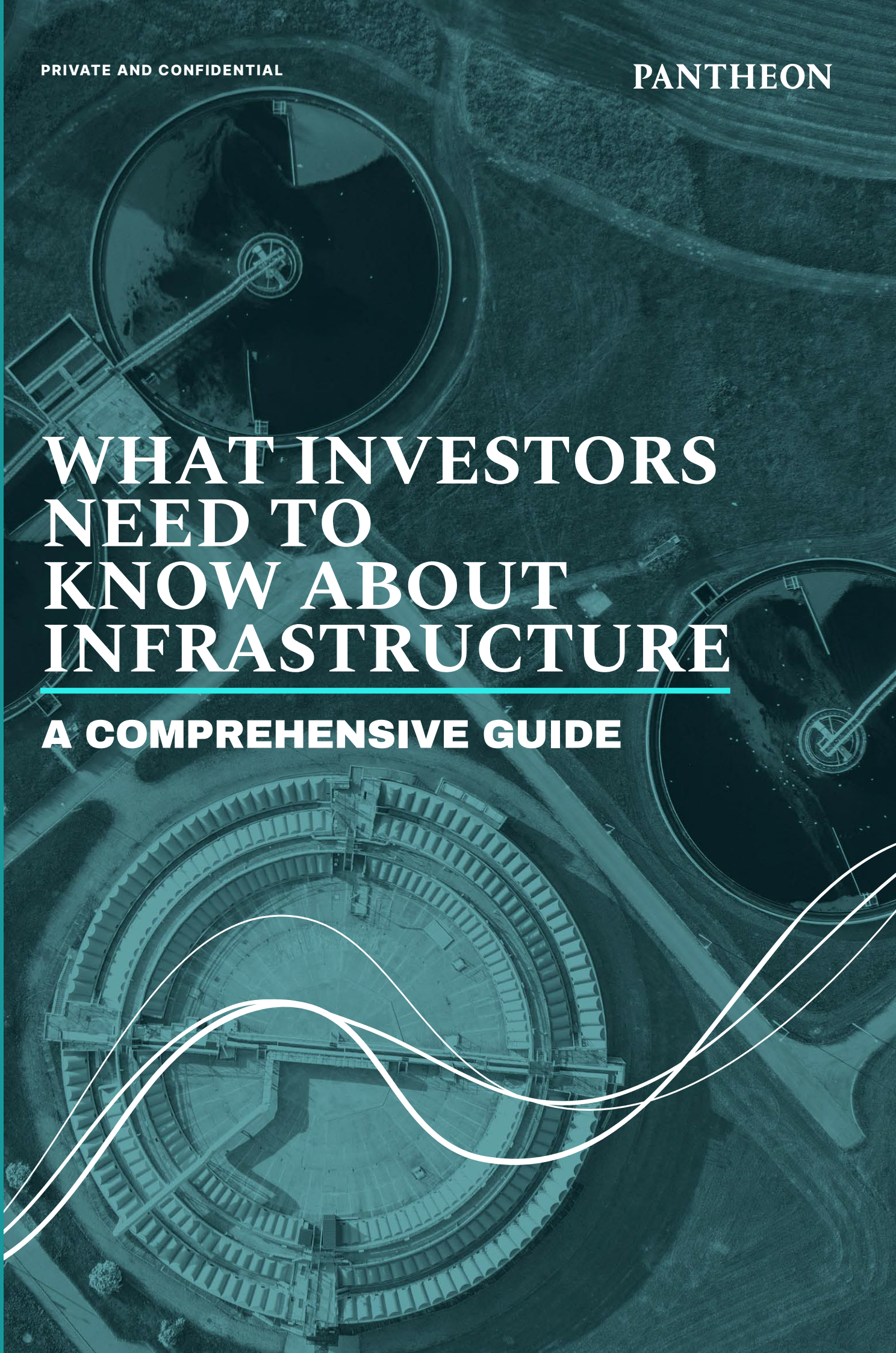
OCTOBER 2025

PRIVATE AND CONFIDENTIAL

PANTHEON

WHAT INVESTORS NEED TO KNOW ABOUT INFRASTRUCTURE

A COMPREHENSIVE GUIDE



Private infrastructure may offer investors access to long-term cash flows and can offer protection from inflation. As global trends such as decarbonization, digitization, and deglobalization reshape the investment landscape, infrastructure can stand out for its resilience, portfolio diversification benefits, and alignment with macroeconomic tailwinds.

KEY TAKEAWAYS

Infrastructure provides essential services across sectors like **transportation, utilities, digital infrastructure, and renewable energy.**

The asset class offers **attractive risk-adjusted returns and low volatility**, with historical outperformance over public benchmarks.

Infrastructure assets can serve as a **natural hedge against inflation** due to contractual inflation linkages.

Private infrastructure bridges the gap between private equity and private credit: it offers yield + inflation protection + stability, making it a valuable diversifier.

The rise of AI and clean energy is accelerating demand for digital and renewable infrastructure.

Secondaries offer liquidity, diversification, and enhanced return potential in a constrained exit environment.

Pantheon's platform provides **differentiated access, deep expertise, and a robust investment process** tailored to private wealth and institutional investors alike.

Introduction to the asset class

Infrastructure refers to the physical systems and facilities that support economic and social activity. These include transportation networks such as roads, airports, and railways; utilities like electricity, water, and waste management; digital infrastructure encompassing data centers and fiber networks; and renewable energy sources such as solar, wind, and hydro power.

In a portfolio context, infrastructure occupies a unique position between traditional fixed income and private equity. It can offer stable, long-duration cash flows with lower volatility than equities and higher return potential than bonds. The lifecycle of infrastructure assets can be categorized into three stages: Greenfield, Brownfield, and Secondary Stage.

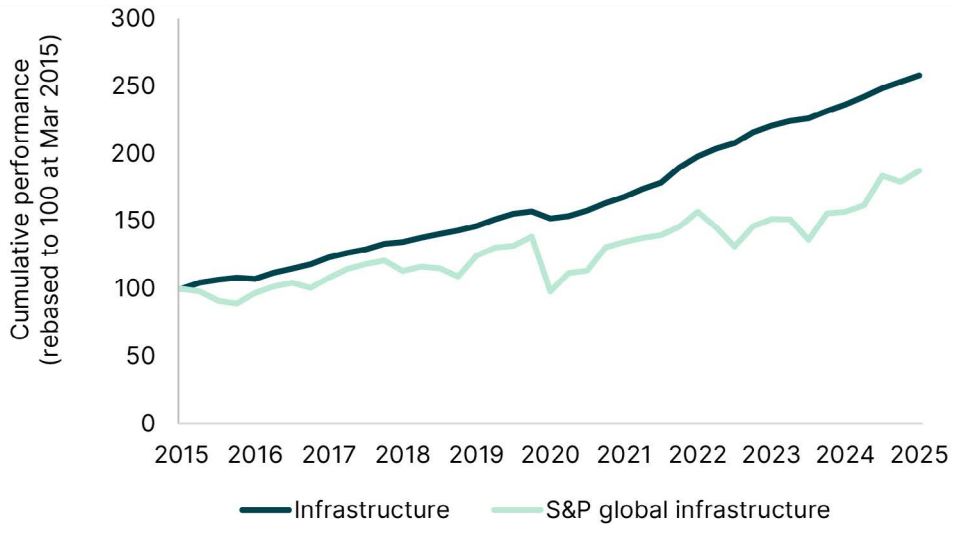
Greenfield projects involve new developments with higher risk due to construction and demand uncertainty. Brownfield investments target existing assets that require upgrades or expansion, offering moderate risk and partial cash flow. Secondary Stage investments focus on fully operational assets with established revenue streams and lower risk. The essential nature of infrastructure and its long-term contracts can make it a compelling allocation for investors seeking stability, income, and inflation protection.

The essentials of infrastructure investing

Historically, private infrastructure investments have consistently outperformed public benchmarks. As of March 31, 2025, the Preqin Infrastructure benchmark delivered a 10-year annualized return of 9.9%, compared to 6.5% for the S&P Global Infrastructure Index[1]. Infrastructure also exhibits the lowest annualized volatility among private market asset classes, aligning closely with direct private credit.

Figure 1:

Performance of Preqin Infrastructure vs S&P Global Infrastructure

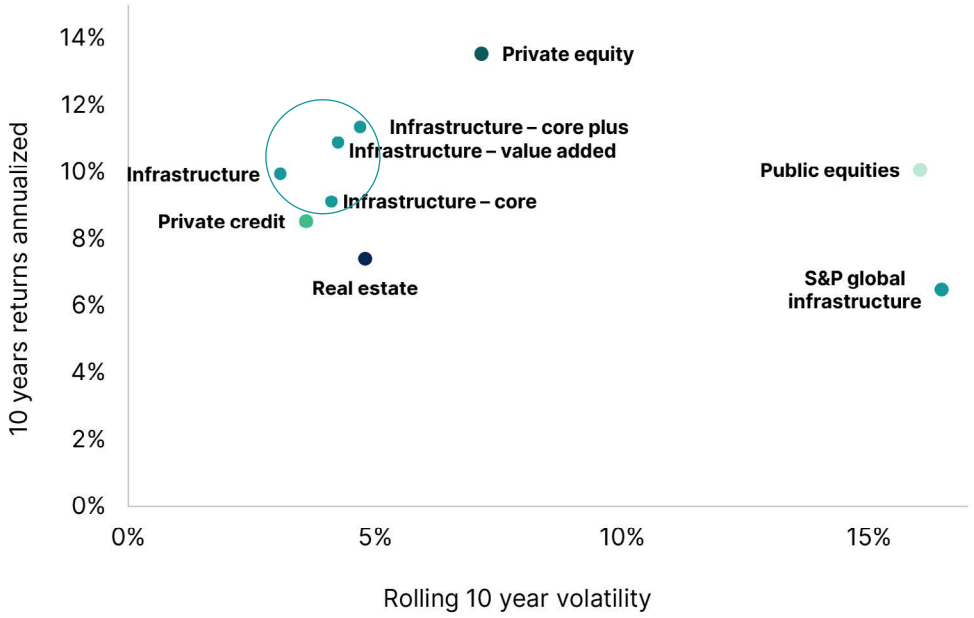


Source: Preqin as of March 31, 2025. Past performance is not indicative of future results. Future results are not guaranteed, and loss of principal may occur.

[1] Preqin, as of July 14, 2025.

Figure 2:

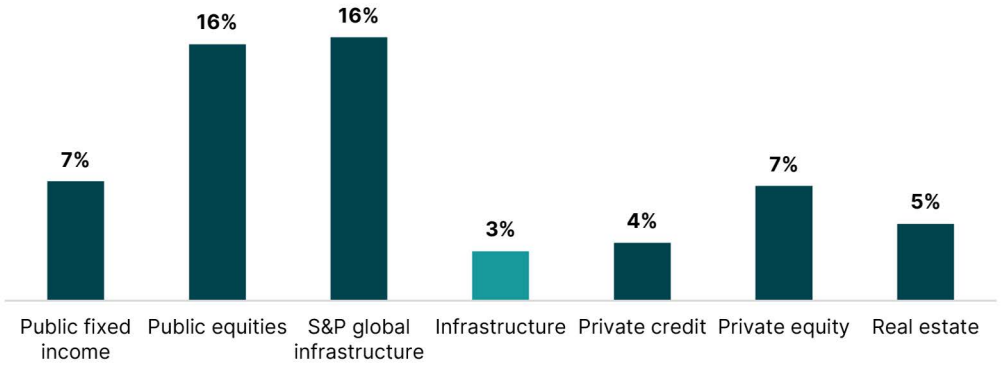
Risk and return profile by asset class



Source: Preqin as of March 31, 2025. Past performance is not indicative of future results. Future results are not guaranteed, and loss of principal may occur.

Figure 3:

10-year annualized volatility by asset class



Source: Preqin as of March 31, 2025. Past performance is not indicative of future results. Future results are not guaranteed, and loss of principal may occur.

How infrastructure fits into the private markets landscape

In the broader context of private markets, infrastructure plays a vital role in balancing risk and return. Private equity, while a powerful engine for growth, brings with it heightened volatility. Private credit, by contrast, offers yield with reduced volatility but remains susceptible to credit and interest rate cycles. Infrastructure sits strategically between the two, offering yield, inflation protection, and stability in one package. This makes it a potent diversifier, smoothing private equity's risk profile while reinforcing the income-generating characteristics of private credit. For investors navigating an increasingly complex macroeconomic landscape, infrastructure is certainly not a niche allocation; it has become a structural necessity[2].

In addition to the performance advantage of infrastructure, investors may find that allocations to the asset class – and other real assets such as real estate or transportation systems – offer protection against inflation. In a period when trade tensions, the threat of tariffs, and rising economic nationalism could pave the way for a more persistent inflationary environment, this may become increasingly valuable[3].

1. **Private equity**
gives the portfolio growth but brings higher volatility and less predictability.

2. **Private credit**
adds yield with lower volatility, but may be more sensitive to credit cycles and interest rate risks.

3. **Private infrastructure**
bridges the two: it offers **yield and inflation,** alongside **protection and stability**, making it a valuable diversifier.

[2] KKR, January 2025, "Private Infrastructure: An Asset Class for All Economic Conditions."
[3] JP Morgan Asset Management, January 2025, "Alternatives 2025 Outlook."

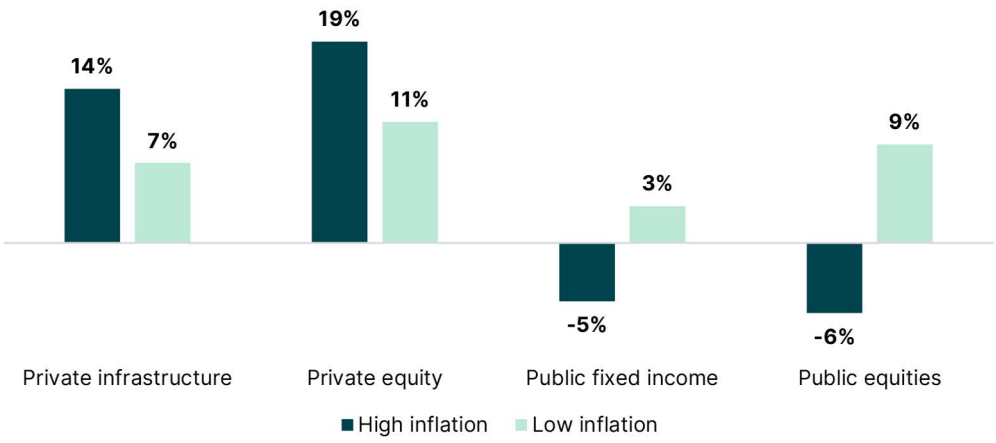
Accessing private infrastructure

Infrastructure assets may be effective hedges against inflation due to their built-in inflation linkages through regulated tariffs or long-term contracts. This characteristic can preserve real returns in rising rate environments. Portfolio construction in infrastructure can be accessed through various fund structures, including 40 Act funds and SICAVs, which offer regulated access for different investor types. Evergreen vehicles provide continuous exposure and liquidity, while secondaries enhance diversification and liquidity, especially in constrained exit environments.

Private infrastructure can offer a combination of inflation protection, income stability, and defensive resilience. Assets such as toll roads, utilities, and renewable energy projects often benefit from inflation-linked revenues, providing a natural hedge in an era of persistent price pressures. Unlike the capital-gain-driven nature of private equity, infrastructure investments typically deliver steady, contracted cash flows, making them a reliable income stream. Their lower sensitivity to economic cycles, particularly in essential services like water and electricity, adds a layer of defensiveness that can help insulate portfolios during downturns[4]. For investors seeking long-duration yield in a low or uncertain interest rate environment, the SICAV and 40-Act structures offer a semi-liquid gateway to these assets, appealing to ultra-high-net-worth individuals and private clients alike.

Figure 4:

During periods of higher inflation private infrastructure average annual returns remain positive when compared to fixed income and equities



Source: Preqin as of March 31, 2025. Time period: March 31, 2008 to March 31, 2025. "High Inflation" is defined as a quarter with annual U.S. inflation that is greater than one standard deviation from mean of the full time period. Past performance is not a guide to future results.

[4] KKR, January 2024, "Infrastructure: A Potential Shock Absorber."

Secondaries continue an upward trajectory

The secondaries market is gaining momentum, driven by investor demand for liquidity, portfolio flexibility, and access to high-quality assets. In 2024, transaction volumes hit a record $160 billion, reflecting a broader shift in how institutional capital is managed across private markets[5].

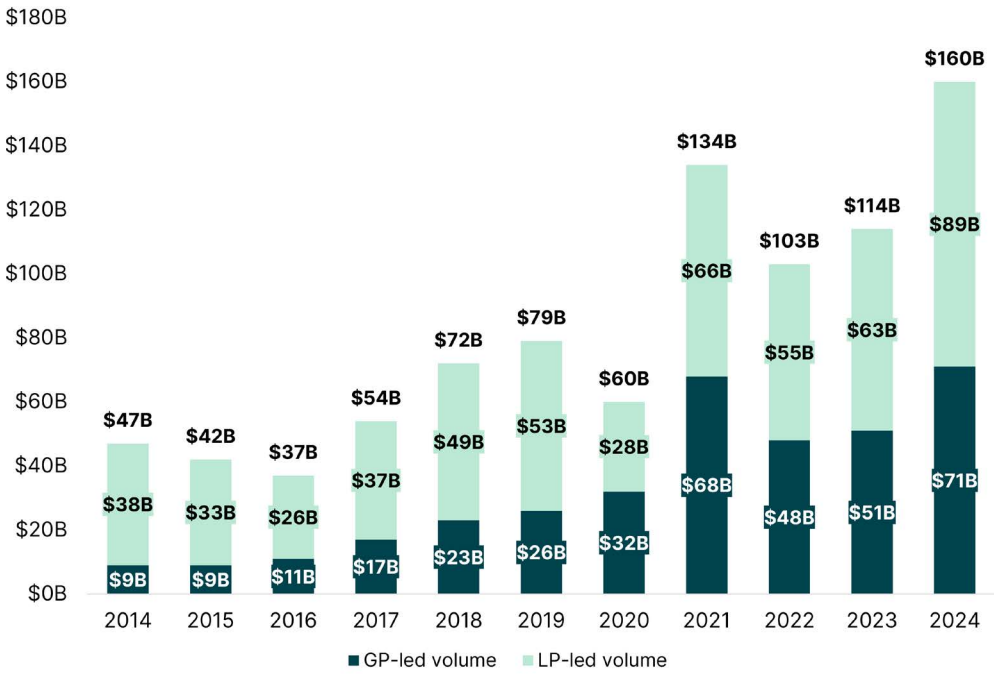
LP-led deals, where investors sell stakes in private equity funds, remain the largest segment. These transactions allow limited partners to rebalance portfolios and free up capital, while buyers gain exposure to mature assets at attractive valuations. The growing sophistication of LPs is fueling continued growth in this space.

GP-led transactions are also on the rise. Fund managers are increasingly turning to continuation vehicles to hold onto high-performing assets while offering liquidity to existing investors. A backlog of sponsor-owned companies, delayed by market uncertainty, is expected to drive further activity as firms seek more strategic exit routes.

Infrastructure secondaries are emerging as a standout niche. These deals offer early distributions, discounted entry points, and access to operational assets with known performance. Infrastructure also brings portfolio benefits – lower volatility, steady income, and diversification – making it a valuable complement to private equity and private credit.

As secondaries evolve, they are becoming a central tool for investors navigating a more complex and selective private markets environment.

Figure 5:
Secondaries transaction volume ($bn)



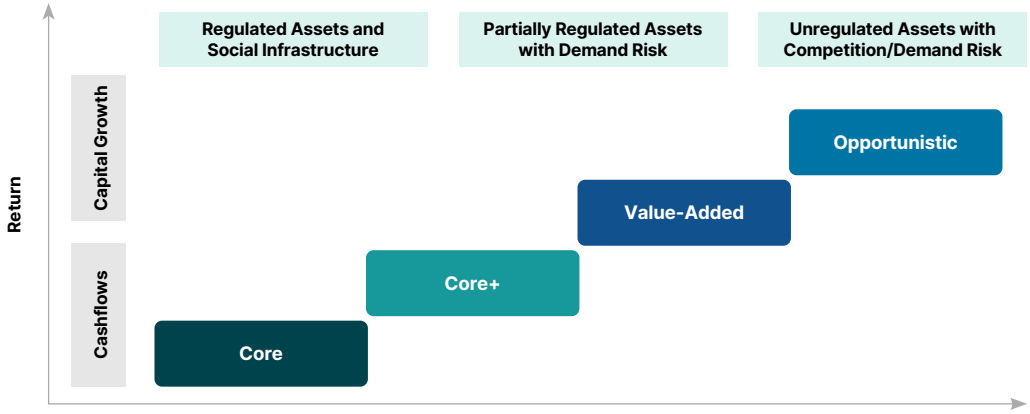
Source: Evercore, July 2025, "H1 2025 Secondary Market Review."

[5] Evercore, July 2025, "H1 2025 Secondary Market Review."

Investment strategies

- **Core** infrastructure assets target essential, low-risk assets in developed markets with stable cash flows and monopoly-like positions.
- **Core-plus** investments sit between Core and Value Add strategies in terms of risk and return. They typically offer moderate risk and return characteristics, blending the stability of Core assets with some elements of growth or operational complexity. They are likely to be essential services or facilities – including toll roads, midstream energy assets, airports or ports, fiber networks, and district energy plants – with moderate operational risk and that provide steady cash flows but with some potential for upside through active management, operational improvements, or limited development exposure.
- **Value Add** strategies target typically transitional or under-optimized assets where active management – such as via operational improvements, strategic repositioning, or technology upgrades – can create significant value. These may present moderate-to-high risk (often exposed to market risk, volume risk, or development risk), and are targeted by investors seeking capital appreciation alongside cash yield.
- **Opportunistic** investments involve high-risk, high-return projects that may require full development or unproven technologies. Debt strategies involve senior loans to infrastructure assets, offering lower risk due to priority in the capital structure.

Figure 6:
Risk and return profile by strategy



Source: Jefferies, January 2025, "Global Secondary Market Review."

Infrastructure evergreen strategies can be particularly well-suited to private wealth investors. These strategies offer stable income and inflation protection, which aligns with long-term wealth preservation goals. Evergreen structures provide flexibility and access without the illiquidity inherent in traditional closed-end funds. Diversification across sectors, geographies, and stages reduces portfolio risk, making infrastructure an attractive option for private wealth portfolios.

Current market trends: the “Three Ds”

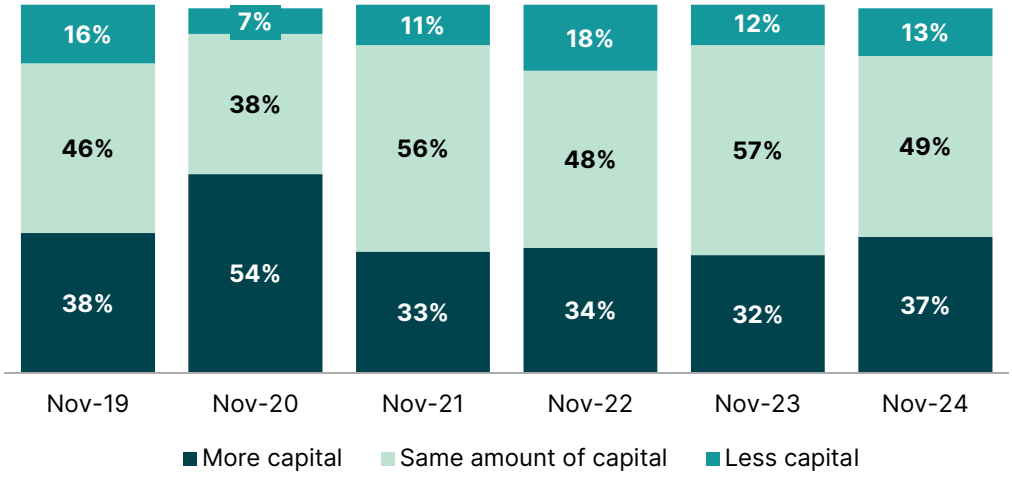
Decarbonization, digitization, and deglobalization are three key trends reshaping the infrastructure investment landscape. The global energy transition is driving unprecedented investment in renewables. In 2024, clean power surpassed 40% of global electricity generation for the first time since the 1940s. Solar and wind outpaced hydropower, with solar growing 6.9% and wind 8.1%. Clean generation met all non-temperature-related electricity demand growth, despite a 1.6% rise in emissions due to hotter weather.[6]

AI is reshaping infrastructure demand, with the number of AI models and their complexity growing exponentially. Models now contain billions to trillions of parameters, driving demand for data centers, which already account for 3% of global power usage. The resulting strain on energy infrastructure is creating new investment opportunities in both digital and traditional power assets.[7]

Geopolitical shifts are prompting a move toward localized infrastructure. Supply chain realignment and regionalization are increasing demand for domestic logistics, energy, and digital networks. Infrastructure strategies must now account for regional nuances and regulatory divergence.

Figure 7:

Investors plan to commit more capital to infrastructure in the next 12 months



Source: Preqin, February 2025, “Investor Outlook: H1 2025.”

[6] Ember, April 2025, “Global Electricity Review 2025.”

[7] Our World In Data; Data as of March 2025. Parameters are variables adjusted during AI training. Neural networks are AI models with layers of nodes, inspired by the brain, used for tasks like image recognition and language processing.

AI in infrastructure investing

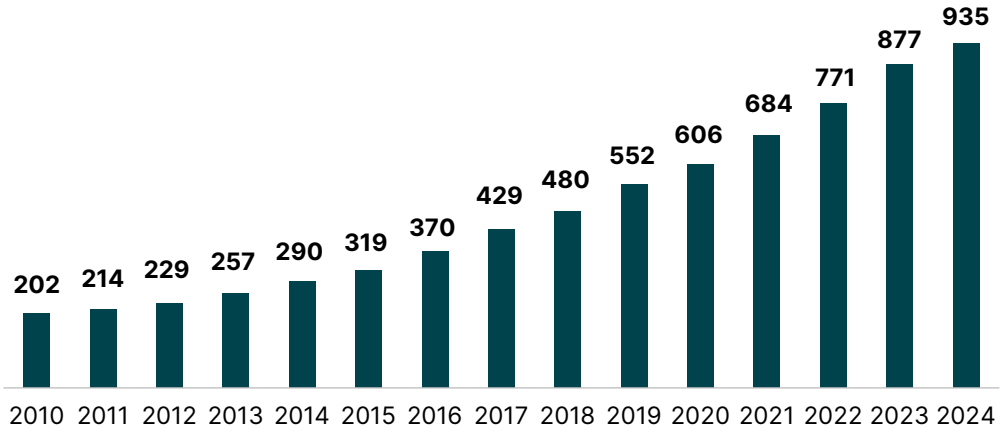
The increasing complexity of AI is putting greater pressure on energy infrastructure. Large-scale AI models, with billions or trillions of parameters, require significant resources for management and training.

Both digital and traditional infrastructure are seeing a significant rise in demand for AI. This demand is driving the need for more data centers, which in turn is putting upward pressure on current energy infrastructure[8].

The growing number of data centers required to support AI models is creating new investment opportunities in energy infrastructure and investors must consider the balance between performance gains and the associated energy costs when evaluating AI-driven infrastructure projects.

Figure 8:

The growing number of AI models deployed globally

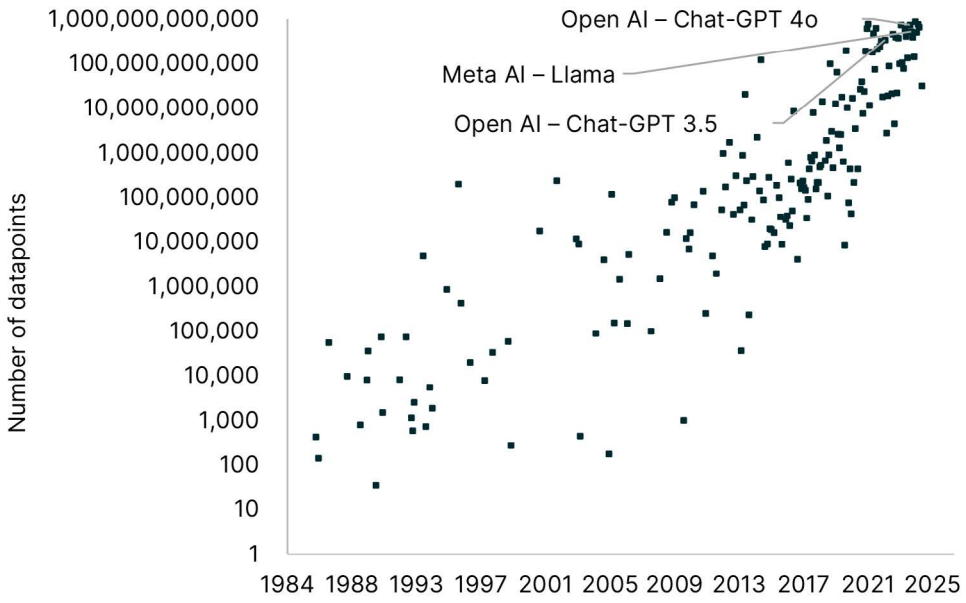


Source: Our World in Data; Data as of March 2025. Number of released AI models.

[8] McKinsey & Company, September 2024, "How data centers and the energy sector can sate AI's hunger for power."

Figure 9:

Increasing complexity of AI is putting greater pressure on energy infrastructure



Source: Our World In Data; data as of March 2025. Parameters are variables adjusted during AI training. Neural networks are AI models with layers of nodes, inspired by the brain, used for tasks like image recognition and language processing.

The graph above illustrates the amount of training datapoints needed for the most complex generative AI models. Each of these parameters help the model to make more accurate predictions. As the chart displays, the AI models we are most familiar with in our day-to-day lives require exponentially more datapoints than they did even a few years ago. The more datapoints used in model training, the more complex the model, and the more energy required.

Between 2021 and 2024, the number of AI models only increased by 150. However, the complexity of those models surged. And therefore, it requires greater energy usage, putting even more pressure on data centers and power grids globally.

Forecasting the energy demands of AI

As AI models get more complex, the global race to scale AI is also colliding with a more straightforward constraint: electricity. As we have seen above, the technology is becoming more complex and ubiquitous, and with that comes a mounting pressure on the infrastructure supporting this technology. Data centers, in particular, are under increasing strain to keep pace with AI's energy demands.

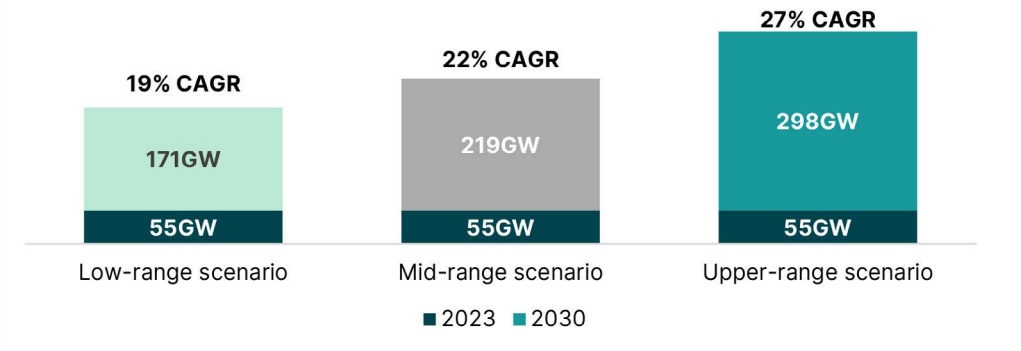
New modelling by McKinsey suggests that, even under conservative assumptions, global data center power consumption could triple by the end of the decade, growing annually by 19–22%.

The report outlines three scenarios – lower, middle, and upper – which all look at how quickly AI is adopted, how energy-efficient the chips are, and where the computational load is processed. If AI uptake accelerates

and hardware efficiency lags, the sector could be drawing nearly 300 gigawatts (GW), more than five times today's 55 GW baseline. This potential surge raises the prospect of a significant supply gap. Meeting the upper-bound forecast would require building more data center capacity in five years than has been added globally in the past quarter-century.[9]

Figure 10:

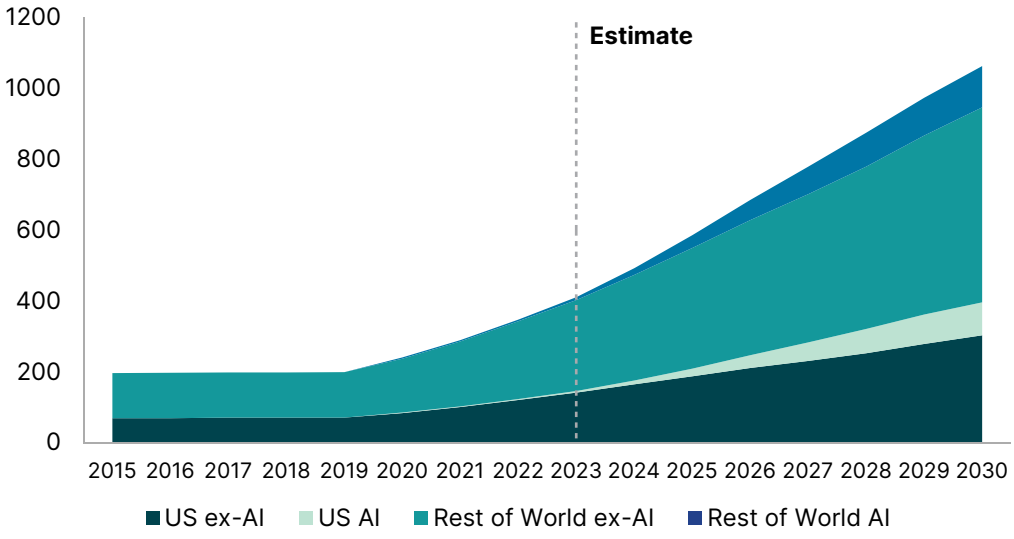
Forecasted energy usage by scenario



Source: McKinsey Data Center Demand model, McKinsey & Company Goldman Sachs Research, Masanet et al. (2020), Cisco, IEA.

Figure 11:

Data center power demand, TWh



Source: McKinsey Data Center Demand model, McKinsey & Company Goldman Sachs Research, Masanet et al. (2020), Cisco, IEA.

[9] McKinsey & Company, October 2024, "AI power: Expanding data center capacity to meet growing demand."

Renewables

The year 2024 saw a record increase in renewables, driven by a surge in solar power, a rebound in hydropower, and moderate wind growth. Hotter temperatures amplified electricity demand, leading to a small rise in fossil generation (+1.4%). Power sector emissions also increased by 1.6%, reaching a record high of 14.6 billion tons of CO_2.

Clean generation rose quickly enough to meet non-temperature-related growth in electricity demand. Clean power surpassed 40% of global electricity generation for the first time since the 1940s. Solar power and increased nuclear output pushed clean electricity's share to 40.9% in 2024, up from 39.4% in 2023.

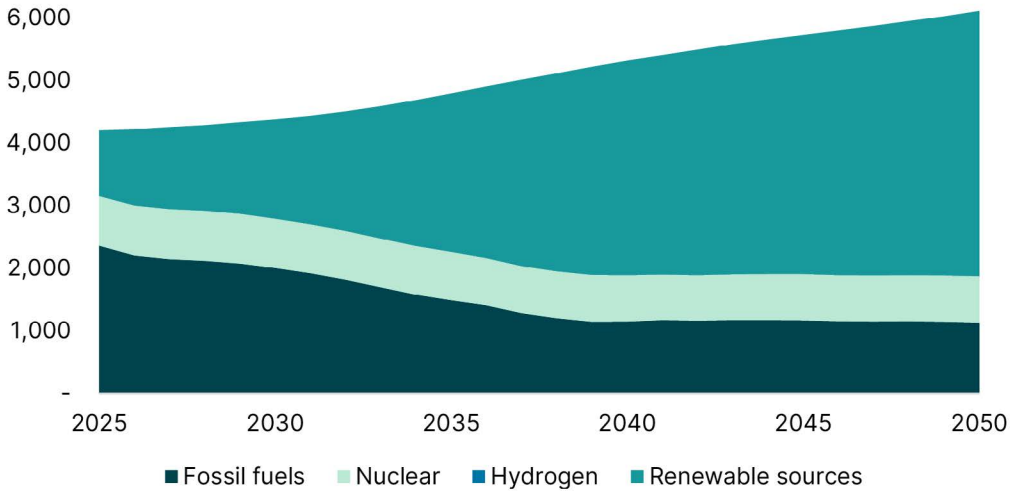
Wind and solar growth exceeded hydropower for the first time in 2024, with wind growing 8.1% and solar 6.9%.

Hydro remained the largest source of clean electricity (14.3%), followed by nuclear (9.0%). As the share of renewable energy usage increases, battery storage is playing a significant role in reducing the intermittency of these variable energy sources, storing excess energy during periods of high generation and releasing during periods of high demand. Thus improving overall supply stability of renewable energy. Other renewables, such as bioenergy and geothermal power, contributed 2.6% of global electricity in 2024[10].

The surge in renewables is creating new investment opportunities in clean energy infrastructure. Investors must consider the balance between renewable growth and the associated emissions when evaluating clean energy projects.

Figure 12:

Forecasted generation by fuel type (GWh) energy usage by type



Source: McKinsey Data Center Demand model, McKinsey & Company Goldman Sachs Research, Masanet et al. (2020), Cisco, IEA.

[10] Ember, April 2025, "Global Electricity Review 2025."

Pantheon is a global private markets investment firm with a **40-year heritage** of generating returns for clients across private equity, private credit, infrastructure, and real estate markets. Founded in 1982, it now has assets under management of **$76 billion** (as of March 31, 2025), and more than **130 investment professionals** operating across **12 offices on four continents.** This global investment platform provides the scale and extensive, long-term relationships to deliver significant informational and sourcing capabilities across **primaries, secondaries, and co-investment strategies** while retaining a market-leading position focused on the private markets.

IMPORTANT DISCLOSURE

This publication has been prepared solely for illustration, educational, and/or discussion purposes. It does not constitute independent research and under no circumstances should this publication or the information contained in it be used or considered as an offer, inducement, invitation, solicitation, or recommendation to buy or sell any security or financial instrument or service or to pursue any investment product or strategy or otherwise engage in any investment activity or as an expression of an opinion as to the present or future value or price of any security or financial instrument. Nothing contained in this publication is intended to constitute legal, tax, securities, or investment advice.

This publication may include "forward-looking statements". All projections, forecasts, or related statements or expressions of opinion are forward-looking statements. Although Pantheon believes that the expectations reflected in such forward-looking statements are reasonable, it can give no assurance that such expectations will prove to be correct, and such forward-looking statements should not be regarded as a guarantee, prediction, or definitive statement of fact or probability.

Pantheon has taken reasonable care to ensure that the information contained in this document is accurate at the date of publication. However, no warranty or guarantee (express or implied) is given by Pantheon as to the accuracy of the information in this document, and to the extent permitted by applicable law, Pantheon specifically disclaims any liability for errors, inaccuracies, or omissions in this document and for any loss or damage resulting from its use. Unless stated otherwise, any opinions expressed herein are current as of the date hereof and are subject to change at any time. Unless stated otherwise all views expressed herein represent Pantheon's opinion.

This document is distributed by Pantheon, which is comprised of operating entities principally based in San Francisco, New York, London, Dublin, Hong Kong, and Tokyo. Pantheon Ventures Inc. and Pantheon Ventures (US) LP are registered as investment advisers with the U.S. Securities and Exchange Commission ("SEC") and Pantheon Securities LLC, is registered as a limited purpose broker-dealer with the SEC and is a member of the Financial Industry Regulatory Authority ("FINRA") and the Securities Investor Protection Corporation ("SIPC"). Pantheon Ventures (UK) LLP is authorized and regulated by the Financial Conduct Authority (FCA) in the United Kingdom. Pantheon Ventures (Ireland) DAC is regulated by the Central Bank of Ireland ("CBI"). Pantheon Ventures (HK) LLP is regulated by the Securities and Futures Commission ("SFC") in Hong Kong.

The registrations and memberships described above in no way imply that the SEC, FINRA, SIPC, FCA, the SFC have endorsed any of the referenced entities, their products or services, or this material.