

Powering the European Digital Future: An Energy Blueprint for Data Centres



01 Executive Summary

02 A Blueprint for Data Centres as Energy Partners

2.1 Pillar 1: Supporting the Grid

2.2 Pillar 2: Bringing Additional Clean Generation

2.3 Pillar 3: Safeguarding Energy Affordability in Local Communities

03 A Policy Roadmap for the Sustainable Integration of Data Centres in the Energy System

3.1 Accelerate Connections to the Grid by Reforming Demand Connection Queue Management

3.2 Enable Both Near-Term and Long-Term Grid Capacity Expansion

3.3 Enable Deployment of Carbon-Free Generation

3.4 Incentivise Energy Efficient Data Centre Infrastructure

3.5 Implement Enabling Measures to Connect Data Centre Heat with Offtakers

04 Conclusion

05 Appendix

Executive Summary

AI technologies can boost Europe's GDP by €1.2 trillion over the next decade, accelerating scientific breakthroughs, improving power grid security, reducing emissions, and predicting natural disasters. Europe has set an ambitious vision to triple data centre capacity in the next 5 to 7 years to establish itself as a global leader in AI, while driving progress toward climate neutrality targets, energy security, and industrial competitiveness.

Google is deeply committed to helping Europe seize this opportunity, with 9 operational data centres, 8 under construction, 13 cloud regions, and 6 subsea cables connecting Europe to the world. As one of the world's largest corporate clean energy purchasers, Google has signed agreements to **enable over 4.5 GW of additional carbon-free energy (CFE) capacity in Europe**. This advances Google's 24/7 CFE moonshot, supplying electricity demand with clean power every hour and on every grid where it operates.

When developed responsibly, data centres can be valuable partners to Europe's energy transition, supporting the European Union's strategic priorities to safeguard energy affordability and industrial competitiveness, energy security and decarbonisation. To demonstrate this, Google has developed and implemented a [blueprint](#) for responsible data centre energy growth for our new infrastructure in Finland.

If replicated across the sector, this three-pillar approach can make data centres an asset to Europe's energy agenda:

Pillar 1 Supporting the Grid

Pillar 2 Bringing Additional Clean Generation

Pillar 3 Safeguarding Energy Affordability in Local Communities

As Europe enters an era of digital innovation driven by the rapid scaling of AI, policymakers can ensure that data centres integrate intelligently and sustainably into the European energy system. **To support industry-wide adoption of this energy blueprint, a partnership-led approach between the sector and policymakers is needed across five key areas:**

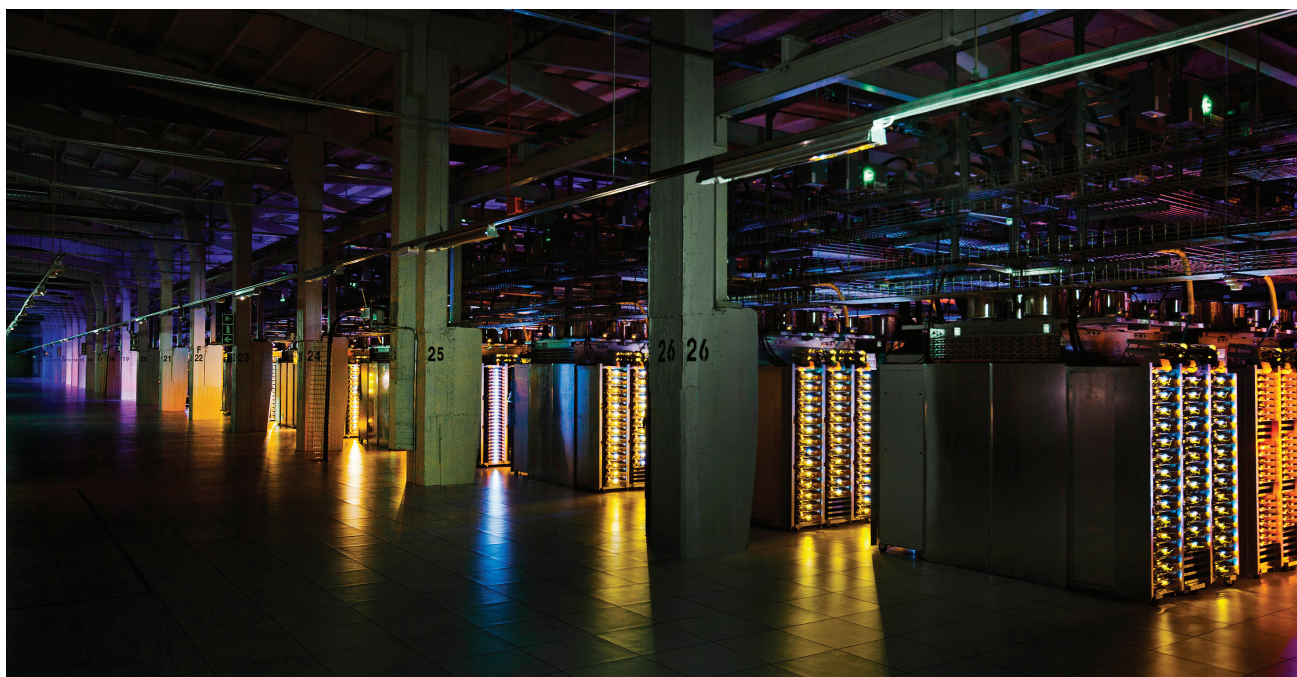
1. Accelerate connections to the grid by reforming demand connection queue management
2. Enable both near-term and long-term grid capacity expansion
3. Enable deployment of carbon-free generation
4. Incentivise energy efficient data centre infrastructure
5. Implement enabling measures to connect data centre heat with offtakers

With the right framework and policy levers in place, the digital and clean energy transitions can be mutually reinforcing, so that data centre demand growth supports, rather than undermines, the expansion of affordable, reliable, and clean energy in Europe.

02

A Blueprint for Data Centres as Energy Partners

- 2.1 Pillar 1: Supporting the Grid
- 2.2 Pillar 2: Bringing Additional Clean Generation
- 2.3 Pillar 3: Safeguarding Energy Affordability
in Local Communities



Server floors like these require massive space and efficient power to run the full family of Google products for the world. Here in Hamina, Finland, we chose to renovate an old paper mill to take advantage of the building's infrastructure as well as its proximity to the Gulf of Finland's cooling waters.

Built the right way, data centre operators can make measurable contributions that support Europe's energy affordability and industrial competitiveness, energy security, and decarbonisation objectives. To demonstrate this, Google has developed a blueprint for responsible data centre energy growth which, if replicated across the sector, can make data centres an asset to Europe's energy agenda. We have put this approach into action most recently in [Finland](#), which serves as a good example of how data centres can approach energy responsibly.

The blueprint consists of three core pillars:

- 1. Supporting the Grid:** contributing to lowering overall system costs by locating data centres in grid-optimal zones where surplus power and transmission is underutilised (where feasible), deploying flexible assets—such as battery energy storage systems and demand response—and enabling the adoption of AI to optimise grid operations.
- 2. Bringing Additional Clean Generation:** delivering additional clean generation to the local grid to power new load growth, stabilise wholesale energy prices and support European energy security.
- 3. Safeguarding Energy Affordability in Local Communities:** working in partnership with local data centre communities to identify and fund programmes that deliver direct energy cost relief (e.g. funding residential heat pumps, batteries, or energy efficiency upgrades and supplying district heat free of charge).

Data centre operators should seek to contribute across all of these pillars and, as we explore in section 3, policymakers can seek to create the framework conditions that can drive these behaviours.

It is nevertheless important to highlight that there is no single, archetypal, best-in-class data centre model from an energy perspective. Every market is different, with its own unique generation mix, natural resources, climatic conditions, national energy strategy, and energy needs. Likewise every data centre is different, providing a wide variety of services with a range of designs. The appropriate approach will depend on the data centre, the region in which it is located, and the energy needs at both national and local level.

Finding this balance requires close collaboration between operators and policymakers to evaluate actual impacts and tailor the most effective solutions for the local power system and to safeguard energy affordability for everyone it serves.

Pillar 1: Supporting the Grid

When developed responsibly, data centres can support a more resilient grid. Data centres can reduce costs for all consumers by locating (where feasible) where power and transmission capacity are underutilised, by contributing towards existing fixed system costs, deploying flexible resources such as battery energy storage systems and demand response, and using the AI solutions which they power to intelligently manage and optimise grid operations.

Siting Data Centres in a Grid-Friendly Way

Building infrastructure responsibly starts with partnering with local experts to choose the best possible places for development. The choice of where to build and connect a large load plays a significant role in the overall impact of that load on overall system efficiency. Over the lifetime of the facility, a well-situated load can give rise to a material reduction in system costs and improved efficiency.

Google partners closely with grid operators and other industry stakeholders to identify optimal locations for its infrastructure that allow it to be grid-supportive. By making data-driven siting decisions for our data centres, Google aims to utilise existing grid infrastructure and sites near existing carbon-free energy sources, or where future clean generation can be built, where possible.

This approach directly aligns with EU guidance encouraging locational signals to steer new demand away from congested grid areas and towards parts of the network with ready capacity¹. By utilising existing capacity

and minimising costly grid expansions, smart locational planning accelerates data centre delivery while reducing system-wide costs for all consumers.

At the same time, grid conditions are part of a broader matrix of location criteria. To deliver reliable digital services, data centre operators must balance grid hosting capacity alongside essential factors such as access to high-speed fibre connectivity, low-latency network routes to end users, land availability and zoning suitability, and environmental considerations.

Even when sufficient grid headroom exists, a location may be suboptimal for a developer. For instance, infrastructure delivery can be delayed by fragmented administrative zoning or permitting procedures. While energy considerations are central to site selection, it is an inherently multi-dimensional process and requires flexible planning rather than rigid, single-metric mandates.

Project Spotlights

[In Finland](#), Google worked with TSO Fingrid, Business Finland, and local municipalities to locate future infrastructure in northern and central regions where clean generation and grid capacity are readily available. This approach reduces the need for new grid investments and helps lower overall system costs. To better understand how smart siting can maximise benefits to the grid, we

commissioned a study² to model the impact of locating a hypothetical 1GW³ of new energy demand in the Oulu–Kajaani region of Finland compared to the southern region. The study found that this smart siting could enable an estimated €520 million in savings to energy consumers across Finland over a 20-year period.

Delivering Flexibility Services

Flexibility solutions can help stabilise electricity prices, support the local grid when it's stressed, and enable a more modernised, efficient power system. From deploying grid-connected batteries to managing compute workloads, data centres can advance a broad toolkit of flexibility solutions that help local grid operators balance supply and demand across temporal and spatial horizons. This enables the system to better utilise existing grid resources and helps minimise the need to build new expensive infrastructure.

Data centres can invest in large-scale battery storage systems offsite that absorb surplus renewable energy during periods of oversupply and dispatch electricity back to the grid when it's needed. These battery storage systems can be strategically co-located within the same grid supply point as data centres to help alleviate stress on the localised grid and support demand expansion ahead of costly network upgrades. By bringing grid-connected, co-located storage and generation, data centre operators can help reduce the draw on

the transmission network, allowing for accelerated connection of more demand. In addition, data centres can contract with balancing service providers who can flexibly operate renewable energy generation to stabilise the grid.

At Google, we've developed capabilities in certain locations to limit or shift non-urgent workloads running in

our data centres that can be flexible for a limited period of time. We work with local grid and network operators to explore how this demand response capability, where it is available, can be leveraged to support the grid.

Project Spotlights

In 2025, Google [announced](#) our collaboration with grid partner Centrica Energy and transmission system operator Elia to integrate a demand response capability in conjunction with our St. Ghislain facility's battery storage system in Belgium. When the Belgian grid is under pressure, demand response is dispatched by Centrica Energy's proprietary

optimisation algorithm, integrating both flexibility resources—demand response load-shifting and battery storage—hand in hand. This builds on [successful pilots](#) we've done in the past, including in Europe during winter 22–23 when energy prices hit historic highs due to the war in Ukraine.

Efficient Data Centre Design and Operation

For data centres to truly act as energy partners, making the most of every kilowatt-hour consumed is essential. Significant progress has already been made on data centre energy efficiency, through continuous efficiency

optimisation that decouples compute growth from electricity demands and allows the digital economy to scale while keeping net electricity demands manageable⁴.

Project Spotlights

We're investing heavily in efficiency across our AI stack—from infrastructure and chip design to model deployment. At the data centre level, we've been leaders in developing extremely energy efficient facilities.

Google's data centres are among the industry's most efficient, operating with a 2025 fleet-wide average power usage effectiveness (PUE) of 1.09 and using 83% less overhead energy than the industry average.

We've been designing our Tensor Processing Units (TPUs) for over a decade to maximise performance while minimising energy and emissions. In early 2025, we launched Ironwood, our seventh-generation TPU—which is nearly 30 times more power efficient than our first Cloud TPU from 2018, and which delivers double the performance-per-watt than our sixth-generation TPU Trillium from 2024. And our recently announced eighth-generation TPUs deliver up to two times better performance-per-watt over Ironwood.

Leveraging AI for the Grid

AI tools are proving to be powerful catalysts for planning, building and operating a cleaner, more efficient, and resilient grid. When AI is developed and harnessed in a responsible and collaborative way, it helps grid operators, utilities, and regulators transform the energy ecosystem. A 2025 International Energy Agency (IEA) report found that AI applications could unlock major efficiency and operational gains, improve the security of the grid, and cut global CO₂ emissions by 1,400 megatonnes by 2035⁵.

In addition to clean energy deployment, AI tools can benefit electricity reliability and resilient grid planning and operations. The Commission's [assessment](#) of Europe's

1,400 Mt

AI applications could unlock major efficiency and operational gains, improve the security of the grid, and cut global CO₂ emissions by 1,400 megatonnes by 2035

aging grid infrastructure and projection of doubling cross-border transmission capacity by 2030 highlights an opportunity for leveraging AI to enable cost and risk

reduction. European transmission and distribution system operators could leverage collaborative, AI-powered platforms to monitor infrastructure and rapidly identify

defective equipment, thereby mitigating outage risks and reducing maintenance costs across the broader European grid.

Project Spotlights

[Tapestry](#) is developing a unified platform of AI-powered tools that make the grid—and the energy resources connecting to it—fully visible and manageable to grid operators, planners, and utilities. Tapestry's tools use AI to improve grid awareness, offering transmission and distribution customers important new insights about the functioning of their grid and the health of the grid's underlying assets (including the ability to [identify potentially defective equipment](#) before it fails). Other Tapestry tools use AI to transform day-to-day operations, like managing assets and load forecasting, as well as long-term planning; in testing, planners for Chile's national grid operator found that Tapestry's planning tool [helped it run simulations 86% faster](#), and run 30 scenarios simultaneously, instead of one at a time. Tapestry is also [collaborating with North America's largest grid operator](#)

to build and deploy new AI-enabled tools, including one that has reduced a critical bottleneck down to [minutes of processing time](#).

In 2025 and 2026, Google launched its Google for Startups programme focused on [AI for Energy](#) in Europe. We are investing in European start-ups that are building AI solutions to reduce energy burdens for European households or lower energy costs for European industries, accelerating innovation for energy efficiency and smarter grid utilisation across the region. In 2025 and 2026, 30 high-impact AI energy startups from a dozen European countries all across the energy value chain were selected, partnering with more than 20 major industry energy leaders, including major grid operators, energy companies and international organisations.

Pillar 2: Bringing Additional Clean Generation

Europe's energy security, affordability and decarbonisation rely on deploying homegrown, carbon-free generation, and scaling it alongside new energy demand. As our data centre demand grows, we bring greater volumes of additional carbon-free generation to the grids where we operate, helping to offset the potential impact of demand growth on wholesale market prices and supporting European energy security.

Accelerating a Decarbonised European Energy System

Google is one of the largest corporate purchasers of clean energy in the world. From 2010 to 2025, we signed more than 240 agreements to purchase nearly 35 GW of net-new clean energy globally, with more than 12 GW contracted in 2025 alone—the largest annual total in our history and more than our total procurement from the previous two years combined.

In Europe, Google has secured over 4.5 GW of carbon-free energy generation capacity through long-term Power Purchase Agreements (PPAs), advancing progress toward our 24/7 carbon-free energy (CFE) moonshot. This means matching our consumption with new clean power every hour and on every grid where we operate. In 2025, we achieved an average of approximately 83% CFE across our European data centres and offices. As a result of our global CFE procurement, in 2025 we reduced our global operational emissions by 2%, despite a 37% increase in electricity consumption year-over-year⁶.

At the core of our approach is a shift towards hourly, local clean energy matching. True data centre decarbonisation requires a shift away from matching renewable energy at an annual level across all of Europe, which can mask ongoing reliance on fossil fuels, toward matching electricity consumption in each hour and on each grid where data centres operate. Research [shows](#) that targeting hourly clean energy matching can also deliver deeper decarbonisation of Europe's electricity system⁷, as well as [accelerate the commercialisation](#) of advanced energy technologies⁸.

4.5 GW+

In Europe, Google has secured over 4.5 GW of carbon-free energy generation capacity through long-term Power Purchase Agreements (PPAs)

In 2025, we navigated our largest load growth in history



100%

renewable energy match on
a global and annual basis



83%

less overhead energy than
the industry average



2%

reduction of our operational
emissions year-over-year

Project Spotlights

In Ireland, we have a [partnership with Energy Dome](#) to build a 23 MW / 200 MWh long-duration energy storage plant at a former thermal power station. The project is part of a long-term agreement to deploy Energy Dome's CO2 Battery technology at scale and advance Google's ambition to expand access to 24/7 clean, affordable energy for grids globally.

We have also worked with our energy providers to create the [“Carbon-Free Energy \(CFE\) Manager”](#) model, which involves the energy buyer tasking an energy supplier with assembling a portfolio of CFE projects to meet hourly carbon-free energy goals. We signed our first CFE Manager [agreement](#) in Europe with Engie in 2021, and have since replicated the structure elsewhere.

Powering New Data Centres Responsibly

Everywhere we operate, we work hand in hand with local energy partners, governments, and community members to bring new energy solutions online and support the unique needs of each grid and everyone it serves.

We know electricity prices are top of mind in Europe. In each electricity market, Google is working with energy system modelers to determine what new energy resources, such as wind, solar, and clean firm power generation, as

well as battery storage, can help mitigate potential price impacts from adding new data centre energy demand to the grid. Through this data-backed approach, we aim to do our part to protect households and businesses from price increases or volatility directly related to our new data centres. We then take active steps to procure from a targeted portfolio of these technologies, bringing additional carbon-free energy supply to the grid to offset price impacts from our energy demand.

Project Spotlights

In [Finland](#), we commissioned [expert modelling](#) and worked with local energy providers to identify a targeted portfolio of additional carbon-free energy supply for the Finnish grid that would mitigate the impact of our new demand on wholesale electricity prices. We then worked with leading Nordic energy company Fortum and other local partners to procure a portfolio of projects, including supporting the life

extension of the Loviisa nuclear power plant, contracting for a total of 629 MW of wind generation, and adding a new battery system to the grid. Through this new carbon-free energy supply and flexibility, we are taking responsibility so that our energy demand from our growing infrastructure in Finland does not contribute to higher power prices for households and businesses.

Pillar 3: Safeguarding Energy Affordability in Local Communities

From the infrastructure we build to the programmes we fund, we're investing in ways to lower electricity costs for households and small businesses, and support long-term energy resilience in the communities we call home.

Investing in Households and Communities

To ensure that local host communities directly share in the benefits of the clean digital transition, Google is pioneering a global [Energy Impact Program](#). The program is built on a simple premise: our presence should be a powerful engine for local economic growth and an opportunity to solve the toughest energy challenges for families. By partnering with local municipalities, regional authorities, utilities, and nonprofits, we commit high-impact,

community-focused funding designed to safeguard energy affordability, improve livelihoods, and strengthen the local grid for residents in the communities where our data centres operate. We are working with local community leaders to identify impactful initiatives, such as covering the costs to refurbish heating infrastructure and install heat pumps in households, which will directly lower electricity bills for our neighbours.

Project Spotlights

In [Finland](#), we are working with the Hamina, Kajaani, Muhos, and Vaala municipalities to commit funds to programmes that safeguard energy affordability and improve the livelihoods in our communities via Google's Energy Impact

Program. We are partnering to support a range of local initiatives, such as solar panel installations on municipal-owned apartments, batteries and heat pump installations at schools and sport centres, and new energy lighting projects.

Repurposing Data Centre Heat

We also view the heat generated by our data centres not as waste, but as a valuable community resource. Google designs its data centres to capture and repurpose heat that would otherwise be wasted for local district heating networks. Where offtakers are available within a workable geographical distance,

we offer data centre heat free of charge to eligible partners, ensuring that cost savings are passed on to the local community. As Google continues to actively assess on- and off-site heat recovery opportunities across Europe, we aim to enable it where technically and economically viable and environmentally sound.

Project Spotlights

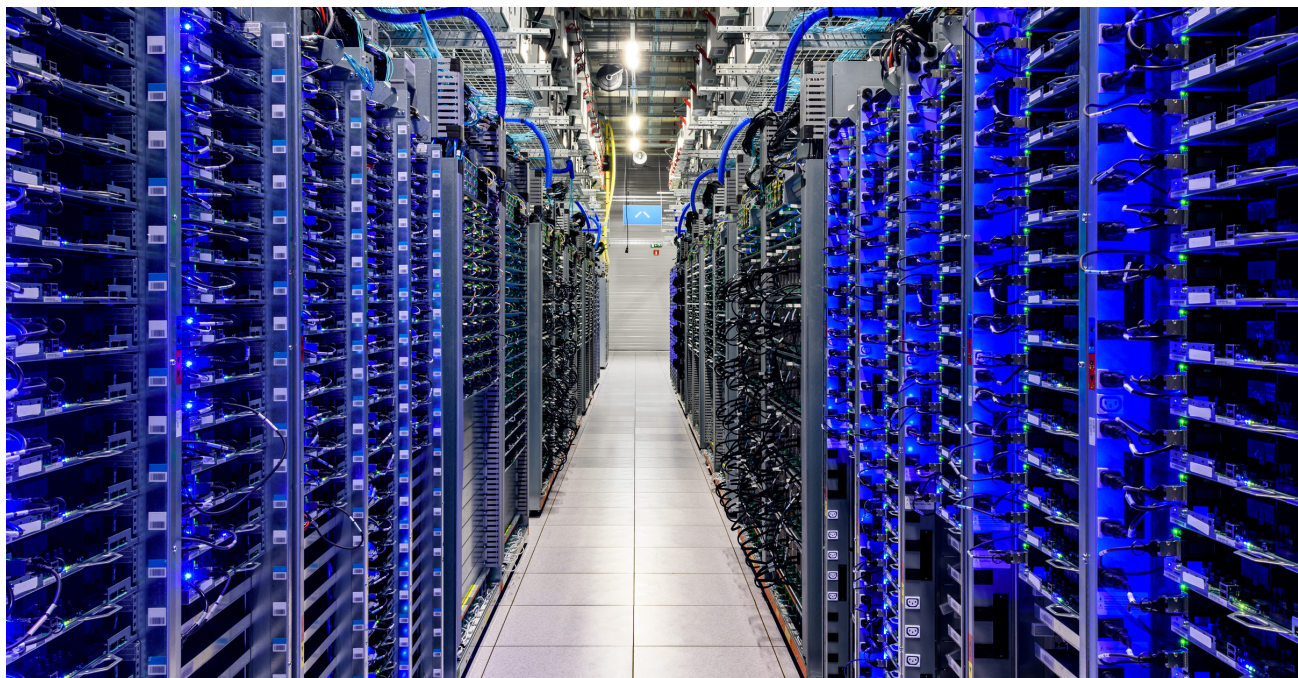
Finland: In Hamina we have developed our first offsite heat recovery project, which became operational in 2025. In partnership with Haminan Energia, the local district heating provider, we are recovering heat from our facility, which operates today with 98% carbon-free energy. This heat is delivered to the local district heating network free of charge. Once at full capacity, the recovered heat is expected to cover approximately 80% of the annual heat needs for the Hamina district heating network, supplying about 2,000 households with sustainable heat.

Germany: Google is collaborating with the local district heating provider EVO in Dietzenbach to capture and repurpose heat from a forthcoming data centre, which will enable them to provide heating to more than 2,500⁹ local households. By providing heat from data centres that increasingly operate on carbon-free energy, we help end-users decarbonise their own heat sources and displace the need for fossil fuel-based heating methods.

03

A Policy Roadmap for the Sustainable Integration of Data Centres in the Energy System

- 3.1 Accelerate Connections to the Grid by Reforming Demand Connection Queue Management
- 3.2 Enable Both Near-Term and Long-Term Grid Capacity Expansion
- 3.3 Enable Deployment of Carbon-Free Generation
- 3.4 Incentivise Energy Efficient Data Centre Infrastructure
- 3.5 Implement Enabling Measures to Connect Data Centre Heat with Offtakers



Servers light up in our St. Ghislain, Belgium, data centre.

As Europe enters a new era of digital innovation driven by the rapid scaling of artificial intelligence (AI), policymakers can help to ensure data centres, the physical infrastructure of the digital economy, are integrated intelligently and sustainably into the European energy system. With the right policy frameworks in place, our energy blueprint for data centres can be replicated and scaled across the entire sector, enabling rapid deployment of European compute resources whilst delivering on Europe's strategic energy priorities.

Today, the European power sector faces a number of systemic infrastructure and policy challenges that stand in the way of success on this goal. Key challenges to bringing on compute capacity at speed and scale include grid development and congestion, persistent market

fragmentation and volatile price signals, and insufficient policy mechanisms to incentivise cross-border interconnections which restrict the efficient flow of clean energy allowing demand to meet supply.

Addressing these challenges requires a partnership-led approach between data centre operators, policymakers, transmission system operators (TSOs), utilities, and industry stakeholders underpinned by mutual transparency and well-structured, predictable policy decisions. This can provide the stable foundation needed for a proactive, coordinated, and system-level policy roadmap that enables data centres to be active partners in creating a modernised, resilient grid, built on five key areas:

1. Accelerate Connections to the Grid by Reforming Demand Connection Queue Management
2. Enable Both Near-Term and Long-Term Grid Capacity Expansion
3. Enable Deployment of Carbon-Free Generation
4. Incentivise Energy Efficient Data Centre Infrastructure
5. Implement Enabling Measures to Connect Data Centre Heat with Offtakers

The appropriate mix of measures will depend on the data centre, the region in which it is located, and the energy needs at both the national and local level.

1. Accelerate Connections to the Grid by Reforming Demand Connection Queue Management

Data centres and other large energy users and clean energy users face grid connection queues of up to 7 to 13 years with electricity grid congestion costing the EU over €4.3 billion annually¹⁰. The prevalent ‘First-Come, First-Served’ (FCFS) approach to both generation and load-side interconnection is a major cause of these delays. It allows speculative, immature projects to occupy queue positions for years, creating artificial backlogs that block the progress of mature projects that are ready to be built.

Adopt a Readiness Framework for the Connection Queue

Grid connections for demand, generation, and storage can be accelerated by moving away from the prevalent ‘First-Come, First-Served’ rule. Member States and national regulatory authorities should establish transparent, non-discriminatory frameworks that prioritise connection requests based on clear and objective “readiness” criteria. This approach has already been implemented in the United Kingdom, Norway, Sweden, and similar frameworks are under development in several other markets through ongoing reforms.

As [recommended](#) by the European Commission, “readiness” criteria should rely on objective milestones (such as land control or evidence of creditworthiness) rather than final administrative permits which are out of the developer’s control and should be allowed to run in parallel to the connection queue. For managing high volumes of data centre applications, system operators should require evidence that a legitimate ‘compute offtaker’ is attached to the project (as is being developed in the United Kingdom). To speed up the deployment of digital infrastructure and eliminate administrative gridlock, policymakers should also modernise data centre permitting by decoupling grid and land-use approvals, allowing early civil works and flexible phased designs, and streamlining reviews through one-stop shops.

Where grids are significantly congested, additional prioritisation criteria could be considered, such as criteria that support accelerated connections for projects that contribute to resolving grid congestion, for example through ‘partnered assets’ in the same bidding zone. Criteria that treat connection requests based on their potential contribution to the clean energy transition or other strategic goals such as digitalisation must be well-specified, targeted to specific projects rather

than sectors, and combined with rather than replace a readiness framework.

Different, tailored criteria should be applied to the generation and storage queue vs. the demand connection queue, given the different nature of these projects.

Implement a Staged or Gated Connection Process

Concurrently, regulators should develop a readiness framework that is able to provide sufficient assurances to demand customers about the timeline for accessing capacity, in order to allow them to de-risk their project and progress to subsequent stages of ‘readiness.’ One solution to this is a staged or gated process as has been adopted or is currently being implemented in several markets including the UK, France, and as recommended by the European Commission¹¹.

With each subsequent stage the customer demonstrates increasing levels of ‘readiness’ or maturity to the system operator, and the system operator provides higher levels of certainty to the customer on the connection capacity available to them, the timeline and the cost. This staged approach filters out speculative ‘paper congestion’ while giving the necessary assurances needed by developers of credible projects to de-risk those projects.

Avoid Prescriptive Use-It-Or-Lose-It Rules

When updating connection rules to ensure the fair and efficient allocation of grid capacity, network operators must strike a balance between a) restricting speculative projects with low development or growth viability to avoid delaying mature, credible projects, and b) providing demand projects with appropriate flexibility in their development timelines to accommodate inherent uncertainties in the development process, and provide them with suitable assurances regarding power availability to make these major long-term investments.

Connection queue reform focused on readiness criteria is the most effective measure TSOs can take to free up connection capacity, striking a balance between these two objectives. Rigid Use-It-Or-Lose-It (UIOLI) mechanisms present severe risks to capital-intensive, long-term investments, like data centres. Data centres have a unique development model characterised by phased growth and ramping into their maximum power reservations over time based on external demand. Enforcing strict demand growth or reclaiming capacity on unduly short timelines risks undermining investment certainty and threatens service reliability.

Best Practice Spotlights

The UK operates a two-gate connections process for effective queue management. Gate 1 provides an initial, indicative offer based on a preliminary electrical study, giving customers an estimated connection timeline and cost without tying up physical network capacity. At Gate 2, a thorough study leads to a confirmed connection offer with a firm connection date (month and year) and location. To enter Gate 2, projects must satisfy clear readiness criteria—primarily demonstrating secured land rights accompanied by an original red line boundary plan (or progressing via an eligible statutory planning route).

Between accepting a Gate 2 offer and energisation, developers must meet enforceable progression milestones, notably: initiating statutory consents and planning permission; securing full planning consent; finalising and securing all necessary land rights; submitting contestable design works and agreeing the formal project construction plan; demonstrating project commitment / Final Investment Decision; and initiating physical on-site construction.

This approach allows for non-binding exploration of connections before Gate 2 without committing network expenditure; and then effectively reflects an increased commitment from the networks and the connecting customer between Gate 2 and energisation, and the milestones proportionately reflect the natural development process of a data centre (such as securing planning permission after a connection offer).

While the UK connections system currently has a significant number of speculative data centre applications, upcoming reform to the process specifically for data centres, such as a commitment fee (security) on Gate 2 acceptance and additional milestones, are well-developed proposals that should effectively address speculation while enabling non-speculative and viable developers to progress through the queue.

The [European Commission's Guidance on Efficient and Timely Grid Connections](#) also outlines a number of existing good practice examples across EU Member States.

In markets where grid capacity is becoming constrained, network operators may need to introduce mechanisms that disincentivise customers from holding on to 'unused' reserved capacity which they have no meaningful plan to use. Utilising a "Take-or-Pay" (ToP) structure or capacity reservation fees based on maximum subscribed capacity can financially disincentivise capacity hoarding, ensure system costs are paid for by the customer requesting the capacity, while guaranteeing the long-term power certainty required for customers to be able to make significant capital investments in their data centres. While the precise structure of these charges must be tailored by national regulators to reflect localised system costs and tariff structures, they should remain proportionate and cost-reflective in line with the European Commission's Guidelines on future-proof network charges¹². If a UIOLI mechanism is deemed essential, it should be balanced and designed with a 10-year ramp-up timeline that only

reclaims capacity from projects showing no meaningful evidence of physical progression, and it should avoid introducing rigid milestones tied to consumption.

Finally, national policy makers should adopt more innovative measures to balance the two objectives noted above (restricting speculative projects with low viability of growth and giving developers adequate assurances that their reserved power will be available to them in the future). One mechanism that could jointly support the delivery of additional carbon-free power, whilst providing large demand customers with the assurances they need to commit to a major long-term investment, is a Bring Your Own Power (BYOP) mechanism that ties delivery of additional carbon-free energy to safeguarding contracted power. This mechanism is further outlined in section 3 below.

Best Practice Spotlights

In the US, the [Capacity Commitment Framework](#) is a consensus-based contracting model where large energy customers provide upfront binding financial commitments to fund the grid infrastructure required for their operations. This reduces risks for utilities and shields residential ratepayers from shouldering the costs of capacity upgrades required for the data centre while ensuring ratepayers benefit from a more affordable and reliable grid.

While European market designs differ, the core principles of such models could be explored to structurally protect electricity consumers in the event that industrial demand does not materialise. Complementing these policy discussions, voluntary corporate initiatives—such as directly funding local energy efficiency programmes and deploying additional clean generation—can proactively ensure that data centre expansion benefits everyday consumers.

2. Enable Both Near-Term and Long-Term Grid Capacity Expansion

Improve Data-Sharing to Support Better Planning and Siting Decisions for Both System Operators and Customers

Accelerating the sustainable integration of large loads requires transitioning toward long-term, anticipatory grid investments, streamlining administrative grid permitting processes, and strengthening cross-border integration. The [EU Grids package](#) seeks to address this through targeted reforms that streamline grid planning and permitting and facilitate grid interconnections¹³.

To accurately determine long-term grid investment needs, early stakeholder involvement and standardised data sharing on both the customer side and on the System Operator side is needed. TSOs and national regulators should develop a standardised methodology to integrate confidential, non-binding, and aggregated demand forecasts from large electricity consumers across all major industrial sectors into their Ten-Year Network Development Plans (TYNDP). Large users should be able to confidentially share high-level, long-term demand signals, which TSOs can aggregate and anonymise to justify much-needed anticipatory investments in grid expansion before bottlenecks arise.

In addition, by using data-driven tools, such as European and national platforms for [grid hosting capacities](#), data centre operators can proactively locate their facilities in areas with abundant network capacity or near surplus carbon free energy. Building on the launch of the ENTSO-E and DSO Entity's [Capacitypedia](#), TSOs and Distribution System Operators (DSOs) should work to further harmonise the publication of detailed, standardised, and machine-readable grid hosting capacity maps.

These should provide clear details on available capacity, information on grid planning process, and connection studies. This will enable industries to conduct more efficient site selection, directing investment to areas where the grid can accommodate new load, helping to reduce congestion costs.

Incentivise Grid-Enhancing Technologies (GETs) and Digital Tools

Alongside building new infrastructure, policymakers, regulators and system operators should seek to maximise the capacity and efficiency of the existing grid. Grid-enhancing technologies (GETs) hold tremendous potential to get more capacity out of existing infrastructure by using the grid more efficiently and limiting the need for physical grid buildout, accommodating the rapid deployment of carbon-free energy, as well as the rise in electricity demand. These technologies—such as advanced conductors¹⁴, dynamic line rating¹⁵, advanced power flow control device¹⁶, topology optimisation¹⁷—can unlock significant capacity on existing lines by 20–40% by 2040 and save up to 35% of the cost and time of building new one¹⁸. The [ACER May 2026 Monitoring report](#) emphasises that GETs deliver additional capacity much faster and at a fraction of the cost of building new physical power lines.

The adoption of GETs requires comprehensive changes in grid operators' investment planning and eliminating the historic “CAPEX bias” that incentivises grid operators to build expensive physical lines. Policymakers should require National Regulatory Authorities (NRAs) to design tariff methodologies that allow network operators to be reimbursed for their spending on OPEX-related GETs, thereby creating a level playing field between CAPEX and OPEX solutions.

Regulators should require TSOs to evaluate the potential for GETs and digital technologies to unlock grid capacity and establish value-based incentives to network

Best Practice Spotlights

Elia, the Belgian TSO, has successfully deployed Dynamic Line Rating (DLR) or high-temperature low sag advanced [conductors](#) to allow for greater grid integration of renewables. In Belgium, regulators make it easier for the grid operator to invest in innovation by fully funding eligible R&D initiatives. This structured approach helps move innovative grid technologies from trial phases into full operation while removing CAPEX bias. The Swedish TSO Svenska kraftnät has also incorporated DLR in their [grid planning for 2024–33](#).

Germany's “Energiewende Kompetenz” is looking into incentives on digitalisation, providing performance metrics linked to innovation, digitalisation, efficient integration of renewables, and proactive planning, and the UK regulatory framework pioneered output-based incentives for grid development.

operators by requiring them to assess and implement the remuneration of efficiency outcomes like achieving specific targets on line utilisation, connection time, hosting capacity, customer satisfaction, and transparency.

Governments should encourage TSOs to co-develop and deploy advanced AI tools to manage variable renewable energy and predict network bottlenecks.

Enable Private Co-financing and Pre-financing Frameworks for the Grid

Meeting Europe's ambitious energy and digital goals will require an estimated €1.2 trillion in grid investments by 2040. There is a key opportunity to leverage innovative new, targeted legal frameworks that allow for private participation while upholding the core principle of non-discriminatory access to the grid. This will allow large demand customers to be valuable energy partners and contribute to the grid capacity they are requesting.

This can be done by allowing large energy users to co-finance or pre-finance the specific anticipatory investments in grid reinforcements required for their connection, under new regulatory frameworks which

would credit the capacity unlocked through the grid user's investments to that same grid user. This could take the form of Connection Agreements that would grant energy users grid capacity corresponding to the incremental volume unlocked by the specific investment.

Private capital can also enable direct investment in GETs that provide system-wide benefits for all grid users, such as helping eliminate bottlenecks, effectively modernising the system and lowering systemic energy costs thus minimising the financial burden on residential consumers. With new frameworks designed together with grid operators and NRAs, for instance within a regulatory sandbox, the large energy users could receive additional grid capacity equivalent to the size of their contribution. At the same time, the grid operators would retain any excess additional capacity or efficiency gains to alleviate broader system congestion for other network users, thus creating a virtuous link between private GETs investment and expanding grid access for everyone.

This should also reduce the overall capital investment by grid operators (keeping these assets off the rate base paid by consumers), and can be complemented by performance-based incentives determined by the NRAs.

Best Practice Spotlights

France's S3REnR scheme can pool the costs of regional grid reinforcements among all new generation users connecting in that zone. This eliminates the prohibitive 'first-mover' penalty, where the first large project is burdened with the entire cost of a major network upgrade, and instead shares the cost equitably among all future beneficiaries with similar anticipatory cost-sharing mechanisms for large industrial loads also being considered.

While the UK pioneered full third party investments in the grid through competitive regimes like Competitively Appointed Transmission Owners ([CATOs](#)), other mechanisms such as third-party flexibility procurement and private grid solutions are also scaling across Europe—evidenced by platforms such as GOPACS in the Netherlands, NODES in the Nordics and Central Europe, and the international rollout of platforms like Piclo Flex into Portugal and Lithuania.

Enable Voluntary, Market-Based Flexibility Provision

Improved policy and regulatory frameworks and incentive structures can help ensure flexibility provision is adequately valued for its system benefits and encourage voluntary participation across a wide range of grid users. To drive widespread adoption of data centre flexibility, a broad suite of voluntary, market-based flexibility products should be designed and leveraged. Flexibility products must be adapted to the diverse technical and operational parameters of potential providers.

Voluntary flexible connection agreements have the potential to deliver additional flexible resources to the grid, whilst providing a pathway to accelerated power

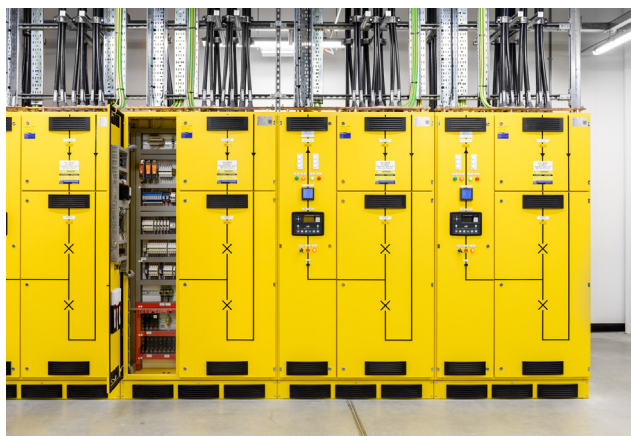
for data centre operators. Data centre operators seeking expedited power can voluntarily adopt a (temporary) flexible connection agreement and simultaneously deliver additional flexible resources (e.g. Battery Energy Storage Systems) to the same grid supply point to help manage any curtailment obligation. This has the joint benefit of bringing online additional flexible resources (which can participate in system services markets), as well as enabling faster connection for participating data centre operators.

Current flexible connection agreements, however, are often designed for dispatchable generation and are not operationally viable for critical demand loads. This is typically due to requirements for near-real-time activation and a lack of predictability, which are incompatible with

the continuous operations of certain industries/sectors including data centres. The rules for voluntary flexibility markets should instead be designed to allow participants to select the most cost-effective solution available to them.

Understanding these distinct needs and capabilities across various sectors of the economy is critical to designing truly effective and welcoming flexibility programmes for the grid. With this in mind, we recommend:

- **Participation in flexibility markets must be voluntary:** Mandating industries, like data centres, to reduce power without flexibility can disrupt critical services and undermine the reliability that businesses and communities depend on. Instead of one-size-fits-all requirements, policymakers should focus on creating flexible, incentive-based policies that encourage all sectors to contribute to grid stability without compromising essential services.
- **Create alternative incentive frameworks for demand customers to promote greater adoption of flexible resources:** Regulatory mechanisms should be developed to recognise and credit the flexibility solutions that large electricity corporate consumers can bring to the table, whether it is through a PPA, the control of generation via a balancing responsible party, virtual power plants, or behind the meter solutions. As well as directly incentivising the owners/operators of flexible assets, incentives should also be provided to demand customers who are in a position to purchase or enable additional flexible resources on the system. Because the current financial incentives for flexibility fail to offset the capital and opportunity costs of flexible operations by many industrial sectors, including data centres, National Regulatory Authorities (NRAs) should introduce non-monetary incentives, such as accelerated grid connection pathways.
- **Expedite access to flexible connection agreements:** Network operators should offer bespoke flexible connection options for customers, with expedited grid studies to inform the parameters of these connection offers. For customers who are seeking power sooner than is possible under a firm connection, it is essential that network operators can quickly inform these customers about what options are available to them under a flexible arrangement. Expedited study procedures for large loads that agree to be curtailable and for co-located facilities that agree to be both curtailable and dispatchable are essential. An option to transition to a firm arrangement within a suitable timeframe should always be available.
- **Leverage grid-constraint modelling to unlock capacity:** Grid operators should use advanced modelling to characterise the spatial and temporal nature of grid constraints—from periods of system resource adequacy shortfall to mapping out localised grid bottlenecks and identify under-utilised capacity. By understanding exactly where and when the grid is congested, operators can offer a wider variety of flexible connection options. Regulators should test these models in real-world “regulatory sandboxes,” a collaborative trial method already being championed by grid operators like Belgium’s [Elia](#).
- **Deploy flexibility where it is most needed:** Flexible resources, such as BESS, often cannot be deployed in certain locations due to land and permit constraints. Additionally, they can often be more valuable within the network rather than behind the customer’s meter. The ability for data centres to leverage grid connected flexible resources could enable more distributed benefits to other customers as well. Network operators should recognise and incentivise flexible resources siting in “electrically relevant” grid locations.
- **Demand connection codes must allow for data centre capability:** The revision of the Harmonised Network Code on Demand Connection (NC DC/ DCC) is currently under negotiation. The initial NC DC proposals from ENTSO-E are defined based only on the TSO view of system need and not accounting for data centre capabilities. Industry and ENTSO-E must agree on a connection code that balances Data Centre operational constraints, system needs and maintaining competitiveness in a global market. A number of the requirements require dynamic grid support and are not within data centre capability. These will require additional onsite storage/ generation and/or GETs to meet, which will be technically challenging to implement.



This PMDC (Power Management Distribution Centre) transformer helps distribute power in our Dublin, Ireland, data centre.

3. Enable Deployment of Carbon-Free Generation

Decarbonising the electricity consumption of Europe's data centres requires policies that incentivise the systemic procurement of local, hourly-matched carbon-free energy (CFE) by data centre operators.

Create “Bring Your Own Power” Schemes that Tie CFE to Capacity Safeguards

As noted above, one powerful mechanism that could jointly support the delivery of additional carbon-free power, whilst providing large demand customers with the assurances they need to commit to a major long-term investment, is a “BYOP” mechanism that ties delivery of additional carbon-free energy by large demand customers to safeguarding contracted power. Under this model, customers that deploy additional carbon-free generation equivalent to their annual demand to the same grids where they operate, would benefit from additional protections against contracted capacity clawbacks. Given the importance of such safeguards to many large demand customers, this would create a compelling incentive which could support significant private investment in CFE, helping to safeguard energy affordability for all consumers, protect energy security, and decarbonise the grid.

Establish Technology-Neutral Frameworks to Incentivise Firm CFE

Achieving a stable, 24/7 carbon-free grid requires a diverse technology portfolio. While wind and solar are vital, policymakers must actively encourage the development and deployment of advanced, firm, and dispatchable carbon-free technologies, such as next-generation geothermal, long-duration energy storage (LDES), advanced modular reactors, and carbon capture and storage (CCS)¹⁹. Data centres can support the deployment of these [advanced clean electricity technologies](#) through their procurement, investment, and advocacy to incentivise their uptake. In turn, governments should establish clean energy targets that go beyond renewable energy, and market structures that appropriately value the clean firm capacity provided by long duration energy storage and other advanced technologies, to incentivise clean firm generation alongside other clean energy resources. National Energy and Climate Plans (NECPs) can serve as key vehicles for long-term decarbonisation planning and investment, with set target dates and clear trajectories for the complete decarbonisation of their energy systems (including the power sector). Policymakers should seek to further streamline permitting processes and consider extending



For over 15 years, Google has been privileged to call Finland home, with our data center here in Hamina. Since our first onshore wind project became operational in 2019, our clean energy power purchase agreements (PPAs) have added more energy to the Finnish grid than we've used.

acceleration measures that currently apply to renewable energy projects and net-zero strategic projects to advanced, firm, carbon-free technologies.

Ensure Power Purchase Agreements (PPAs) and Contracts for Difference (CfDs) Co-Existence

Corporate Power Purchase Agreements (PPAs) are the single largest driver of private investment in European renewable capacity, outside of CfDs. As Member States design state-supported CfD schemes, they must ensure that public tenders do not crowd out private PPAs, nor create indirect barriers to corporate purchasers to access the volumes. Future tenders should allow the participation of projects which reserve part of the electricity for sale through a renewable PPA for any portion of the volume, to the ultimate benefit of taxpayers. Governments should have CfDs as a backstop only if market demand is not strong enough and to set up tenders to ensure the CfDs don't subsidise PPAs. Tenders should utilise hybrid CfD-PPA auction models or optional PPA carve-outs within state-supported schemes that provide CfDs as a financial backstop while incentivising developers to maximise commercial PPA volumes, facilitating PPA execution in line with EU Electricity Market Design legislation and to the ultimate benefit of taxpayers.

Require Transparent Disclosure of Data Centre Clean Energy Use

Data centres frequently make 100% renewable claims based on annual matching of purchased clean energy that could not plausibly be delivered to their facilities. Policymakers should require that data centres transparently disclose the percentage of electricity consumption that is matched with clean energy generated in the same hour and on the same national grid where data centres consume power.

Accelerate the Rollout of Granular Guarantees of Origin

To enable accurate, transparent, and high-impact corporate carbon accounting, European regulators should require national issuing bodies to accelerate the implementation of granular, hourly, and localised Guarantees of Origin (GOs). Moving from annual averages to hourly temporal correlation (consistent with existing EU policy such as the Regulation governing renewable fuels of non-biological origin—[RFNBO](#)²⁰ and EU's Carbon Border Adjustment Mechanism—[CBAM](#)²¹) sends precise price signals to the market, incentivising investments in clean generation and storage exactly when and where the grid needs it most²².

4. Incentivise Energy Efficient Data Centre Infrastructure

Policy frameworks across the EU must preserve design flexibility to optimise for energy, carbon, and water, enabling the development of the most energy-efficient, carbon-efficient, water-efficient, and lowest-impact data centres based on local conditions. Policymakers should recognise the trade-offs between energy and water efficiency, and the first and second order impacts on carbon-efficiency across scopes 1, 2, and 3. Measures focused solely on one metric may have the unintended consequence of preventing the development of the most holistically sustainable data centres that optimise across energy, carbon, and water in a specific location.

For example, measures focused on restricting water-cooling (even in locations where water is abundant and sustainable) risk inadvertently compromising overall energy performance, driving up both peak and annual power demand and increasing strain on electrical grids during hot periods. Granting industrial infrastructure operators, including but not limited to energy producers and data centre operators, the flexibility to consider and responsibly use sustainable water sources where viable, ensures that European digital infrastructure achieves maximum energy efficiency while minimising its total environmental footprint across the water-energy-carbon nexus.

5. Implement Enabling Measures to Connect Data Centre Heat with Offtakers

Heat recovery projects present a number of complexities and interdependencies that need to be addressed. In practice, the primary hurdle is not the technical challenge of recovering heat from data centres, but rather the commercial and infrastructure challenge of finding a viable distributor and off-taker. Even when heat is offered at no cost at the data centre boundary, our experience has been that few off-takers are ready to utilise it. This is partly because many data centres are located in remote areas far from district heating networks, which presents a significant barrier to implementing heat recovery solutions as it may not be cost-effective to build heat delivery infrastructure to district heating networks.

Even when an off-taker is available, several additional challenges arise that need to be addressed:

- **Infrastructure constraints:** District heating infrastructure or transmission piping is frequently unavailable in these areas and must be constructed or significantly enhanced.
- **Financial barriers:** The capital investment required for an off-taker to connect to the data centre can exceed acceptable financial and investment thresholds relative to the value of the heat that the data centre can provide.
- **Permitting timelines:** The land zoning process for placing energy recovery equipment can be lengthy, typically taking 10 to 12 months to complete.
- **Temperature:** The exported heat is typically low-temperature ('low-grade' heat, around 25–30°C) and must be boosted using heat pumps to be compatible with municipal district heating systems (which typically require 60–80°C). This temperature boosting requires additional electricity, adding capital and operational costs to the project.



Clear waters reflect the beauty of our Eemshaven, Netherlands, data centre.

National and local authorities can take a number of measures to reduce the complexity of securing a viable distributor and off-taker within a workable geographical distance:

- **Infrastructure enhancement:** Support the expansion or construction of municipal district heating networks and transmission piping to bridge the physical gap between data centres and heat sinks.
- **Off-take development:** Promote the development of adjacent activities, such as agricultural greenhouses or industrial processes, that can act as viable, long-term heat off-takers.
- **Permitting simplification:** Streamline and accelerate the administrative permitting process for connecting industrial facilities to local heat networks, reducing delays that currently stall deployment.
- **Holistic approach:** Encourage the interconnection of heat systems, treating heat recovery as a cross-sector industrial opportunity rather than looking at data centres in isolation.
- **Feasibility-driven, localised frameworks:** Policies should require heat recovery only where there is a technically feasible, economically viable, and environmentally sound local off-taker within a workable geographical distance.
- **Off-taker infrastructure:** Establish public funding or tax incentives for municipalities and district heating operators to co-invest in district networks and the necessary temperature-boosting infrastructure (e.g., large-scale heat pumps).
- **Strategic heat mapping and connectivity hubs:** Develop centralised registries or digital mapping platforms that identify data centre heat sources alongside potential urban or industrial heat sinks to bridge the information gap and facilitate direct matchmaking between producers and interested off-takers.



In Hamina, Finland, the recovered heat from Google's data centre is expected to cover approximately 80% of the annual heat needs for the Hamina district heating network, supplying about 2,000 households with sustainable heat free of charge.

04 Conclusion



Wind turbines spin near our Eemshaven, Netherlands, data centre.

Europe's digital and clean energy transitions do not have to compete; instead, they can and must reinforce each other. By recognising data centres as active partners rather than passive consumers, Europe can safely unlock the computing power necessary to compete in the global AI era while accelerating its ambitious energy security, affordability and grid decarbonisation goals.

With the right policy frameworks in place, our energy blueprint for data centres can be replicated and scaled across the entire sector, enabling rapid deployment of European compute resources whilst delivering on Europe's strategic energy priorities to safeguard energy affordability and industrial competitiveness, energy security, and decarbonisation. Through a collaborative partnership-led framework, policymakers, grid operators, local communities, and digital leaders can build a highly resilient, competitive, and fully carbon-free energy future for all Europeans.

05 Appendix

Notes

- 1 European Commission (2025), [Guidance on efficient and timely grid connections](#)
- 2 Baringa (2026), [Network impacts of locating demand closer to generation in Finland](#)
- 3 1 GW figure used for illustrative/study purposes
- 4 IEA (2026), [Key Questions on Energy and AI](#)
- 5 International Energy Agency (2025), [Energy and AI](#)
- 6 Google (2026), [Environmental Report 2026](#)
- 7 Riepin, Igeor, and Tom Brown. "On the Means, Costs, and System-Level Impacts of 24/7 Carbon-Free Energy Procurement." *Energy Strategy Reviews* 54 (July 1, 2024): 101488. <https://doi.org/10.1016/j.esr.2024.101488>
- 8 Riepin I, Jenkins J, Swezey D, and Brown T (2025) [24/7 carbon-free electricity matching accelerates adoption of advanced clean energy technologies](#)
- 9 The DZH DC will be offering 20 MW heat capacity which will heat more than 2500 homes as per [press release](#) (initial estimate was 9 MW could heat more than 1200 homes)
- 10 ACER (2025) [Transmission capacities for cross-zonal electricity trade and grid congestion management in the EU - 2025 Monitoring Report](#)
- 11 European Commission (2025), [Guidance on efficient and timely grid connections](#)
- 12 European Commission (2025), [Communication on future proof network charges for reduced energy system costs](#)
- 13 [Google position on the EU Grids Package](#) (2025)
- 14 new chemistries or equipment that produce higher capacity, more efficient wires (conductors)
- 15 hardware and/or software that allows grid operators to see the true, real-time capacity of an existing transmission line based on the current physical conditions. For most transmission lines the maximum capacity of a transmission line is set for the single hottest day of the year. However on cold or windy days, power lines can easily deliver 50 percent more energy than these labeled limits. DLR allows grid operators to schedule transmission based on real-time capacity of the lines rather than annualised static ratings
- 16 allow grid operators to reroute power to lines with available capacity by increasing or decreasing the power delivered to balance overloaded lines and under used corridors within the transmission network
- 17 hardware or software technology that identifies reconfigurations of the transmission grid and can enable the routing of power flows around congested or overloaded distribution or transmission elements
- 18 Compass Lexecon, [Prospects for innovative power grid technologies](#), June 2024
- 19 CFE technologies include types of electricity generation that don't directly emit carbon dioxide, including solar, wind, geothermal, hydro-power, and nuclear. In addition, when deployed with the appropriate guardrails, low-carbon technologies including sustainable biomass and carbon capture and storage can contribute to a CFE portfolio. Energy storage systems can contribute as well. For more details, refer to [The Corporate Role in Accelerating Advanced Clean Electricity Technologies](#).
- 20 European Commission (2023), [Commission Delegated Regulation \(EU\) 2023/1184 of 10 February 2023 supplementing Directive \(EU\) 2018/2001 of the European Parliament and of the Council by establishing a Union methodology setting out detailed rules for the production of renewable liquid and gaseous transport fuels of non-biological origin](#)
- 21 European Commission (2025), [Commission Implementing Regulation \(EU\) 2025/2547 of 10 December 2025 laying down rules for the application of Regulation \(EU\) 2023/956 of the European Parliament and the Council as regards the methods for the calculation of emissions embedded in goods](#)
- 22 For more on how Granular Guarantees of Origin can support Europe's decarbonisation objectives, see Google's paper, [The Role of Granular Certificates in Enhancing Clean Energy Credibility and Impact](#).

Powering the European Digital Future: An Energy Blueprint for Data Centres