Macquarie Global Listed Infrastructure[1]

Power demand: Divergent markets, universal investment

The vast scale of new data centre plans, and the media attention that has followed, has seen much of the investment world view power as the next big thing.

In the following note, we look to contrast the current state of the power thematic in the US and Europe and reflect on the opportunities across markets.

All markets are not created equal, but all are seeing investment

[1] Macquarie Global Listed Infrastructure is an equity team within Macquarie Asset Management's (MAM) Equity & Multi-Asset business.

What drives returns in infrastructure?

Understanding first what drives returns in the infrastructure sector is key to understanding the opportunity presented by exposure to the power theme. At its simplest, the key driver of returns in infrastructure is investment. The more investment made today, the greater potential for earnings and cash flows in the future, by virtue of the regulated nature of many infrastructure assets. For every euro, dollar, and pound invested, many of these assets/businesses generate an agreed or regulated return.

> **“The more investment today, the greater potential for future returns.”**
>
> **– Brad Frishberg, Head of the Macquarie Global Listed Infrastructure (GLI) Team**

With the above as context, it is logical then to look at what is driving investment of capital and investor interest in the asset class. One of the major drivers is the changing power landscape.

US – It’s all about the demand

The US power market has experienced a significant transition period over the past couple years.

The following four themes are driving the surge in power demand:

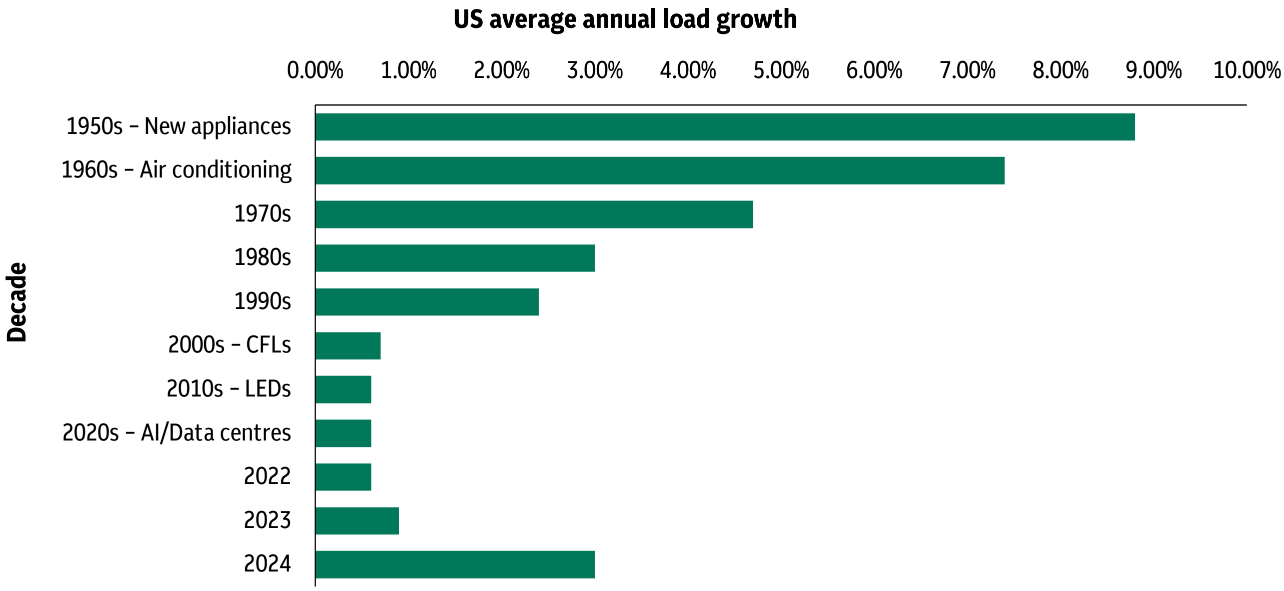
1. Reshoring of energy-intensive manufacturing sectors like semiconductors
2. Electric vehicles (EVs)
3. Broader electrification
4. Data centres, underpinned by generative artificial intelligence (AI)

Power demand in the next 10 years is expected to be vastly different from the past 20, which saw close to 0% annual growth. The chart below reflects the fact that, realistically, we believe power demand may have a compound annual growth rate (CAGR) of 2.5-3% going forward.

Just like toll roads...

Transmission wires and toll roads are analogous in that both are infrastructure systems designed to facilitate the movement of something (electricity or vehicles) and both involve charging a fee for their use. In each case, the infrastructure owner benefits from the usage fees, while users benefit from the service provided by the infrastructure.

In short, transmission wires are like highway and roads, transporting electrons rather than vehicles – more traffic needs more roads, more power needs more transmission. More peaks, more capacity on lines.

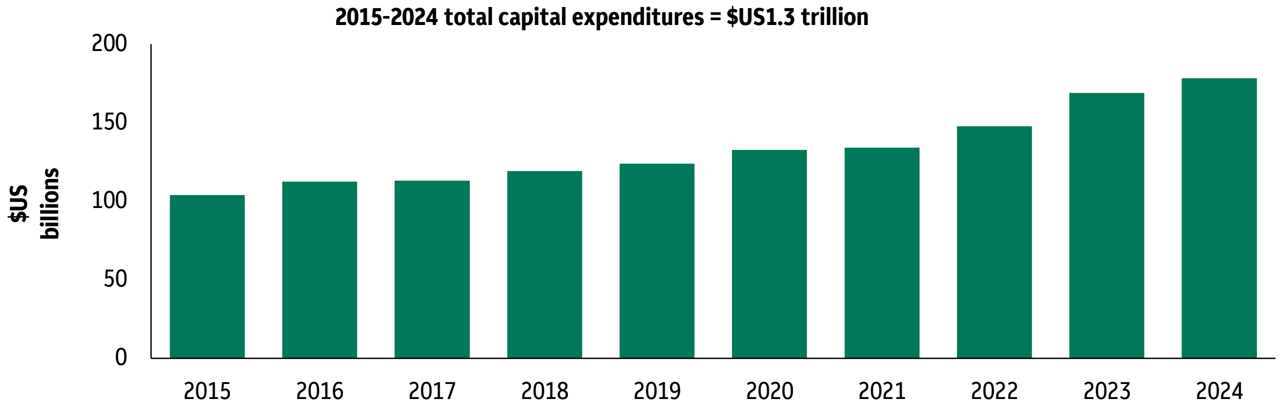


Source: Grid Strategies (Strategic Industries Surging: Driving US Power Demand, Dec 2024). CFL - Compact Fluorescent Lamps, LEDs - Light Emitting Diodes.

Impact on the grid

Further, in contrast to power generation, which has become cheaper over the past two decades in the US thanks to gas and renewables, transmission and distribution investments have risen and are showing no signs of slowing. Distribution delivers electricity from transmission stations to end users and has been the main driver of these spending increases. Transmission and distribution spend climbed to nearly $US60 billion in 2023. It is important to note that not all the spending for electric utilities is done on transmission and distribution wires. There are other assets owned by most "electric" utilities, including electricity generation (regulated or unregulated), energy storage, gas utility assets etc. Transmission spend made up just under half of that, at $US27.7 billion, which represented a tripling between 2003 to 2023. Meanwhile, distribution costs grew 160% (by $US31.4 billion) in the same period. Looking ahead, the industry projects capital expenditures to be more than $1.1 trillion for the five-year period of 2025-2029 (source: International Energy Agency).

2015-2024 capital expenditures for US investor-owned electric utilities



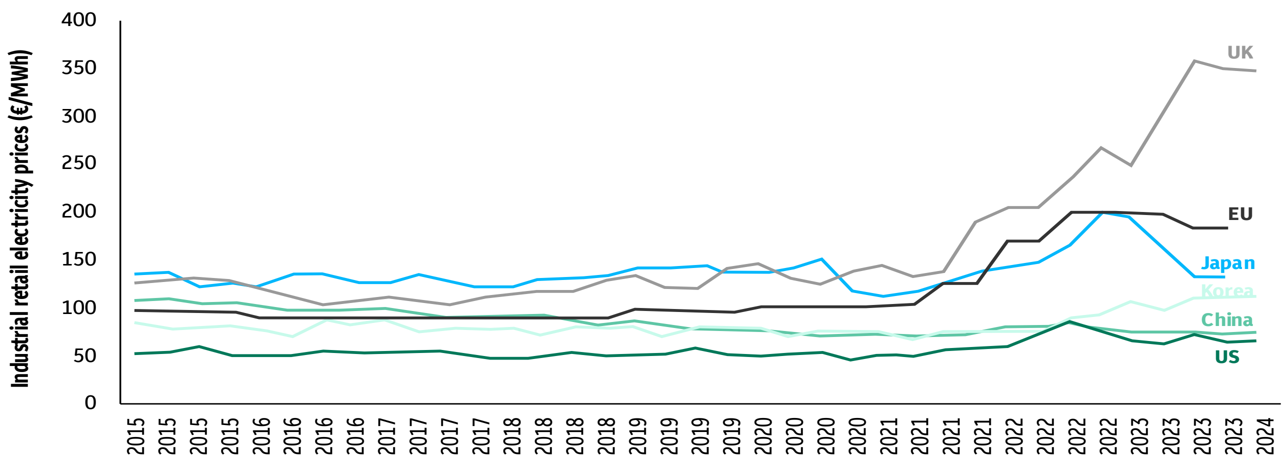
Source: Edison Electric Institute.

Europe – A different kettle of fish

The data centre theme for acceleration in power demand is currently very much US based, with notable absence of interest in the European angle from many investors. This does not mean, however, that there are not opportunities in the European/UK markets as they relate to power. The European power story is instead one of **cost** and **transportability**.

Europe's higher cost of electricity

Electricity prices in Europe and the UK are higher, in some cases substantially higher, compared with the US. In fact, European prices are at a global high compared with other major economies, including Japan and China.



https://www.eurochambres.eu/wp-content/uploads/2025/06/Electricity-Prices-and-Employment-A-Comparative-Analysis-of-EU-Countries-3.pdf

Experience in the German market, for example, which has historically had strong manufacturing centres, has seen a significant reduction in industrial demand as a consequences of high electricity prices.

Data centre demand is no different, with investors running up against affordability issues in Europe. One challenge has been that investors are required to make the investments in jurisdictions that generally operate on a merchant basis (i.e. they are exposed to the volatility of power price rather than having long-term power purchase agreements), and these markets tend not to have strong energy policy to mitigate pricing volatility.

As a result of the above, and the fact that Europe has one of the oldest grids in the world, the European story is one of power generation and enabling a better flow of electricity around Europe.

With limited options on power generation, particularly post the Russian invasion of Ukraine, many countries have invested heavily in renewables. While relatively quick to deploy, renewables build costs have increased, resulting in an increased need for subsidisation. The subsidisation in turn increases costs, making it harder to connect cost effectively. Renewables also face the challenge of intermittency, so they have less ability to handle base load power requirements without substantial investment in the grid, particularly in storage technologies.

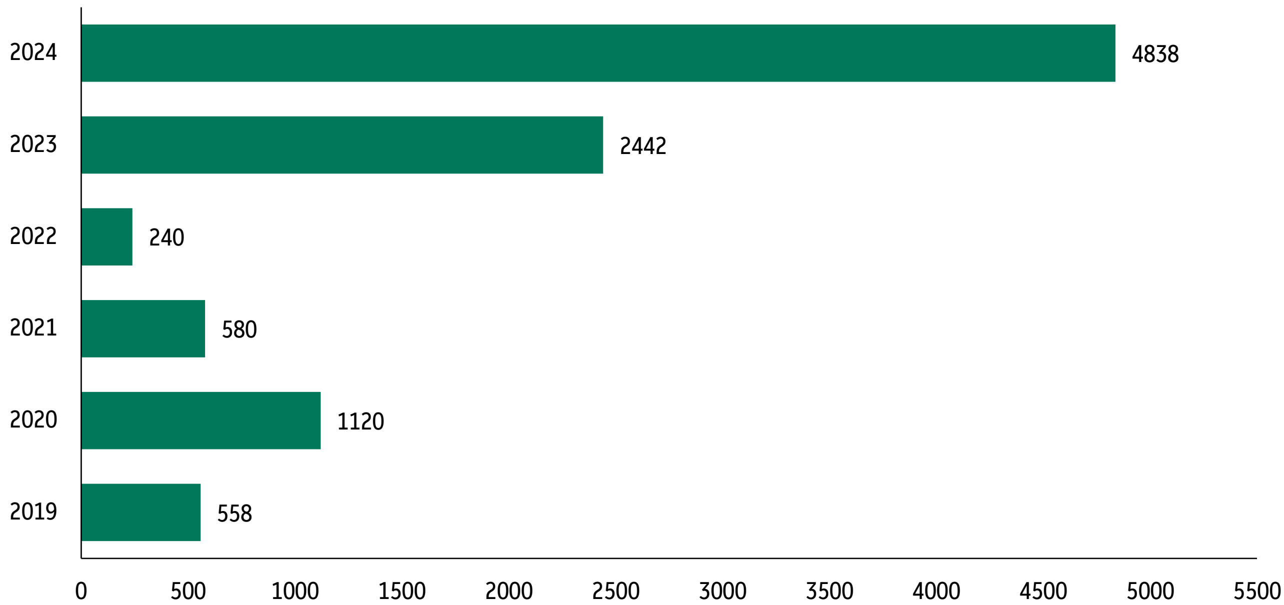
Live example – Market in need of investment

The power outage that affected Spain and Portugal on 28 April 2025 was caused by a combination of technical and planning errors, leading to the grid's inability to handle voltage fluctuations, affecting approximately 60 million people across the Iberian Peninsula.

Negative power prices…Are they really a thing?

In 2024, European electricity markets saw a record number of periods with negative power prices, driven by a surge in renewable energy generation and relatively low demand. Specifically, there were 4,838 instances of day-ahead power prices falling to zero or below.

Cumulative number of negative prices per year in Europe



Source: comcamenergy.com/negative-electricity-prices-in-europe-analysis-outlook

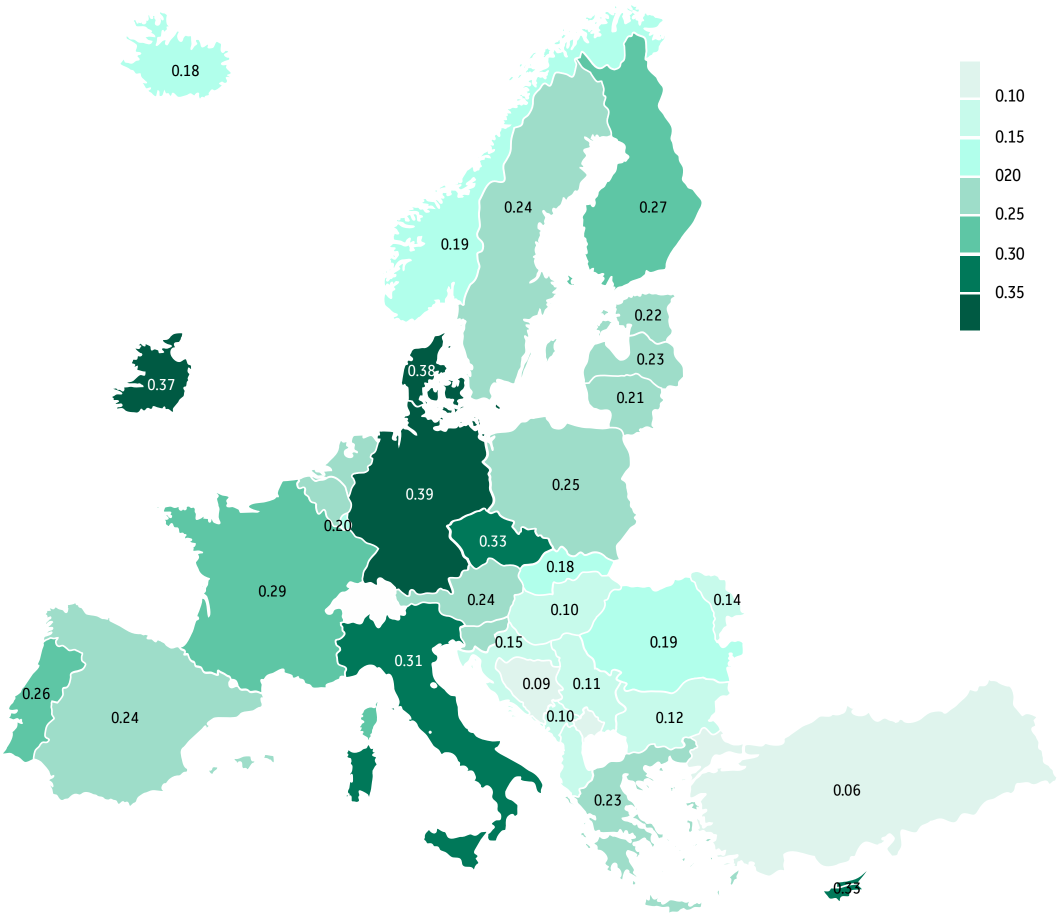
Why do they occur?

Since electricity is difficult to store at scale, the power system must constantly balance supply and demand in real time; thus, during times of low demand and high supply, ultra-low and even negative power prices may occur. This means that generators are faced with a situation in which they must pay to feed their electricity into the system. Ultra-low and negative prices typically occur in the middle of the day during the spring and summer months, when solar generation is at its peak, and occasionally at night during winter due to high wind output. They also tend to be more frequent on weekends and holidays, when overall demand is lower. In recent years, the occurrences of ultra-low and negative prices have increased, with these periods becoming more prolonged. (Source: Eurelectric, December 2024.)

Facilitating the flow

Facilitating the flow of electricity across the system is also key because there are big differences in power prices across European countries. Easing the flow of electricity to make it more efficient (i.e. when the prices are low and there is an excess of power, the electricity is directed to another area where there is a deficit with higher prices) should enable a more stable cost environment. As a result, significant investment in the grid is required to facilitate the flow.

For household consumers, in Euro per kWh*. All taxes and levies included.



Source: qery.no/consumer-energy-prices-in-Europe

Conclusion – Where are the opportunities?

As is always the case with themes, there will be winners and losers, and the team believe it takes a specialist infrastructure manager to identify the best opportunities.

In both the US and Europe/UK, the opportunities presented are driven by substantial increases in investment.

In Europe the team currently see most value in electricity transmission and renewables. Portfolio exposures are spread across markets including Spain, Italy and the UK.

In the US opportunities are expected across the energy stack (sources of power), with renewables, for example, essential to the strategy, in our view. We believe utility-scale batteries and transmission infrastructure will also see significant growth along with contracted generation and gas (including liquefied natural gas).

Company example – National Grid (NG)

- NG expects ~10% CAGR from 2025 to 2029, with its asset base expected to grow from ~£60 billion in FY25 to ~£100 billion FY29.
- NG's growth is largely locked in through the regulatory process and discussions with relevant regulators. The need for investment to facilitate net zero (connection of renewables, firming the network against higher penetration of intermittent renewables, gas to electricity switching, EVs and the more recent AI data centres) all underpin NG's investments in the future.
- We can see a sustained and long-term need for NG to invest well into the next decade while investments in other sectors may be more cyclical and subject to economic conditions at the time.
- Not only is NG's growth expected to be highly probable, but its UK returns and cash flow are also highly protected via inflation protection (its asset base and operating expense/capital expenditure allowances are all subject to inflation protection).

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Key risks

The potential for adverse events in the global infrastructure sector to impact the performance of the investments of the Strategy. Investments in securities issued by companies that are principally engaged in the infrastructure business will subject the Strategy to risks associated with direct investment in infrastructure assets. Factors such as the availability of finance, the cost of such finance in general as well as in comparison to prior periods, the level of supply of suitable infrastructure projects and government regulations relating to infrastructure may influence the value of these investments and hence the Strategy.

The risks of investing in the infrastructure sector include those listed here.

New project risk: Where an infrastructure issuer invests in new infrastructure projects, it is likely to retain some residual risk that the project will not be completed within budget, within the agreed time frame and to the agreed specification.

Strategic asset risk: Infrastructure assets may include strategic assets, that is, assets that have a national or regional profile, and may have monopolistic characteristics. The nature of these assets may generate additional risk given the national/regional profile and/or their irreplaceable nature and may constitute a higher risk target for terrorist acts or political actions.

Documentation risk: Infrastructure assets are often governed by a complex series of legal documents and contracts. As a result, the risk of a dispute over interpretation or enforceability of the documentation may be higher than for other issuers.

Operation risk: Should an infrastructure issuer fail to maintain and operate the assets efficiently, the ability to maintain payments of dividends or interest to shareholders may be impaired. Failure by the infrastructure issuer to carry adequate insurance or to operate the asset appropriately could lead to significant losses and damages.

International investments entail risks including fluctuation in currency values, differences in accounting principles, or economic or political instability. Investing in emerging markets can be riskier than investing in established foreign markets due to increased volatility, lower trading volume, and higher risk of market closures. In many emerging markets, there is substantially less publicly available information, and the available information may be incomplete or misleading. Legal claims are generally more difficult to pursue. The Strategy may invest in preferred stock and hybrid securities, which may have special risks. Preferred and hybrid securities may include provisions that permit the issuer, at its discretion, to defer distributions for a stated period without any adverse consequences to the issuer. Some preferred and hybrid securities are non - cumulative, meaning that the dividends do not accumulate and need not ever be paid. A portion of the Strategy's assets may include investments in non-cumulative preferred or hybrid securities, under which the issuer does not have an obligation to make up any arrears to its investors. Preferred and hybrid securities may be substantially less liquid than many other securities, such as common stocks or US government securities. Generally, preferred and hybrid security holders (such as the Strategy) have no voting rights with respect to the issuing company unless preferred dividends have been in arrears for a specified number of periods, at which time the security holders generally may select a number of directors to the issuer's board. Generally, once all the arrears have been paid, the security holders no longer have voting rights. In certain varying circumstances, an issuer of preferred or hybrid securities may redeem the securities prior to a specified date. For instance, for certain types of preferred or hybrid securities, a redemption may be triggered by a change in federal income tax or securities laws. A redemption by the issuer may negatively impact the return of the security held by the Strategy.

Important information

Source for all performance data unless noted: Macquarie.

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