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Integrating renewable energy and digital infrastructure

Pioneering the next generation

To meet rising energy demand, the next generation of energy must integrate various renewable sources with innovative energy solutions.

Key takeaways

1. An increase in energy demand will characterise the infrastructure landscape over the coming decades, creating unique challenges and significant opportunities.

2. Data centres are critical to the digital economy and require large amounts of electricity. Some are approaching renewable energy generators to build new centres on existing renewable sites.

3. Energy operators are increasingly able to enhance energy efficiency and power reliability for data centres by integrating multiple renewable energy sources at the same grid connection point.

The outlook for energy demand, particularly electricity, is increasing at a rate not seen in decades.

This increase in demand will characterise the energy infrastructure landscape over the coming decades, creating unique challenges and significant opportunities. We believe key drivers of this growth include the digital economy—particularly the rise of high-performance computing for AI training and inference, the electrification of heating and transportation, industrial decarbonisation, and the resurgence of manufacturing through nearshoring and reshoring. The primary driver of rising electricity demand is the convergence of energy and digital infrastructure in the private sector, rather than government policy, which has become more uncertain globally.

To satisfy this growing demand, we believe lower-emitting conventional energy, such as nuclear and natural gas, will continue to play prominent roles. However, the next generation of energy—cleaner, abundant renewable energy such as wind, solar, battery storage and bio-fuels—is leading the way into the future.

The convergence of energy & digital infrastructure

The digital economy, powered by data centres and fibre networks, is set to be a key driver of energy demand in the coming years. The digital economy fosters innovation, boosts productivity, and enhances global connectivity, enabling businesses to access broader markets and manage resources efficiently, thus promoting economic growth and creating new opportunities.

Data centres, which require large and stable amounts of electricity, are critical to enabling growth and innovation in the digital economy. Perpetual growth in new digital content and services, including areas such as AI, requires significant investment in both data centres and electricity infrastructure to support their large power needs.

Driven by this symbiotic relationship, we expect a rapid convergence of renewable power generation, energy storage and digital infrastructure to meet surging power demand, while simultaneously

addressing the growing net zero objectives of data centre operators. Rapid technological development in both energy and digital infrastructure will assist in driving the dependency between sectors. For example, advancements in AI and machine learning capabilities are enabling data centre operators to optimise their energy usage, and thus enhance the overall efficiency of operations.

Another key driver that cannot be ignored is the strategic importance being placed on national AI capabilities by governments. This will require strong energy infrastructure to further support the development of local AI capabilities. In January 2025, the US announced the Stargate Project, which involves a $500 billion investment in AI infrastructure across 20 data centres in the near-term in partnership with leading technology companies including OpenAI, Oracle, Microsoft and NVIDIA. On the back of the growing domestic AI focus, the US Department of Energy recently forecast that power demand from data centres would double or triple by 2028 compared to 2023 levels[1].

In tandem with public sector initiatives, US hyperscalers are increasingly looking for innovative solutions to meet the large and increasing power demand from their growing data centre operations. Interestingly, these US hyperscalers have been prominent in the renewable energy market for years. Meta, Amazon, Microsoft and Google alone account for around 40% of US utility solar demand according to a study by UBS, and around 70% of the corporate power purchase agreement market in the last five years.[2]

Indeed, data centres are at the heart of cloud computing, digital media, and digital services, which have all revolutionised how we have used technology over the past two decades. The global expansion of data centres will broaden access to digital activities, with renewable electricity playing a key role in unlocking the digital sector's full potential. We expect that renewable and other forms of low carbon energy—including natural gas alongside nuclear, will be pivotal to meet this demand.

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Follow-the-power and co-location

There is enormous demand globally for power from data centre operators, to the point where existing electricity networks in traditional data centre hubs cannot meet power demand. New data centres are therefore decentralising into secondary markets with access to power, and we are seeing an increased demand for green electricity as access to power is critical. Data centre operators are now “following the power” and approaching renewable energy generators to build new data centres on existing renewable energy sites. This can have a range of benefits for both parties, including having guaranteed power (with storage), a captive offtaker through behind the meter solutions, lowering transmission and distribution charges, and reduced curtailment risks.

We believe portfolio companies owned by IFM Investors' funds are well-placed to benefit from this trend and are strategically positioned at the nexus of power generation, electricity networks and data centres through our investments, experience and knowledge of these industries. Given our development capabilities, we understand and are able to speak the same language as data centre developers in order to deliver both generation and storage solutions to provide stable, round the clock power.

Energy operators are also increasingly able to enhance energy efficiency and power reliability for data centres by integrating multiple renewable energy sources – such as wind and solar – at the same grid connection point. This approach improves energy production by leveraging the complementary nature of different energy sources, making the system more reliable. In addition, the combination of different technologies using a shared grid connection improves the productivity of the existing power network, thereby reducing investment requirements for network owners and reducing long term network costs.

[1] US Department of Energy, 2024 Report on US Data Center Energy Usage
[2] Solar is growing faster than any electricity source as Big Tech seeks clean energy for data centers - CNBC.com

Here battery storage can be implemented to create a flexible, or dispatchable, renewable energy plant, combining solar and wind to optimise energy delivery. Beyond cost savings, co-locating storage with renewable energy sources improves energy flow management by storing excess energy during peak production and releasing it during high demand, thus stabilising supply. We believe the diversification offered by hybrid energy systems has the potential to reduce investment risk.

Accelerating renewable energy growth

Global renewable capacity is expected to grow by 2.7 times between 2024 and 2030, according to the International Energy Agency (IEA). This growth is essential to meeting rising global energy demand. As digital infrastructure and electric vehicles become more prevalent, the pressure on renewable energy sources intensifies.

"Considering existing policies and market conditions, our main case sees 5,500 gigawatts (GW) of new renewable capacity becoming operational by 2030," the IEA states. "This implies that global renewable capacity additions will continue to increase every year, reaching almost 940 GW annually by 2030—70% more than the record level achieved [in recent years].[3]"

Of this, solar and wind are projected to account for 95% of all renewable capacity growth through the end of the decade, driven by increasing economic competitiveness worldwide. However, not all wind energy is considered the same. Onshore wind is the more established technology, with a track record extending over decades, while in Europe, the advent of offshore wind continues to accelerate.

Despite the evolving need for more renewable energy capacity globally, permitting and interconnection issues continue to be significant constraints on the commercialisation of new projects, particularly in more nascent jurisdictions. These challenges principally stem from complex and lengthy approval processes with various permitting authorities. Furthermore, interconnection into the grid typically requires extensive feasibility studies and coordination with grid operators, which often prolong development timelines. The market requires continuous permitting and interconnection reform to streamline project approval processes and enable more renewable energy capacity to come online over time.

Conclusion

Renewable energy demand is growing due to the large power requirements of data for AI, and the electrification of several sectors. The decreasing levelised cost of electricity from renewables is expected to continue regardless of changes in the political landscape.

Corporates are developing tailored solutions such as co-locating renewable energy sources with data centres to ensure power security and to gain competitive advantages. Integrated managers who are invested across the value chain look well-placed to capitalise on this thematic, as they can leverage their expertise to provide innovative solutions to the market.

[3] Massive global growth of renewables to 2030 is set to match entire power capacity of major economies today, moving world closer to tripling goal - News - IEA

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