

Electrifying Returns in the AI Era

Published October 31, 2025

Artificial intelligence (AI) is not just transforming business models and economic growth—it is contributing to a step change in global electricity demand, with far-reaching effects on energy markets, utility infrastructure, and investment portfolios.¹ This shift is creating both acute challenges and compelling opportunities. Grid reliability, infrastructure bottlenecks, and decarbonization pressures are intensifying, while the scale and urgency of required capital investment are unprecedented. Solutions that address these challenges—modernizing the grid, expanding clean and reliable power, and improving efficiency—offer the most appealing prospective returns.

Yet, as with any technological revolution, uncertainty remains. The pace of AI adoption, the trajectory of energy efficiency, the availability of labor and materials along the electricity supply chain, and the ability of policy and capital to keep up with demand will shape the investment landscape. Investors must allocate capital thoughtfully, balancing optimism about the scale of the opportunity with discipline and selectivity.

In this edition of VantagePoint, we examine how the rise of AI is reshaping the global energy landscape and highlight the most compelling opportunities and risks for investors. We analyze the drivers of surging electricity demand, the infrastructure and supply chain constraints that threaten to limit growth, and the comparative merits of emerging power solutions. We conclude with actionable investment implications and recommendations for navigating this rapidly evolving landscape. The winners will be those who can identify and invest in the infrastructure and technologies that enable the next era of digital and energy growth.

The global demand surge

Hyperscale data centers powering advanced AI workloads are proliferating rapidly, as technology firms race to secure power contracts and build new capacity. This surge in AI-driven demand is layered atop powerful secular trends: digitalization, electrification of transport and industry, and manufacturing reshoring.

Projections from the International Energy Agency (IEA) suggest global electricity demand could grow 1.5x to 3x by 2050 (2%–4% annually), with data centers alone expected to double their share of global consumption by 2030 to nearly 3% (Figure 1). In the United States, data centers may account for as much as 12% of total power demand by 2028, up from 4.4% in 2023.

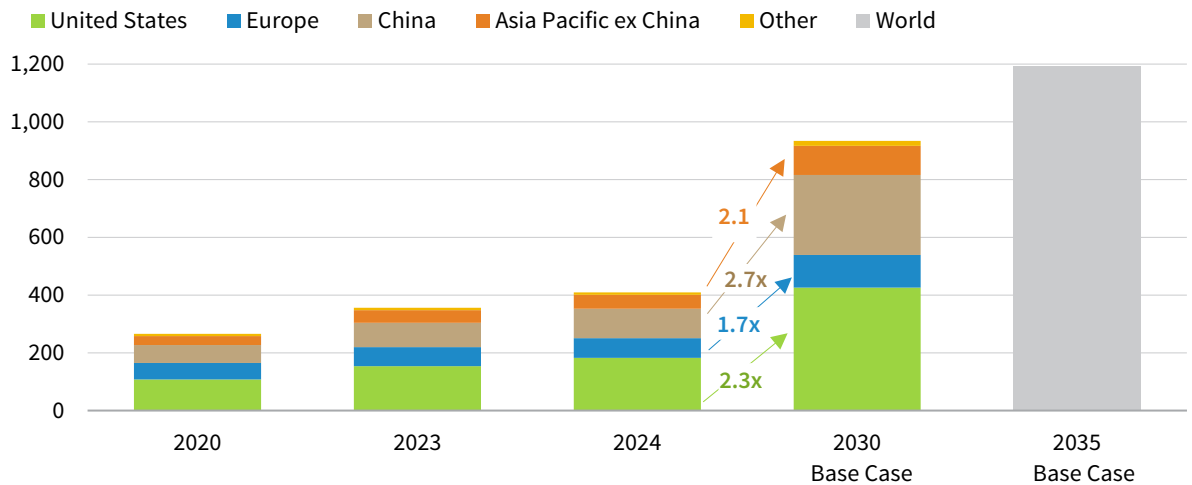


Celia Dallas
Chief Investment
Strategist

¹ Please see “Navigating the AI Revolution: A Three-Part Series,” Cambridge Associates, LLC, July 2025.

Figure 1 Data centers expected to increase electricity consumption across the globe

Data Center TWh



Source: International Energy Agency.

Historically, technology platform shifts have made demand forecasting difficult. For example, the move to cloud computing delivered dramatic efficiency gains that tempered earlier projections of data center power use. Today, advances in AI hardware, software, and cooling are again driving efficiency improvements, but the sheer scale and intensity of AI workloads mean that aggregate demand is likely to rise sharply. Further, should AI electricity demand fall short, other demand drivers should support investments in expanding electricity capacity.

These forces are converging at a time when many power grids are already strained by aging infrastructure, intermittent renewable generation, and extreme weather events. The result is a widening gap between projected demand and available, reliable supply—creating acute challenges for grid reliability and decarbonization.

For investors, this environment presents a generational opportunity. Those who target infrastructure and efficiency solutions that address the scale and urgency of this transformation are best positioned to benefit.

Data center differences

AI workloads in data centers fall into two distinct categories: training and inference. Training large models involves short, intense bursts of computation, requiring ultra high-density hardware and advanced cooling systems. These workloads typically occur in specialized, hyperscale facilities, often sited in remote locations where abundant, low-cost power is available.

Inference, by contrast, is a continuous and distributed process. While each query is less demanding, the aggregate electricity use can surpass that of training due to the sheer volume of real-world applications. Inference workloads require data centers to deliver reliable, low-latency performance, often necessitating proximity to population centers and robust network redundancy. This locational preference ensures rapid response times for end users and supports a wider range of commercial and consumer applications.

From an investment perspective, inference-oriented data centers offer broader applicability and more predictable demand profiles, while training centers—though critical for AI advancement—are more speculative and concentrated in fewer, remote sites. Understanding these distinctions is essential for evaluating infrastructure needs, strategies for sites, and long-term value creation in the evolving AI data center landscape.

Supply and infrastructure constraints

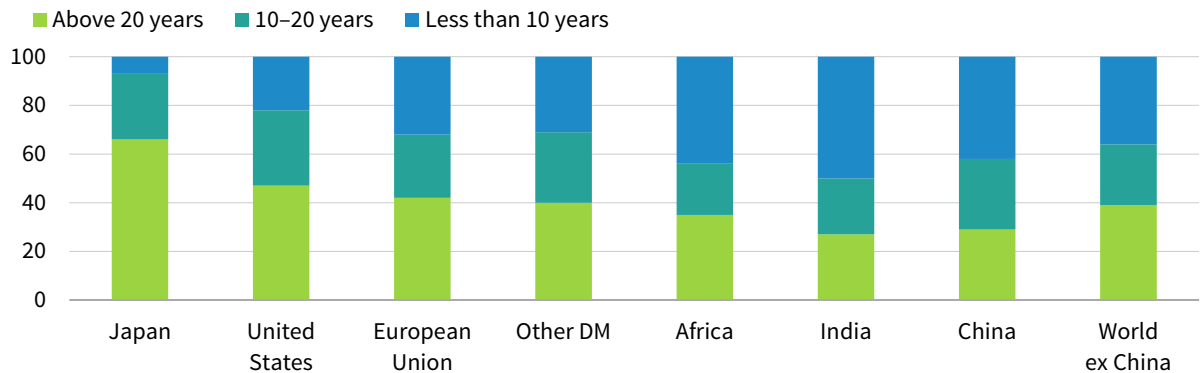
The surge in electricity demand driven by AI and digitalization is colliding with significant supply-side and infrastructure challenges. These constraints are not only slowing the pace of new capacity additions but also creating critical investment opportunities for solutions that can unlock growth and reliability.

Aging grid infrastructure and grid modernization needs

In advanced economies, more than 40% of transmission and distribution assets are more than 20 years old and were designed for centralized, fossil fuel-based generation (Figure 2). The shift toward distributed and intermittent renewables requires a more flexible and intelligent grid. As infrastructure modernizes and digitizes, the risk of cyberattacks and operational disruptions rises, making robust cybersecurity frameworks and resilience planning essential for long-term asset value and risk mitigation.

Figure 2 Aging infrastructure creates grid vulnerabilities

2023 • Transmission length distribution (%) by age group and country/region



Source: International Energy Agency.

Supply chain strains: Equipment, labor, and permitting

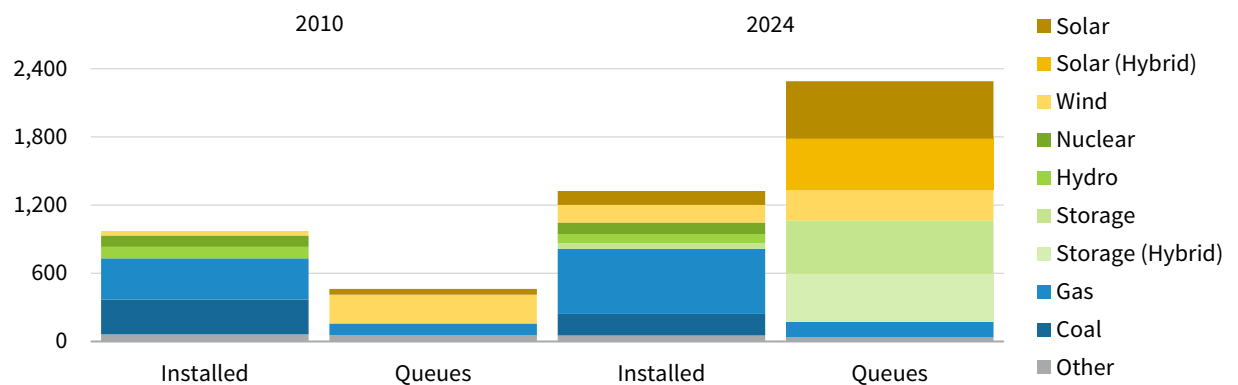
Lead times for essential grid components—transformers, switchgear, and high-voltage cables—have extended from months to years. In the United States, transformer delivery times routinely exceed two to four years, with similar delays in Europe and Asia-Pacific. Transformer costs have doubled since 2020, and the backlog for new orders is at a record high. These delays are driven by surging demand, limited manufacturing capacity, and persistent labor shortages, especially in electrical engineering and construction trades. Tariffs and inflation in materials and logistics are also impacting project economics and timelines, requiring flexible procurement strategies and risk-sharing mechanisms in contracts.

Permitting and regulatory hurdles compound these challenges. In many jurisdictions, transmission projects face multi-year approval processes. In the United States, the average transmission line takes seven to ten years from planning to completion—a timeline fundamentally misaligned with the rapid buildout of data centers, which can be completed in under two years. This lag is creating acute supply bottlenecks, with some projects forced to rely on local generation or on-site solutions (i.e., battery storage or microgrids) to bridge the gap. Grid-enhancing technologies—such as dynamic line rating and advanced power flow control—can increase the capacity and flexibility of existing infrastructure, offering attractive risk-adjusted returns and faster deployment.

Figure 3 illustrates the dramatic increase in generation and storage projects waiting in interconnection queues, as well as the average time projects spend in these queues before coming online. This bottleneck is a key factor limiting the speed at which new capacity can be added to the grid.

Figure 3 Power installation queues have become extended

US installed capacity vs active queues (gigawatts)



New data center connection queues

| Jurisdiction | Average time In queue |
|-----------------------------------|-----------------------------------|
| United States | 1 - 3 Years |
| Northern Virginia (United States) | Up to 7 Years |
| California (United States) | 3 Years |
| Germany | Up to 7 Years |
| United Kingdom | 5-7 Years |
| Netherlands | Up to 10 Years |
| Kanto (Japan) | More than 5 Years |
| Malaysia | Under 3 Years |
| Queensland (Australia) | More than 2 Years |
| Italy | Under 3 Years |
| Spain | 3-5 Years |
| Ireland | Dublin Activity Paused Until 2030 |

Sources: Business Post, Data Center Dynamics, Electrical Review, International Energy Agency, Lawrence Berkeley National Laboratory, and US Department of Energy.

Notes: Top chart data were gathered from the interconnection queues of seven Independent System Operators (ISOs) and Regional Transmission Organizations (RTOs), as well as 49 non-ISO balancing authorities—including utilities and Power Marketing Administrations. Together, these entities account for approximately 97% of the total installed electric generation capacity in the United States.

In some jurisdictions, average time in queue is now seven to ten years (e.g., Northern Virginia, Germany, the Netherlands), and in Dublin, new activity is expected to be paused until 2028. Even projects ready to proceed can face multi-year delays, amplifying the risk of supply shortfalls and stranded capital.

Grid congestion and reliability risks

Utilities and grid operators warn that rapid load growth and aging infrastructure could trigger supply shortfalls, price spikes, and curtailments, especially where transmission upgrades lag demand. In major US markets like California, Northern Virginia, and Texas, data center clusters are straining local grids, causing connection delays and even moratoriums. The North American Electric Reliability Corporation (NERC) has flagged data center expansion as a near-term risk to reserve margins. Loudoun County, Virginia—the world’s largest data center hub—is experiencing grid and land constraints, escalating prices, and growing community opposition.

In Europe, grid saturation in Amsterdam, Dublin, Frankfurt, London, and Paris is limiting the availability of reliable power to new facilities and prompting temporary moratoriums on new data centers. Asia-Pacific faces similar issues, with rapid urbanization and uneven renewable supply causing grid instability.

Navigating the bottlenecks

Supply chain and grid constraints are central for investors, raising the risk of project delays, cost overruns, and stranded assets—especially in congested or slow-permitting markets. These bottlenecks also create opportunities for investment in enabling infrastructure and advanced grid solutions.

Investors should prioritize regions and projects with clear pathways to grid interconnection, strong utility partnerships, and proactive risk mitigation strategies. As the AI revolution accelerates, the winners will be those who can navigate the bottlenecks—deploying capital not just to meet demand, but to unlock the infrastructure and supply chain solutions that make growth possible.

Grid and generation solutions

Before investors can identify the most attractive opportunities in the evolving electricity landscape, it is essential to understand the strengths, limitations, and deployment realities of major generation and grid technologies. Each solution offers a distinct profile in terms of cost, reliability, scalability, and environmental impact. The optimal mix will depend on local market conditions, regulatory frameworks, and the specific needs of end users. The following overview provides a comparative assessment of key technologies, highlighting factors that drive investment value and the challenges to delivering reliable, low-carbon power at scale.

Generation technologies

Natural gas

Natural gas remains the most flexible and scalable dispatchable resource in many markets, offering rapid ramping and high reliability for peak demand and grid stability. However, supply chain bottlenecks (e.g., gas turbines), carbon intensity, and exposure to fuel price volatility present risks, especially as decarbonization policies tighten. Investors should weigh the near-term reliability benefits against the potential for stranded asset risk as emissions standards evolve.

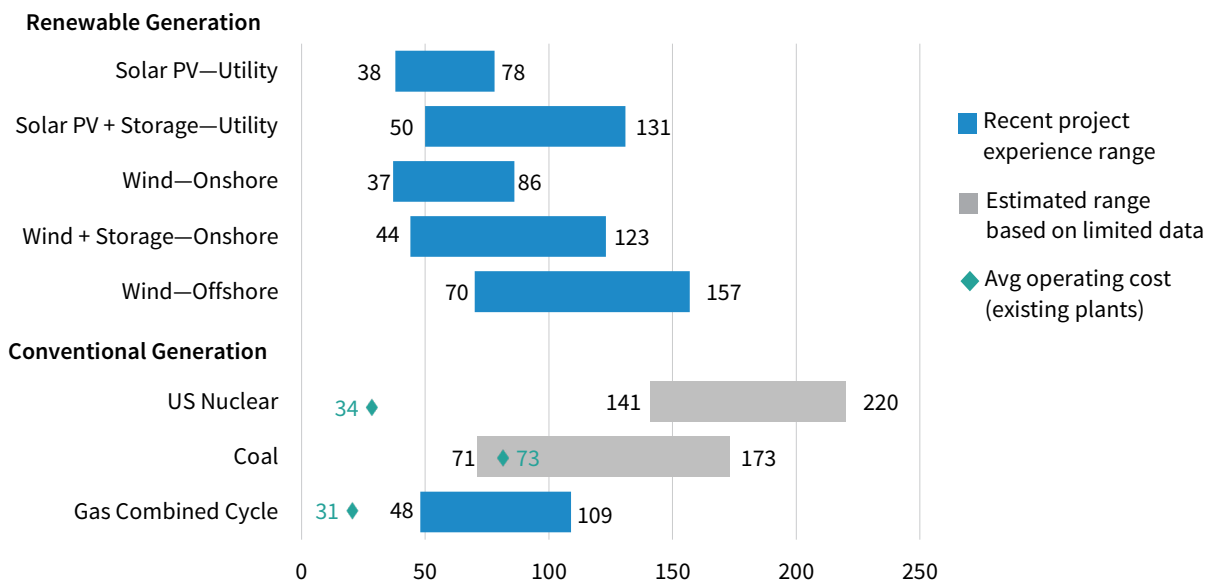
Renewables (wind and solar)

Wind and solar are now the lowest-cost sources of new generation in many regions, but their intermittency creates challenges for grid reliability and requires complementary investments in storage, flexible generation, and advanced grid management. Siting and permitting can be significant hurdles, particularly for large-scale projects. AI can help streamline solar permitting and project management, while evolving battery technologies (e.g., ion-air, flow) offer potential medium-term storage solutions. Investors should consider both the cost advantage and integration challenges.

In the United States, scaled-back tax credits may depress long-term development, while near-term safe harbor requirements could accelerate construction and create supply shortages and cost increases (Figure 4). Developers with healthier balance sheets will more effectively bring forward project timelines, while liquidity-constrained developers will be more challenged, potentially igniting a buyers' market for high-quality assets at distressed prices.

Figure 4 Renewables tend to be cost leaders for new generation

Levelized cost of energy, unsubsidized • \$/MWh



Source: Lazard Levelized Cost of Energy, June 2025.

See page 14 for figure notes.

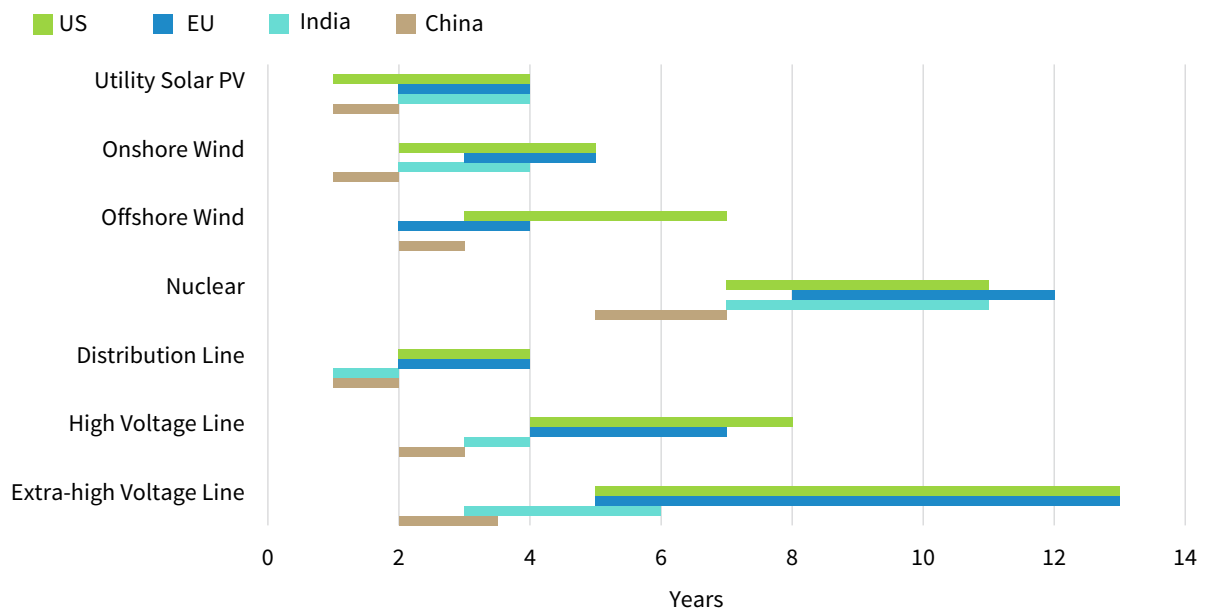
Battery storage

Grid-scale battery storage is rapidly gaining traction for balancing variable renewables and providing ancillary services. Costs have declined and as previously mentioned, battery technologies are improving but are not yet a full substitute for long-duration or seasonal storage. Supply chain constraints and raw material sourcing remain key risks. The investment case is strongest where storage can capture multiple revenue streams or where grid congestion is acute.

Nuclear

Nuclear power offers zero-carbon, baseload generation with high reliability. While new large-scale projects face high capital costs, long lead times, and regulatory complexity, interest in small modular reactors (SMRs) is growing (Figure 5). However, a challenge for investors is the proliferation of SMR technologies—more than 80 different designs across four main models—which makes it difficult to achieve standardization and bring down cost curves. Commercial deployment of SMRs remains several years away, and the path to cost competitiveness is uncertain.

Figure 5 Project timelines present challenges, with nuclear slowest to market



Source: International Energy Agency.

Extending the lifetime of existing nuclear plants is already being done in several markets and can be a cost-effective way to maintain reliable, low-carbon power. These life extensions typically require less capital and regulatory risk than new builds and can deliver attractive returns for investors focused on operational upgrades and maintenance. Meanwhile, fusion nuclear energy is attracting considerable private investment but remains in the research phase.

Geothermal (Next-Generation)

Geothermal energy is evolving rapidly, with enhanced geothermal systems (EGS) and closed-loop geothermal expanding the addressable market. EGS leverages oil & gas technologies to unlock geothermal potential in new geographies. Closed-loop systems reuse water and eliminate the need for a continuous supply. Both approaches offer very low-carbon energy and 24/7 output, with a small land footprint attractive for data centers. Despite high upfront capital requirements, resource risk, extensive transmission infrastructure needs, and long permitting timelines, next-generation geothermal could drive costs lower and enable deployment in new regions. Investors should weigh the long-term potential against these barriers, focusing on projects and platforms that can mitigate development risk and capitalize on technological advances.

Hydropower

Hydropower remains a significant source of reliable, low-carbon electricity in many regions. While new large-scale projects are constrained by geography and environmental concerns, upgrades to existing facilities and pumped storage continue to play an important role in grid flexibility and decarbonization strategies.

Hybrid systems

Increasingly, developers and utilities are deploying hybrid systems that combine multiple technologies—such as solar and battery storage, wind and gas, or renewables with on-site generation—to deliver firm, flexible power. These integrated solutions help address intermittency, improve grid reliability, and optimize project economics.

On-site and distributed solutions

To address grid constraints and reliability risks, many large power users are investing in on-site generation—such as gas turbines, fuel cells, microgrids, and behind-the-meter storage. These distributed solutions can accelerate project timelines, enhance resilience, and reduce dependence on the broader grid. While they may come at a premium cost and require specialized operational expertise, they are increasingly attractive for data centers and critical infrastructure seeking 24/7 reliability.

Grid and data center efficiency innovations

Efficiency is a key lever for addressing supply constraints and decarbonization goals. Innovations in grid management and data center operations are unlocking significant value:

- **Advanced grid management:** Technologies such as dynamic line rating, advanced power flow control, and real-time grid analytics can increase the capacity and flexibility of existing infrastructure, enabling more efficient use of transmission assets and faster integration of renewables.
- **Virtual power plants (VPPs):** VPPs aggregate distributed energy resources—such as batteries, backup generators, and flexible loads—across multiple sites, enabling coordinated participation in grid services. For data centers, VPPs can lower energy costs, generate new revenue from demand response, and enhance resilience. Regulatory support and advances in AI-driven orchestration are accelerating adoption.

- **Data center efficiency:** AI-driven energy optimization, liquid cooling, modular design, and waste heat recovery are reducing the energy intensity of data centers. Leading operators are achieving power usage effectiveness (PUE) ratios well below industry averages, translating into lower operating costs and reduced grid impact.

Improving grid efficiency and data center PUE can be powerful. For example, improving PUE from the industry average of 1.5 to 1.1 can reduce primary electricity demand by 27% compared to business-as-usual projections (Figure 6). Combined with a more efficient grid mix, the reduction in primary energy demand is even more pronounced. This compounding effect lowers operating costs and carbon emissions, and enhances the resilience and scalability of digital infrastructure, making efficiency investments highly attractive in the context of rising AI workloads and electrification.

Figure 6 Increased data center efficiency can drive down primary energy demand requirements

| Scenario | PUE (A) | Weighted Grid Efficiency (%) (B) | Useful Energy (TWh) (C = D / A) | Final Electricity Demand (TWh) (D = 277 x A x Workload Growth) | Primary Energy Req'd (TWh) (E = D / B) | Change in Primary Energy Req'd vs Previous Scenario (%) |
|--|------------|-------------------------------------|------------------------------------|---|---|---|
| Current Energy Mix Baseline (2024) | 1.5 | 54% | 277 | 416 | 767 | --- |
| 2x Workload Growth, Business as Usual | 1.5 | 54% | 555 | 832 | 1,534 | 100 |
| 2x Workload and Increased Efficiency (Lower PUE) | 1.1 | 54% | 555 | 610 | 1,125 | -27 |
| 2x Workload, Lower PUE, 5% More Renewables | 1.1 | 57% | 555 | 610 | 1,066 | -5 |

Sources: International Energy Agency, Lawrence Berkeley National Laboratory, and Uptime Institute.

Notes: PUE measures the overall energy efficiency of a data center facility. It is the total amount of energy consumed by the facility divided by the energy used by the IT equipment. A PUE of 1.0 is perfectly efficient. Global average PUE is estimated to be approximately 1.5 today, with the most efficient, new data centers operating with a PUE of 1.1–1.2. Assumes current grid efficiency of 40% for fossil fuels, 100% for renewables, and 35% for nuclear. The 2024 final electricity demand and generation mix are based on IEA's 2024 assumptions of 416 TWh final electricity demand with a mix of roughly 60% from fossil fuels, 25% from renewables, and 15% from nuclear. We decrease fossil fuels by 5% in the 5% more renewables scenario.

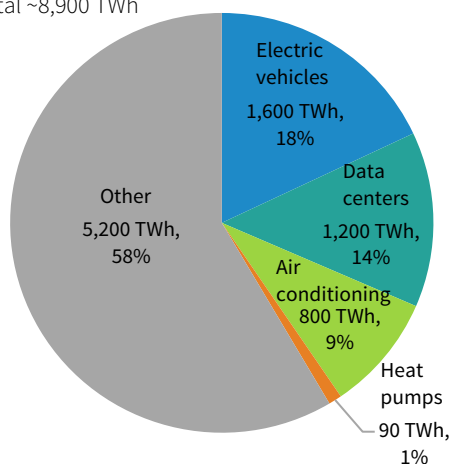
Opportunity and caution in the power of AI

BloombergNEF (BNEF) investment projections show that a broad set of drivers are adding to global electricity demand (Figure 7). While data center–driven electricity demand growth is rapid, it starts from a low base and accounts for a relatively small portion of projected demand growth. The electrification imperative, boosted by AI and digitalization, is creating a generational investment opportunity. If net-zero objectives are met, investment in all but fossil fuel power is expected to increase materially from BNEF's base case.

Figure 7 Sizable power-related investment fueled by multiple drivers including data centers

2025–35 Projected electricity demand growth under BNEF base case (TWh)

Total ~8,900 TWh



| Category | 2025–35 Investments | % of | 2025–35 Investments Under |
|-------------------|----------------------|-------------|---------------------------|
| | Under BNEF Base Case | | BNEF Net Zero by 2050 |
| | (USD Billions) | Power Theme | Scenario |
| | | | (USD Billions) |
| Fossil-fuel Power | 1,090 | 8% | 300 |
| Renewables | 5,810 | 42% | 11,830 |
| Nuclear | 510 | 4% | 2,330 |
| Hydrogen | 170 | 1% | 1,140 |
| Power Grids | 5,140 | 37% | 8,090 |
| Energy Storage | 1,160 | 8% | 2,000 |

Source: BloombergNEF.

Notes: The BNEF base case reflects BloombergNEF’s baseline outlook for the energy system, based on current market trends, technology costs, and policies already enacted or firmly committed. The base case does not assume additional climate policies or net zero targets beyond those in place as of the analysis. BNEF’s Net Zero by 2050 Scenario (NZS) models a pathway in which the global energy system achieves net zero greenhouse gas emissions by 2050. NZS assumes accelerated technology deployment and policy support consistent with meeting net zero commitments.

The scale and urgency of required capital, combined with the pace of technological change, are drawing significant attention from both strategic and financial investors. Mergers & acquisitions activity in the sector has been robust, spurred by opportunities to build efficiency and scale in a highly decentralized market. With nearly 3,000 electric utility companies in the United States alone, transaction typically target the middle market.

Sectors tied to power infrastructure, grid modernization, and efficiency solutions have already seen strong performance, and the long-term demand outlook remains robust. However, this enthusiasm brings risks.

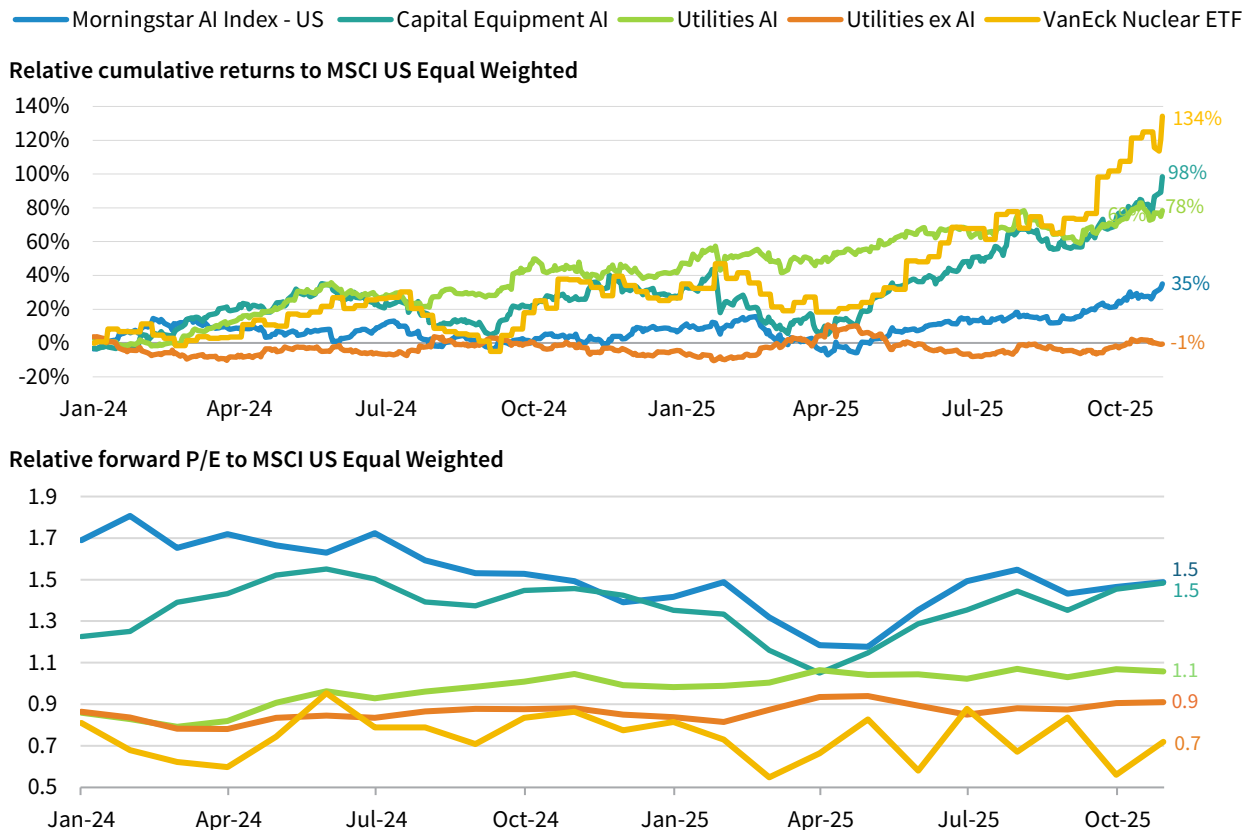
Recent market performance highlights both the promise and risks of AI-adjacent power investments, or AI enablers.² Since the start of 2024, nuclear, utility, and capital equipment power AI plays have meaningfully outperformed broad US equities and broader AI plays as defined by the

² In our three-part series on AI published earlier this year, we defined five archetypes for investors to consider when investing through an AI lens: innovators, disrupters, enablers, incumbents, and disrupted companies. Enablers include investments in physical infrastructure related to AI. Please see “Navigating the AI Revolution: A Three-Part Series,” Cambridge Associates, LLC, July 2025.

Morningstar AI Index (Figure 8). Importantly, this outperformance has not been driven by indiscriminate multiple expansion—relative valuations have remained stable, suggesting returns have been grounded in improved relative fundamentals based on expected earnings outperformance. The exception is capital equipment AI plays, which have seen relative valuations increase from a 20% premium at the start of the period to a 50% premium. This rerating reflects expectations that prices for critical hardware—such as gas turbines and transformers—will remain elevated amid continued shortages and limited investment in expanding manufacturing capacity.

Figure 8 Beyond the Mag 7: AI power plays have charged ahead of the broad market while valuations have held relatively steady

January 1, 2024 – October 29, 2025



Sources: Empirical Research Partners, FactSet Research Systems, Morningstar, and MSCI Inc. MSCI data provided "as is" without any express or implied warranties.

Notes: Utilities AI includes: NRG Energy, Vistra, NextEra, Southern, Constellation, Public Service Enterprise, Entergy, and Nisource. Utilities ex-AI covers all other MSCI US Utilities Index constituents as of September 30, 2025, excluding these. Capital Equipment AI comprises ten firms: Eaton, Trane, Johnson Controls, Quanta, Vertiv, Symbotic, EMCOR, Comfort Systems, MasTec, and nVent. The Morningstar Global Next Gen AI Index and VanEck Uranium & Nuclear Energy ETF (NLR), as well as the MSCI US Index, reference constituents as of September 30, 2025, and only include US-based companies per MSCI. In the top chart, returns are equally weighted and compounded daily for all groups except Nuclear, which uses weekly data. The bottom chart shows median forward P/E ratios based on consensus earnings estimates for the next 12 months.

For investors, the imperative is to balance optimism about the scale of the opportunity with discipline and selectivity. Rigorous underwriting, a focus on operational excellence, and a clear understanding of technology and regulatory risk will be essential to capturing attractive, risk-adjusted returns in this dynamic environment.

Investment implications and recommendations

The convergence of AI and electricity is reshaping the investment landscape, creating both acute challenges and compelling opportunities. As demand for reliable, scalable, and low-carbon power accelerates, investors must navigate infrastructure bottlenecks, technology uncertainty, and market exuberance with discipline and selectivity.

Foundational power and efficiency investments—such as long-term Power Purchase Agreements (PPAs), grid upgrades, distributed energy resources, advanced cooling, and efficiency innovations—apply broadly to infrastructure supporting both training and inference data centers. For inference workloads, emphasize urban grid enhancements and network redundancy; for training, focus on transmission capacity and high-density hardware. Aligning capital with these differentiated needs helps balance innovation potential with stability and scalability.

Investors should include exposure to AI power themes in portfolios. Opportunities span public utilities, private infrastructure funds, hybrid private equity/private infrastructure funds, venture capital, and growth equity. In navigating these opportunities, investors will benefit from the six following priorities in helping to identify winning strategies and managers.

1. Prioritize enabling infrastructure

Investments in grid modernization, transmission upgrades, and advanced grid management technologies are essential to unlock new capacity and support the integration of renewables and distributed resources. Projects and platforms that can accelerate permitting, streamline interconnection, and deploy grid-enhancing solutions are positioned for premium returns. Many infrastructure projects offer multiple revenue streams, such as PPAs with data centers and utilities, and the ability to sell excess electricity back to the grid.

2. Target efficiency innovations

Efficiency improvements in grid operations and data center management offer attractive, risk-adjusted returns and can often be deployed more rapidly than large-scale generation projects. Investors should seek managers focused on companies and assets that leverage AI-driven optimization, advanced cooling, and modular design to reduce energy intensity and operating costs.

3. Embrace technology diversification

No single technology will solve the power challenge. Portfolios that combine renewables, storage, flexible generation, on-site solutions, and hybrid systems—tailored to local market conditions—will be best positioned to deliver reliable, cost-effective, and low-carbon power.

4. Account for regulatory uncertainty

Shifting policy, permitting requirements, technology standards, tariffs, domestic content rules for tax incentives, subsidies, and other regulatory incentives or deterrents can materially impact project timelines, costs, and returns. Investors should prioritize assets and managers with strong regulatory expertise, proactive risk management, and supply chain flexibility.

5. Monitor valuations and execution risk

Elevated valuations in certain segments—coupled with supply chain, permitting, labor, and regulatory challenges—require rigorous underwriting and operational due diligence. Investors should focus on managers and platforms with proven execution capabilities and a track record of navigating complex environments.

6. Stay alert to emerging opportunities

Advances in next-generation geothermal, SMRs, and hybrid systems are expanding the investable universe. Selective exposure to innovation, with a focus on scalability and cost competitiveness, can enhance long-term portfolio resilience.

Conclusion

In short, investors should focus on managers investing in:

- Generation assets with clear pathways to grid interconnection, strong utility partnerships, and regulatory support.
- Platforms and companies that combine multiple solutions—balancing cost, reliability, and decarbonization—and demonstrate operational excellence.
- Efficiency and enabling infrastructure as near-term levers for value creation.

Such managers should use the following risk controls:

- Maintain discipline on valuation and risk, especially in segments experiencing rapid capital inflows.
- Incorporate regulatory due diligence and scenario planning into investment processes, especially for projects in regions with evolving policy frameworks, tariffs, or complex incentive structures.
- Monitor and adapt to changes in domestic content requirements, tax incentives, and subsidy regimes to optimize project economics and compliance.
- Stay informed on policy, regulatory, and technology developments to anticipate shifts in market opportunity.

The winners in this new era will combine vision with discipline—deploying capital to solutions that enable the next wave of digital and energy growth, while managing risk in a rapidly evolving, policy-driven landscape. ■

Justin Hopfer and Graham Landrith also contributed to this publication.

Figure 4 Notes

The LCOE for large-scale projects combining generation and storage reflects system-level efficiencies, including shared infrastructure, improved energy management, and optimized capacity use. Nuclear LCOE estimates are based on Vogtle Units 3 (\$228/MWh, 2023) and 4 (\$169/MWh, 2024), reflecting a 30% cost reduction between units. Assumptions include ~2.2 GW total capacity, ~97% capacity factor, and a 70-year operating life, adjusted for inflation. Coal LCOE estimates are from Lazard's Analysis (Version 14.0), adjusted for inflation and excluding coal transport and storage costs. Fuel prices assumed: gas \$3.45/MMBTU, coal \$1.47/MMBTU, nuclear \$0.85/MMBTU, for year-over-year comparison. For gas combined cycle, coal, and nuclear, teal diamonds show the average marginal cost (including nuclear decommissioning) for existing US plants, using real-world data. Capacity factors and expenses reflect the top and bottom 25% of values; coal costs are assumed similar to gas and nuclear.

Index Disclosures

Morningstar Global Next Generation AI Index

The Morningstar Global Next Generation Artificial Intelligence Index is designed to deliver unparalleled, thematically pure exposure to leading-edge artificial intelligence technologies, including generative artificial intelligence and adjacent products and services, by drawing on the in-depth knowledge and forward-looking insights of Morningstar's equity research team.

MSCI US Index

The MSCI US Index is designed to measure the performance of the large- and mid-cap segments of the US market. With 626 constituents, the index covers approximately 85% of the free float-adjusted market capitalization in the United States.

MSCI US Utilities Index

The MSCI US Utilities Index is designed to capture the large- and mid-cap segments of the US equity universe. All securities in the index are classified in the Utilities sector as per the Global Industry Classification Standard (GICS®).

Copyright © 2025 by Cambridge Associates. All rights reserved.

This document, including but not limited to text, graphics, images, and logos, is the property of Cambridge Associates and is protected under applicable copyright, trademark, and intellectual property laws. You may not copy, modify, or further distribute copies of this document without written permission from Cambridge Associates ("CA"). You may not remove, alter, or obscure any copyright, trademark, or other proprietary notices contained within this document. This document is confidential and not for further distribution, unless and except to the extent such use or distribution is in accordance with an agreement with CA or otherwise authorized in writing by CA. The information and material published in this report is nontransferable. Therefore, recipients may not disclose any information or material derived from this report to third parties or use information or material from this report without prior written authorization unless such use is in accordance with an agreement with Cambridge Associates ("CA"). Nothing contained in this document should be construed as the provision of tax, accounting, or legal advice. PAST PERFORMANCE IS NOT A RELIABLE INDICATOR OF FUTURE RESULTS. ALL FINANCIAL INVESTMENTS INVOLVE RISK. DEPENDING ON THE TYPE OF INVESTMENT, LOSSES CAN BE UNLIMITED. Broad-based securities indexes are unmanaged and are not subject to fees and expenses typically associated with managed accounts or investment funds. Investments cannot be made directly in an index.

This performance report represents CA's estimates of investment performance, portfolio positioning and manager information including but not limited to fees, liquidity, attribution and strategy and are prepared using information available at the time of production. Historical results can and likely will adjust over time as updated information is received and processed. Estimated, preliminary, and/or proxy information may be displayed and can change with finalized information, and CA disclaims any obligation to update previously provided performance reports when such changes occur. This report is not intended as a Book of Record nor is it intended for valuation, reconciliation, accounting, auditing, or staff compensation purposes, and CA assumes no responsibility if the report is used in any of these ways.

The primary data source for information is the investment manager and/or fund administrator, therefore data may not match custodial or other client records due to differences in data sourcing, methodology, valuation practices, etc. Estimated values may include prior quarter end data adjusted by a proxy benchmark or by subsequent cash flows. In some instances, data may be sourced directly from a client and/or prior advisors or service providers. CA makes no representations that data reported by unaffiliated parties is accurate, and the information contained herein is not reconciled with manager, custodian, and/or client records. The nature of performance measurement is such that it is a best estimate of performance. As such, performance is displayed to a one decimal place level of precision, accommodating up to nine basis points (0.09%) of imprecision in reported returns. There are multiple methodologies available for use in the calculation of portfolio performance, and each may yield different results. Differences in both data inputs and calculation methodologies can lead to different calculation results.

As part of the reporting process, errors can and do occur. For the purpose of CA reports, an error represents any component of the performance report that is missing or inaccurate, including, but not limited to, composite returns and market values, manager returns and market values, benchmark returns, risk and other statistical measures, holdings and exposures. Errors can be a result of incorrect aspects of data, calculations, setup, software or may be a result of an omission, incorrect value, incorrect systematic computation, incorrect report production, and other similar reasons. For classification as an error, the item in question must be objectively incorrect according to the standard policies, procedures, and methodologies utilized by CA. Differences due to changes in methodology over time, the difference between preliminary and final data and other related changes do not constitute errors, but rather normal course of business for the reporting process. Though CA makes reasonable efforts to discover inaccuracies in the input data used in the performance report, CA cannot guarantee the accuracy and are ultimately not liable for inaccurate information provided by external sources. Clients should compare the values shown on our performance reports with the statements sent directly from their custodians, administrators or investment managers.

In the event that an error is discovered, CA will correct the error and maintain the most accurate information possible. In the event of a material error, CA will disclose the error to the report recipient along with an updated version of the report from the most recent period.

CA's performance report is intended to be offered as a standardized product. CA may be instructed by the client to customize aspects of the report outside of CA's standard policies and procedures. Deviating from CA's standard operating policies and procedures can compromise the quality of the report and increase the risk of error. Customization requests cannot be accommodated in all cases if it is deemed that necessary systems and controls are not in place to minimize errors or reduce the validity of the report. Customizations, including but not limited to, data sourcing, data input, calculation methodologies and report display are acknowledged by the recipient as potentially compromising to the quality of the deliverable and the recipient assumes the risk for any ensuing quality breaches as a result of these customizations.

Cambridge Associates is a global group of companies that provide investment management, investment advisory, research, and performance reporting services. For the purposes of this document "us", "the Firm", "our", "we", "CA", "Cambridge Associates", and similar terms refer collectively to the following list of companies. Similarly, unless otherwise stated the figures provided are the combined total for the following list of companies: Cambridge Associates, LLC (a registered investment adviser with the US Securities and Exchange Commission, a Commodity Trading Adviser registered with the US Commodity Futures Trading Commission and National Futures Association, and a Massachusetts limited liability company with offices in Arlington, VA; Boston, MA; Dallas, TX; New York, NY; and San Francisco, CA), Cambridge Associates Limited (a registered limited company in England and Wales, No. 06135829, that is authorized and regulated by the UK Financial Conduct Authority in the conduct of Investment Business, reference number: 474331); Cambridge Associates GmbH (authorized and regulated by the Bundesanstalt für Finanzdienstleistungsaufsicht ('BaFin'), Identification Number: 155510), Cambridge Associates Asia Pte Ltd (a Singapore corporation, registration No. 200101063G, which holds a Capital Market Services License to conduct Fund Management for Accredited and/or Institutional Investors only by the Monetary Authority of Singapore), Cambridge Associates Limited, LLC (a Massachusetts limited liability company with a branch office in Sydney, Australia, a registered investment adviser with the US Securities and Exchange Commission and registered in several Canadian provinces ARBN 109 366 654), Cambridge Associates Investment Consultancy (Beijing) Ltd (a wholly owned subsidiary of Cambridge Associates, LLC which is registered with the Beijing Administration for Industry and Commerce, registration No. 110000450174972), Cambridge Associates (Hong Kong) Private Limited (a Hong Kong Private Limited Company licensed by the Securities and Futures Commission of Hong Kong to conduct the regulated activity of advising on securities to professional investors), Cambridge Associates AG (a Swiss Limited Company, registration number CHE-115.905.353, that is authorized and Regulated by the Swiss Financial Market Supervisory Authority (FINMA), and Cambridge Associates (DIFC) Limited (incorporated as a Private Company and regulated by the Dubai Financial Services Authority, License Number: FO11237).