.5 MW) and maintains 100+ MW of operational solar resources powering its Fredericia cloud data centre. The facility serves as the backbone for Google Cloud's AI capacity in northern Europe. Objective: to operate at near-100% carbon-free electricity on the Nordic grid.	160 MW
Amazon⁸⁴ 2024 	Miłkowice, Poland 	 Solar	Amazon supported its first renewable energy project in Poland – the Miłkowice solar farm (87 MW), operational as from 2024. Amazon prioritises Poland and Germany as carbon-intensive grids where renewable investment has a maximum decarbonisation impact. Objective: to accelerate grid decarbonisation in Central Europe to power AWS operations there.	87 MW
Microsoft⁸⁵ 2024-2028 	Penn- sylvania, USA 	 Nuclear	20-year PPA with Constellation Energy to restart Three Mile Island Unit 1 (835 MW). Microsoft will take 100% of output from 2028. Reported cost: USD 110–115/MWh – a deliberate premium for stable, 24/7 carbon-free power. Objective: to secure baseload power for AI data centres within the PJM grid region; to establish the commercial template for nuclear PPAs by hyperscalers.	~\$16B
Meta⁸⁶ 2026 	Ohio / Wyoming / USA 	 Nuclear SMR	Meta announced agreements in January 2026 to secure up to 6.6 GW of nuclear power across four companies: Vistra Corp (2 176 MW from existing plants), Oklo (SMR campus in Ohio), TerraPower (Wyoming) and Entergy (2 GW). Largest nuclear procurement by any single company. Objective: to guarantee 24/7 firm power for AI 'supercluster' data centre infrastructure.	6.6 GW
Google (Alphabet)⁸⁷ Dec. 2025 / March 2026  	Texas / California 	 Acquisition	Alphabet acquired clean energy and data centre developer Intersect Power for USD 4.75 billion in cash plus assumption of debt (announced Dec 2025, closed Mar 2026). The deal gives Google a team to develop, build and generate power directly alongside data centres – bypassing long grid connection queues. Portfolio: 10.8 GW of solar + Battery Energy Storage Systems (BESS) by late 2028. Objective: a 'bring-your-own-generation' model for AI data centres to avoid utility interconnection delays.	\$4.75B
Google⁸⁸ 2024 	USA (multiple states) 	 SMR	Google signed a 500 MW development agreement with Kairos Power for a fleet of molten fluoride salt-cooled small modular reactors. This was among the first of the corporate SMR fleet agreements and received construction permits. Objective: to develop a replicable baseload clean energy solution for 24/7 data centre power needs at scale.	500 MW
OpenAI⁸⁹ Jan 2026 	Milam County, Texas 	  Solar + storage	OpenAI and SoftBank invested USD 1 billion in SB Energy to build a 1.2 GW AI data centre campus in Texas powered by new co-located solar and battery storage. Part of the USD 500 billion Stargate commitment. SB Energy operates 3+ GW of solar and a 15 GW development pipeline. OpenAI also pledged to finance 100% of power infrastructure costs at all Stargate sites to shield local ratepayers. Objective: to own and operate the energy supply alongside AI compute – vertical integration model.	1.2 GW

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PRINT	ISBN 978-92-850-0838-3	doi: 10.2860/7495562	QC-01-26-013-EN-C
PDF	ISBN 978-92-850-0837-6	doi: 10.2860/9881351	QC-01-26-013-EN-N

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Produced in collaboration with the Visual Communication and Production Unit