Infrastructure: A Primer

What is Infrastructure Investing?

Infrastructure provides essential services whose value is derived from their utility. Infrastructure investing is a real assets investment strategy to finance the construction, purchase or upgrade of assets that help distribute people, goods and resources across global economies.

While infrastructure shares some traits with real estate, such as investment in physical, often permanent structures, it has distinct attributes and is a separate sector within real assets. Key transactional sectors in infrastructure include economic infrastructure like: power, energy, data/communication, transportation and logistics, environmental services, water and waste management, and, to a lesser extent for private investment, social infrastructure.

Infrastructure investments generally seek to provide steady returns across a wide variety of economic conditions, often through long-term contracted cash flows, typically offering total returns that include both capital appreciation and income.

WHAT YOU SHOULD KNOW:

- Infrastructure is a real assets investment strategy whose assets are essential for the distribution of people, goods and resources across global economies and the functioning of society and commerce.
- Infrastructure sectors include: traditional and renewable power, data/communication, transportation and logistics, environmental, and water and waste.
- Infrastructure has historically performed well across cycles and may exhibit attractive benefits such as low volatility, downside protection and inflation protection.

Economic vs. Social Infrastructure

Infrastructure is a crucial driver of economic growth and sustainable development. Both rapidly urbanizing emerging economies and developed countries with aging infrastructure exhibit significant demand for infrastructure investment. This demand spans a wide spectrum, generally categorized into social and economic infrastructure. Across both, the underlying sectors targeted by infrastructure investors have been relatively consistent.

Social infrastructure, as the name implies, refers to assets that provide social or public goods, such as hospitals, schools and parks. Governments typically fund these services directly, while users pay indirectly through taxes. Social infrastructure assets go beyond economic value and enhance communities and provide for society's functioning.

Economic infrastructure involves assets where users pay directly for services, such as airports, power plants, and telecommunications. Compared to social infrastructure, this category offers a broader investible opportunity set.

Private Infrastructure Sectors

Focus Sectors	Opportunities	Challenges
Power Generation	• Strong long-term drivers for renewable generation, transmission and distribution • Deep value and high cash yield opportunities exist in more traditional power assets	• Supply chain issues, construction cost escalation, project delays and grid constraints continue to pose a challenge to new projects • Valuations creeping up on platforms with significant development exposure
Energy Infrastructure	• Liquid natural gas (LNG) export to become a major theme as countries seek energy independence • Water delivery, treatment, storage and transportation infrastructure still required • Early days for carbon capture	• Traditional energy has received a boost due to the pickup in natural gas demand in certain markets; however, exit appetite must be considered
Transportation and Logistics	• Electrification of personal and public transportation opportunity growing and diversifying	• Demand and volume risk could introduce volatility to income profiles • Original equipment manufacturer (OEM) universe can be more limited than traditional transport, which introduces additional supply chain pinch points
Data/ Communications	• Artificial intelligence (AI) has potential to supercharge demand requirements • Potential applications of AI may break down gridlock barriers	• Valuations remain elevated; construction and permitting delays continue to hamstring data center capacity expansion
Environmental	• Energy-from-Waste (EfW) continues to grow as landfills become constrained • Water availability may become increasing issue in markets not associated with droughts, e.g., Europe, which may drive volume	• Regulations hinder new development • Battles between regulators and investors to ensure stable regimes that incentivize capex spend

Hamilton Lane Investment Principles

- Entry price defined by attractive, relative value
- Cash flow streams underpinned by recurring, contracted revenues
- Assets with diversified, credit-rated counterparties
- High barriers to entry created by high capex, pricing power, market or other regulatory constraints
- Low risk of technological disruption
- Limited commodity price, merchant or cyclical volume risk
- Limited development risk
- Upside driven by platform growth, operational improvements, re-contracting, and/or execution of pre-contracted, success-based capex programs

Private infrastructure investments can create, enhance and extend the utility of economic and social functions across multiple sectors. Whether it's building new infrastructure from the ground up or optimizing existing infrastructure to improve its long-term value, investments into different infrastructure sectors can provide long-term return potential. The underlying sectors within economic infrastructure include: power, energy, data/communication, transportation and logistics, environmental, water and waste.

- **Power** includes both traditional and renewable assets, consisting of the systems necessary to generate, transmit and distribute electricity to users.
- **Energy** sits adjacent to the power sector due to power generation sources. Energy infrastructure usually refers to midstream assets but can also include upstream assets. Midstream assets, such as pipelines, refineries and storage facilities, connect upstream producers that extract and refine energy with downstream consumers.
- **Transportation** facilitates the movement of people and goods. Examples of transportation assets include: airports, seaports, railways, buses, toll roads and bridges.
- **Data and Communication** infrastructure refers to the technology and networks that allow broadcasting and telecommunication services. Examples include: cell towers, satellites, fiber optic cable systems, data centers and the wireless spectrum.
- **Water and Waste** infrastructure includes the supply, treatment, and storage of water and facilities for waste collection and its conversion to energy, recycling, or composting.

Why Invest in Infrastructure?

Infrastructure is often considered with other private asset classes in a portfolio. It stands out due to three distinct attributes that make it a differentiated and compelling investment: low elasticity, high barriers to entry and often long-term contracted cash flows with inflation hedges.

1. **Low Elasticity:** These assets are typically large, fixed, and long-term, providing essential services with relatively inelastic demand. Their mission-critical nature makes them less sensitive to the business cycle compared to public equities and fixed income.
2. **High Barriers to Entry:** Infrastructure assets often face limited competition, which may lead to monopolistic or duopolistic market positions. Often difficult to replace due to regulatory requirements or physical constraints, by nature they are resilient to economic fluctuations.
3. **Inflation Hedges and Cash Flows:** Infrastructure assets often generate cash flows linked, directly or indirectly, to inflation, serving as a hedge against inflationary pressures. Income potential can be predictable and steady, supported by long-term contracts with high-credit-quality counterparties in the public or private sector. Contracted price escalators tied to indices like the Consumer Price Index or Producer Price Index provide additional protection against inflation impacts on revenue.

These attributes collectively contribute to making infrastructure an attractive investment, offering stability, predictability, and potential for inflation-adjusted returns.

Greenfield vs. Brownfield Infrastructure

Another valuable metric for evaluating infrastructure opportunities is to classify assets based on their development stage: greenfield or brownfield.

Greenfield infrastructure involves developing entirely new assets from scratch. Greenfield investments typically involve higher risk compared to brownfield investments but can offer potential for higher returns, depending on the underlying risks being assumed. Risks often stem from the pre-construction phase and physical construction of the asset. Uncertainty about the project's ultimate completion can arise during the permitting process, which includes regulatory approvals, right-of-way issues, environmental permits, and more, potentially jeopardizing committed capital even before construction begins. Construction risks involve potential delays and cost overruns, which can be mitigated through fixed-price contracts with set timelines between developers and contractors. Further, new assets may be exposed to merchant risk[1] if their revenues are not pre-contracted at the time of creation.

Brownfield infrastructure on the other hand, refers to established assets generating cash flows with minimal operational capital expenditure required to maintain operations. Brownfield rehabilitation infrastructure involves existing assets which may need significant capital investment to enhance or restore operations, but still enjoy certain barriers to entry or market position.

The Infrastructure Lifecycle

As infrastructure assets progress from greenfield to brownfield, investment risks typically decrease, while capital requirements increase.

Greenfield infrastructure assets start as concepts that developers design and plan before undergoing pre-construction permitting and approval processes. At this stage, developers invest relatively little capital relative to the project's full cost and are often focused on acquiring land, completing feasibility and environmental studies, and procuring entitlement and regulatory approvals.

At this stage, risks for investors are high and outcomes are often binary, meaning if a project fails to receive all necessary approvals, any capital invested up to that point is significantly at risk, if not rendered valueless.

Once a project secures the necessary approvals, it moves into the construction phase, requiring substantial additional capital to cover construction costs. Although still classified as a greenfield asset, the risks, particularly the binary risks that could completely halt the project, are considerably reduced compared to the earlier stages. Construction risks at this stage are primarily related to project delivery, so investors' returns can be affected if the project goes over budget or falls behind schedule. However, certain construction risks can be mitigated contractually.

Projects for which investors assume all early stage and construction risks are often considered greenfield. However, if most of these risks have been mitigated, they may be classified as brownfield. When the project is complete and operations commence, the asset fully transitions to brownfield infrastructure.

[1]Merchant risk refers to the exposure faced by investors in private infrastructure projects that sell energy or services directly into the market, instead of relying on fixed-price contracts or regulatory incentives.

Infrastructure Risk Types

The risk classification categories—Core, Core-Plus, Value-Add, and Opportunistic—apply to both real estate and infrastructure investments. These categories offer distinct risk/return profiles, incorporating factors such as return potential, leverage, and holding periods that vary across different infrastructure sectors.

Diversifying capital across these categories can assist investors in managing their portfolios and navigating the evolving landscape of infrastructure investments. But investors should carefully evaluate their risk tolerance, investment time horizon, and their overall portfolio composition before investing.

Infrastructure Risk Categories

	Core	Core-plus	Value-Add	Opportunistic
Net IRR Targets	6-8%	8-10%	10-12%	12-15%
Income Targets	3-6%	3-5%	0%-4%	0%
Investment Profile	• Modest capital appreciation • Stable, predictable cash flows, supported by long-term contracts	• Higher capital appreciation than Core, but regular cash flow remains important • May have uncontracted revenues and may require some level of growth capex, making them more sensitive to economic cycles	• Usually require significant operational enhancements or growth capex • Primarily focused on increasing value through operational improvements, accretive acquisitions or asset expansions	• Requires significant capital and operational enhancements to generate regular cash flows • May have uncertain revenue streams due to merchant or commodity exposure
Greenfield vs. Brownfield	Brownfield with long-term, creditworthy contracts	Mainly brownfield	Brownfield or greenfield with lower quality contracts and counterparties	Greenfield development or pre-commercialization or distressed assets
Typical Holding Period	7-10+ years	5-7 years	4-6 years	3-5 years

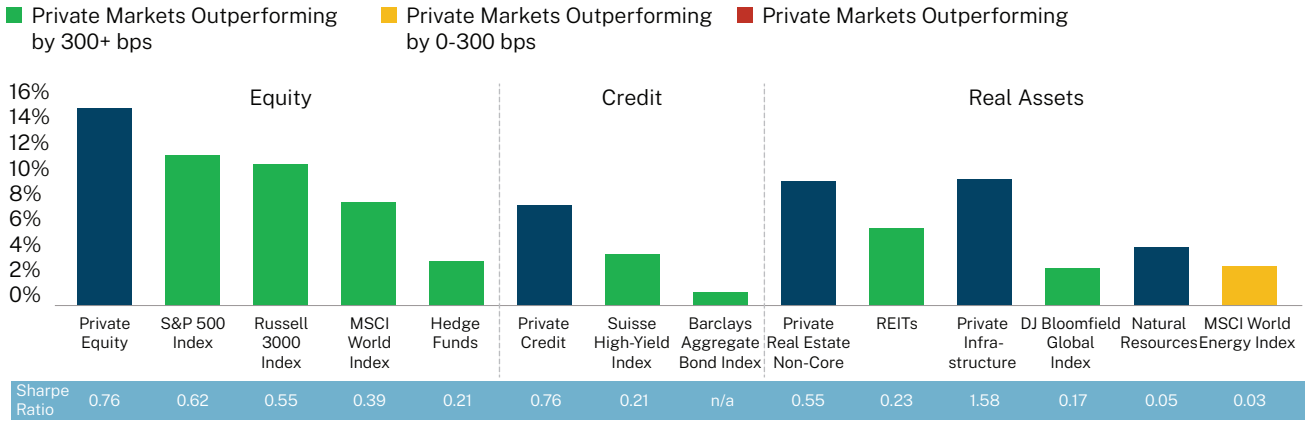
Please note the yield profiles displayed are general and for illustration only. No returns are guaranteed.

Infrastructure Performance

Infrastructure's economic and social benefits drive this asset class's historically strong performance. On a 10-year risk-adjusted basis, infrastructure has consistently outperformed its public market equivalents (PMEs), including real estate investment trusts (REITs) and the DJ Brookfield Global Infrastructure Index. In fact, infrastructure has generated strong returns over the long term (10+ year timeframes), with much less volatility than other private markets sectors. This has led to a Sharpe ratio of more than double the next-best category[2]. (The Sharpe Ratio is the average return earned in excess of the risk-free rate per unit of volatility or total risk).

10-Year Asset Class Risk-Adjusted Performance

Annualized Time-Weighted Returns as of September 30, 2023

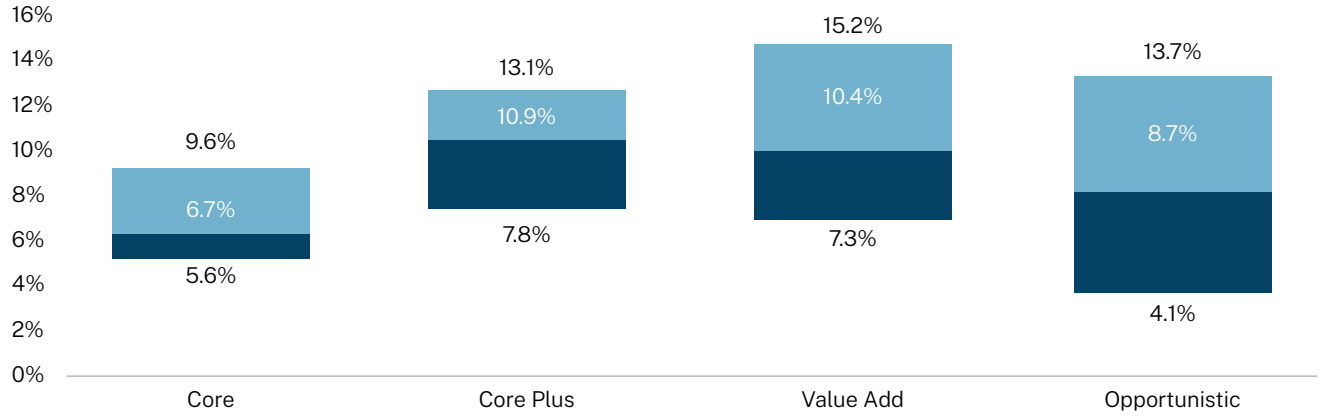


Source: Hamilton Lane Data via Cobalt, Bloomberg. Indices used: Hamilton Lane All Private Equity with volatility de-smoothed; S&P 500 Index; Russell 3000 Index; MSCI World Index; HFRI Composite Index; Hamilton Lane Private Credit with volatility de-smoothed; Credit Suisse High Yield Index; Barclays Aggregate Bond Index; Hamilton Lane Private Real Estate with volatility de-smoothed; Hamilton Lane Private Infrastructure with volatility de-smoothed; Hamilton Lane Private Natural Resources with volatility de-smoothed; FTSE/NAREIT Equity REIT Index; DJ Brookfield Global Infrastructure Index; MSCI World Energy Sector Index. Geometric mean returns in USD. Assumes risk free rate of 2.3%, representing the average yield of the ten-year treasury over the last ten years. (January 2024)

Returns and dispersions differ among infrastructure sub-strategies. The chart below shows that Core Plus and Value Add offer the highest median returns and attractive dispersions relative to core and opportunistic.

Sub-Strategy Fund Return Dispersion

2004-2020 Vintages – 25th to 75th Percentile



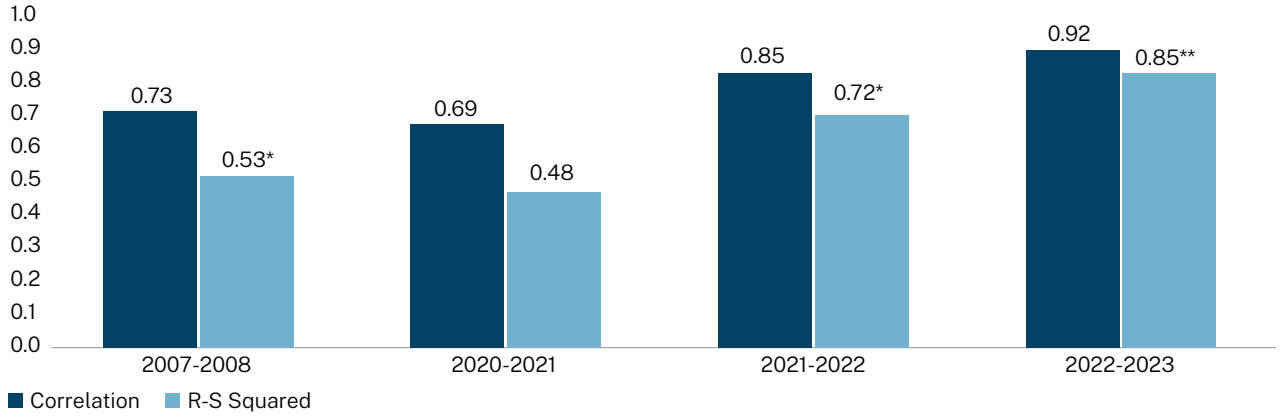
Source: Hamilton Lane Data via Cobalt as of December 31, 2023

[2]Source: Hamilton Lane Data via Cobalt

Infrastructure tends to positively correlate with higher inflation. Contracts may include price escalators, transferring inflation-sensitive costs to the end user instead of the developer or investor. Because infrastructure assets are economically and socially essential, they possess pricing power. Regardless of market conditions, they generally maintain demand inelasticity and can keep up with inflation by passing additional costs to consumers.

Infrastructure During Periods of Significant Inflation Shifts

1Y Rolling Fund Returns Show Positive Correlations to Rising CPI



Source: Hamilton Lane Data via Cobalt as of December 31, 2023
*p <0.05, **p <0.01

Value Creation by Sector

Sector	Deal Count	Value Creation			EBITDA Growth Decomposition	
		EBITDA Growth	Multiple Expansion	Debt Paydown	Revenue Growth	Margin Change
Environment	30	63%	32%	-17%	91%	9%
Other	27	121%	18%	-58%	121%	-21%
Power & Energy	113	60%	37%	-10%	77%	23%
Renewables	57	104%	19%	-11%	92%	8%
Telecom	59	92%	65%	-13%	85%	15%
Transportation	81	116%	16%	-30%	79%	21%
Average of Medians		93%	31%	-23%	91%	9%

Source: Hamilton Lane Data (May 2024)

This chart shows that infrastructure investors have multiple ways to add value to their investments. Historically, the vast majority of value has been derived from EBITDA growth, largely driven by topline growth. This makes the sector less volatile, as it is less reliant on multiple expansion and, to some extent, leverage.

Key Infrastructure Risks

While infrastructure assets have exhibited strong performance across market cycles, they also carry risks. Understanding these risks is an essential element of infrastructure investing and a key reason bottoms-up, asset-by-asset underwriting is so important.

- **Political and news headline risk.** Because infrastructure assets are critical to the functioning of society and the economy, investments can receive special scrutiny. Investors should account for this risk during the due diligence process through ensuring the buy-in of all stakeholders, but some assets will always be controversial. Private equity infrastructure has also had success in the sector by generating better performance for end users through investments and improvements, mitigating the likelihood of headline and political risks.
- **Regulatory risk.** Infrastructure assets tend to be more highly regulated than other sectors. Some assets, particularly power and water, have fully regulated revenue or return models. Changes in regulation, either positive or negative, can have a disproportionate impact on returns.
- **Operational risk.** Operating infrastructure assets can be highly complex, and each asset is highly customized to its location, sector, functionality and specific use.
- **Environmental risk.** Infrastructure assets tend to have large footprints and often involve sensitive materials. Both real and perceived issues can cause setbacks, especially for assets with any kind of development component. While it is rare that environmental issues shut down existing assets, except in cases of extreme mismanagement, development projects can easily be delayed or even cancelled due to environmental issues. Therefore, reviewing key permits, requirements and operating history is an essential part of due diligence.
- **Counterparty risk.** While the long-term contracts associated with infrastructure generally add value, they may also introduce counterparty risk, or the possibility that parties may not fulfill their obligations. This is exacerbated when an asset has only one or a small number of customers. Therefore, underwriting counterparty quality is an important part of due diligence.
- **Commodity price risk.** The market generally tries to avoid investments linked to commodity price risk. However, it is prevalent in energy and power-related investments which can carry both direct and indirect commodity price risk. Even contracted assets have some exposure when the term ends. To mitigate this, it is important to consider each asset's market value; useful and unique assets may be able to transfer commodity risk to counterparties over time.

Conclusion

Some investors view infrastructure as a lesser-known counterpart to real estate. However, infrastructure investing is well-established and has a history of stability and low volatility, reflecting the durable nature of its physical assets. It also has different value drivers relative to real estate, and thus, a different return profile. Infrastructure may be additive to both a standard portfolio and a portfolio that includes private markets allocations, ultimately providing investors with better overall portfolio performance.

There are also many ways to add infrastructure exposure to a private markets portfolio spanning sectors like energy and power, and types such as greenfield and brownfield. While infrastructure has exhibited strong performance across cycles, each sector, sub-sector and type of asset has unique risks and rewards that investors should carefully assess to optimize investment potential.

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