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Power shift: The critical role of data centres in the energy revolution

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The transformation of data centre operators from passive to active players in the energy market

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Navigating the new era for data centres in the age of AI

Data centres are evolving beyond their traditional role as digital storage and data processing hubs. The advent of AI, with its rapidly escalating energy needs, presents DC players with an opportunity to transform their position in the energy markets. No longer just passive consumers, data centres are poised to become key players in the overall power generation industry.

The data centre industry has seen significant expansion over recent years, driven by increased digitalisation and widespread adoption of cloud technologies. This growth has led to a surge in power consumption, with new facilities scaling up in size, capacity and power density.

This trend has placed a substantial strain on the electrical grids of urban and metropolitan areas, leading to constraints such as construction bans and moratoriums in key industry cities like Amsterdam, Dublin, and Frankfurt.
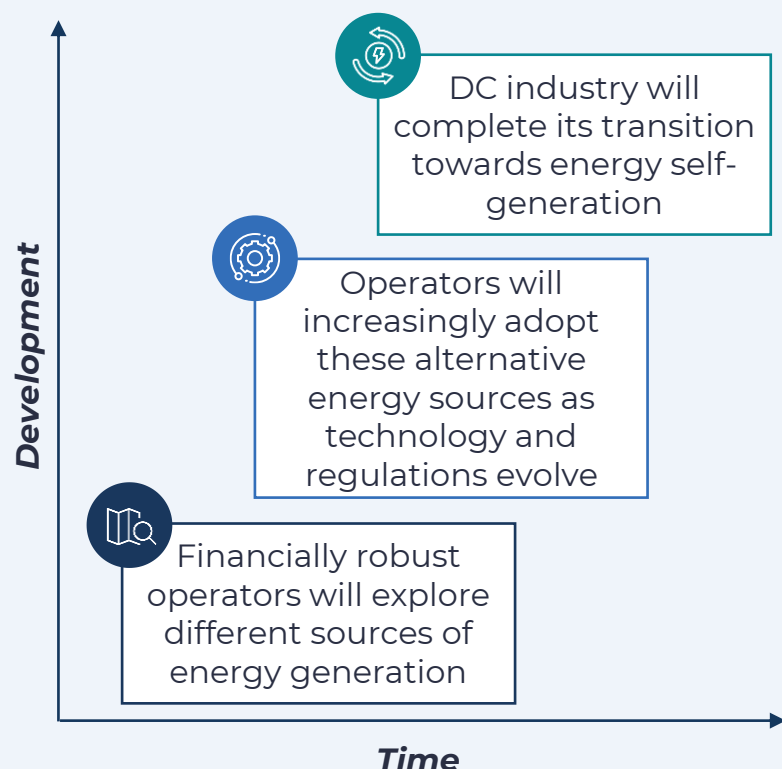
Looking ahead, the influence of artificial intelligence on the data centre sector is expected to be significant, leading to substantial growth and opportunities for the market.

However, this growth will also drive an escalation in electricity consumption, raising concerns about the ability of existing electrical grids to support this expansion sustainably. This potential bottleneck seriously challenges the industry's capacity for continued growth.

In response to these challenges, a new trend is emerging among data centre operators: the pursuit of energy self-sufficiency. By generating their own power, these operators aim to reduce their reliance on external energy sources, thus reducing the stress on electricity grids.

This strategic shift offers them the autonomy to scale operations independently and positions them as key stakeholders in the broader power and electricity markets.

Data centres' transition to alternative energy sources

Development (vertical axis) / **Time** (horizontal axis)

DC industry will complete its transition towards energy self-generation

Operators will increasingly adopt these alternative energy sources as technology and regulations evolve

Financially robust operators will explore different sources of energy generation

Anticipated market key trends

- The data centre industry, already a major energy consumer, is poised for **continued growth in demand**
- **Managing energy consumption efficiently** will remain a pivotal challenge for data centres
- There is a significant and untapped potential for data centres to **actively participate in energy generation**
- There will be **collaboration opportunities with expert operators of the energy industry**
- Operators will need to blend an energy mix that **aligns with both sustainability and reliable, independent power supply**

Data centres' rising appetite: The energy footprint of data titans
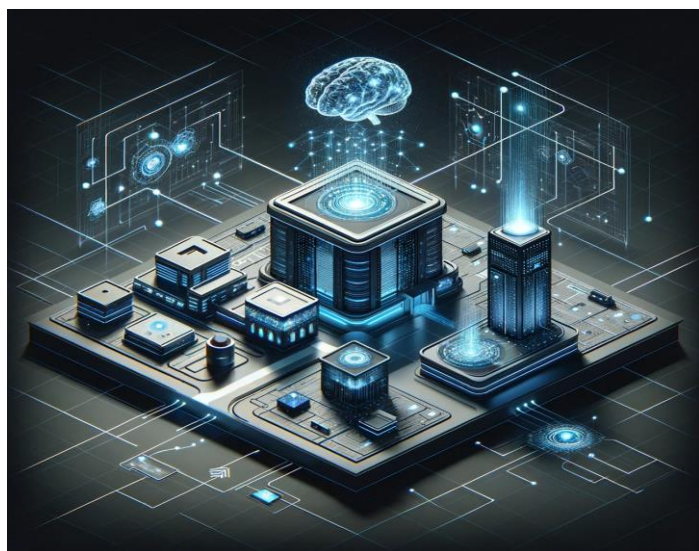
Consistent and reliable energy supply is a fundamental requirement for data centres. These facilities rely heavily on uninterrupted power to maintain operations, store data securely, and support the critical services they provide. Any disruption in power supply can have significant repercussions, potentially leading to data loss and impacting client relationships.

This reliance on consistent and abundant power places data centres as major players in the global energy market. Data centres have emerged as one of the most energy-intensive sectors in the modern economy.

Data centres, one of the most energy–intensive sectors

Data centres have emerged as one of the most energy-intensive sectors in the modern economy, with current estimates placing data centre energy consumption between 240-340TWh per year, accounting for 1-2% of global electricity consumption

With the advent of artificial intelligence, the demand for energy in data centres is expected to surge. Fide Partners estimates that new AI applications alone will require worldwide 5000MW to 8000MW by 2026.

This demand will require data centre operators to expand their capacity significantly, surpassing their current growth plans.

To cope with past increases in demand, data centres have strategically enhanced their infrastructure efficiency. This has been particularly evident in the increase in rack density within these facilities.

The average power capacity of a rack has evolved from 5kW in 2017 to the standard of 10kW in 2022 for new builds. This trend has been primarily influenced by Tier 1 and 2 Hyperscalers. Modern racks designed for AI applications have a power capacity of over 35kW and up to 200kW.

Despite this trend towards higher densities, smaller data centre operators often continue to rely on lower-density racks for most of their workloads.

Region	IT Power (MW)
North America	8500
Asia	7500
Europe	4500
Oceania	850
South America	200
Africa	160

From consumers to creators: The energy autonomy of data centres

Most of the major global DC hubs are located in densely populated urban areas, where the rapid growth of data centres has led to challenges in meeting their energy demands. Local electrical grids, already under pressure, struggle to keep up with the increasing power requirements.

Some data centre operators have reacted by strategically relocating to less densely populated areas and generating their energy, avoiding the burden on metropolitan power infrastructures. Hyperscalers are leading this transition, pushed by their substantial need for power for high-performance computing applications.

This emerging trend towards energy self-sufficiency is still in its early stages, with cities like Dublin setting precedents by requiring new data centres to be energy-independent.

This shift poses a critical question for the industry: how can data centres evolve from high-energy consumers to self-reliant energy producers? The path forward involves technological advancements and strategically reevaluating data centres' role in the global energy landscape.

Generating the Future: Data centres' role in energy production

The data centre industry faces a major challenge: its energy needs outpacing traditional energy providers' growth capacity.

This opens an opportunity for data centres to venture into the generation of their energy mix through various energy sources, positioning themselves not only as energy consumers but as potential innovators as energy generators. By diversifying into energy production, data centres can assume a dynamic role in the energy sector, generating their own energy mix from various sources.

Becoming an energy generator presents various opportunities.

- **It empowers data centres with energy autonomy**, liberating them from the constraints of external power infrastructures and allowing them to expand as required by their customers

- **It allows power-generating DC operators to enjoy the long-term advantage of a stable and predictable cost of electricity**, protecting their customers from price spikes

- **It allows operators to generate additional revenue streams** by selling excess energy back to the electrical grid

However, this journey is not without its challenges. Transitioning into energy generation will require significant capital investment, larger land acquisitions, and increased operational complexity.

To navigate these hurdles, data centres can leverage strategic partnerships, tapping into the expertise of utility companies and energy specialists.

Certain operators have already established partnerships and joint ventures with utility companies to establish purpose-built power substations close to data centres that could be extended into generation agreements.

From consumers to generators: Choosing the adequate energy

Energy	TTM	Capex Intensity	LCOE EUR/MWh	Availability
Solar	6 months	◔	33-47	◑
Wind	4 years	◕	29-46	◔
Nuclear	5-10 years	●	28-40	●
Natural gas	2 years	◑	40-95	●
Hydrogen	To be developed	To be developed	To be developed	To be developed
Geothermal	While DC Construction	◑	55-80	●
Hydraulic	1 year	◕	38-50	●
Biomass	1 year	◑	50-55	●

Operators will have to adopt an energy mix that balances uninterrupted power supply, sustainability and cost–effectiveness

Choosing energy sources is a crucial decision point for an operator considering self-generation, influenced by many factors, including geographic location, time-to-market, cost-effectiveness, and regulatory compliance. Sustainability also weighs heavily in these decisions, as the industry faces increasing regulatory scrutiny and client-driven demands for lower carbon footprints. The table above illustrates a spectrum of energy options, each with its distinct timelines, capital intensity, levelized cost of energy (LCOE), and availability.

While green energy sources like solar and wind are attractive for their sustainability, their intermittent nature poses challenges for becoming primary power sources for data centres. Continuous and reliable power supply is paramount, necessitating a balanced and well-thought-out energy mix.

Regarding sustainability, stricter regulation will likely increase the pressure currently driven by data centres' operators and their clients' emission reduction targets. Laws and directives are being passed to control data centres' energy emissions in the European Union and the United States, among other regions. However, many green alternatives, such as solar or wind power, do not seem fit to become the primary source of power for DCs as they can't provide power uninterruptedly.

As the industry stands at this crossroads, the choices made today will not only shape the future of data centres but also potentially redefine their role in the global energy landscape. The path to energy self-sufficiency is complex but carries the promise of a more sustainable, autonomous, and resilient data centre ecosystem.

The road ahead: Data centres' journey towards energy autonomy

The evolution of data centres from passive energy consumers to proactive energy generators will inevitably take time. Data centre operators will likely undergo a period of adaptation, driven primarily by market dynamics requiring them to expand their operations through sustainable practices.

- **This transition is expected to start as an experimental initiative led by financially robust operators willing to take the associated risks and investments.** These pioneers will set the stage for a broader industry shift, experimenting with various energy sources and paving the way for widespread adoption.

- A larger cohort of data centre operators will likely join this movement as the **technology matures, becomes more cost-effective, and aligns with a more comprehensive regulatory framework**

- Over time, we expect a **gradual shift towards relying on these alternative energy sources** as the primary drivers of their operations, marking a full transition to the role of energy producers

The data centre industry must prepare for significant and transformative changes. Financial readiness, structural adaptability, and operational agility will be key to navigating this new landscape.

The future of data centres may not just be about housing and processing data, but also about generating power. This dual role promises to revolutionise both the data centre industry and the energy sector.

This journey towards energy autonomy is more than a path to self-sufficiency; it's a stride towards a more sustainable and resilient future.

Countries where our consultants have worked

> Fide Partners is ready to support data centre operators in their journey towards self-sufficient generation

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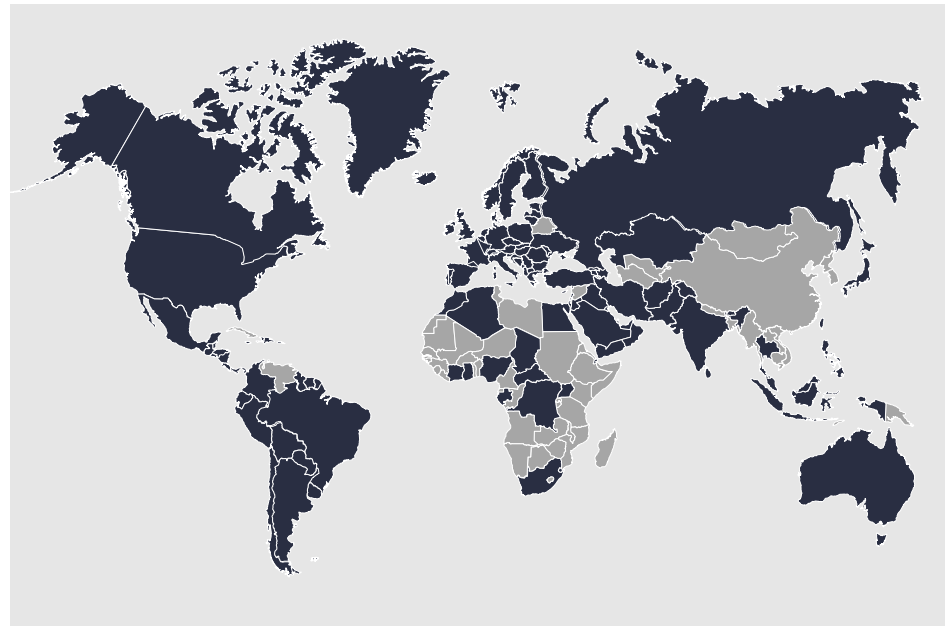
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