

Investing in private infrastructure

RBC GAM Private Markets Global
Infrastructure Investment Team



For qualified investor only

Investors have increasingly been using alternative investment strategies to complement traditional asset allocations. Over the course of the last decade, we have witnessed considerable growth in exposure to real assets in general and to infrastructure in particular. As investors seek to improve the risk-adjusted returns of their portfolios, allocations to high-quality global core/core+ private infrastructure strategies can provide a number of important benefits. This primer provides an overview of private infrastructure as an asset class, describes the benefits of adding it to a diversified investment portfolio, and identifies some of the key implementation considerations for investors.

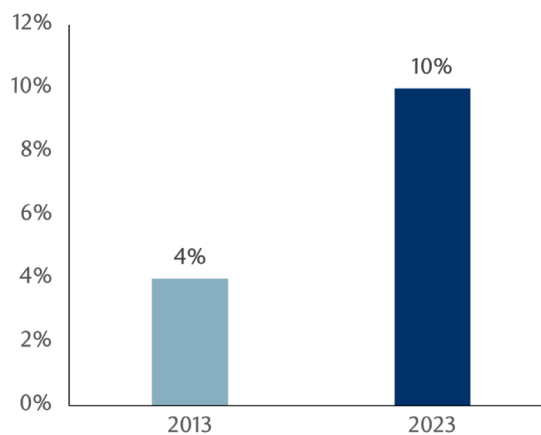


Introduction

Over the past decade, we have observed that institutional and individual investors alike have increased their focus on allocations to private market investments as they seek ways to enhance returns and reduce the volatility of their portfolios. For example, many of Canada's largest institutional investors have developed investment models with private infrastructure as a significant component of their policy allocations, as illustrated in Figure 1, which shows the growth in allocations across Canadian pension plans. More recently, smaller institutional and individual investors have followed, as access has improved through the development of investment vehicles specialized in the asset class.

Increasingly, investors are recognizing that the ability to capture the illiquidity and complexity premium present in private infrastructure—as well as its reduced correlation to traditional asset classes and potentially lower levels of overall volatility, which are demonstrated later in this paper—can add material value to a portfolio over the long term. In addition, the long-term nature of the asset class, with its stability of returns, consistency of income, and robust opportunity set, has driven many investors to take notice. These characteristics can make private infrastructure a suitable part of a diversified portfolio.

Figure 1: Canadian defined benefit pension plans, infrastructure allocation growth (2013-2023)



Source: RBC GAM. Coalition Greenwich, Key Trends in Institutional Asset Management, 2023.

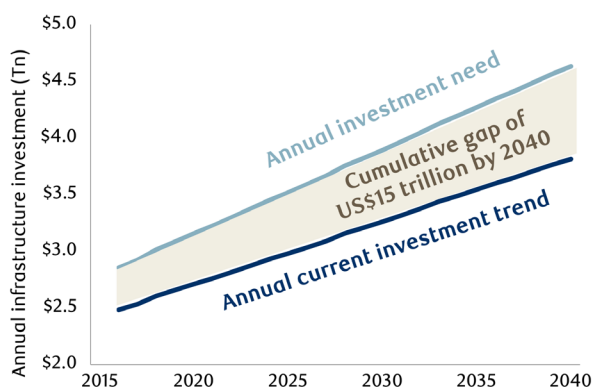
Private infrastructure: A large and growing investible opportunity set

Infrastructure consists of the tangible assets that support the activities of daily life and economic growth. Familiar historical examples include the ancient Roman aqueducts, which provided fresh water within the Roman Empire, or the Trans-Canada Railroad, which helped unite Canada as a nation.

Traditionally, governments have had the primary responsibility for funding and delivering infrastructure to their citizens. These investments were generally viewed as public assets, and were funded mainly through tax revenue. However, public sector balance sheets have come under increasing pressure and infrastructure spending has had to compete with other government priorities such as health care, social programs, and other initiatives. This has contributed to a trend that has diverted capital away from much-needed (but often longer-term) investments in building or updating critical infrastructure, and opened the door to the increased need for private capital.

As illustrated in Figure 2, the cumulative global need for annual infrastructure investment is forecast to reach USD\$94 trillion by 2040, while spending is expected to fall short by USD\$15 trillion over the coming two decades.¹ This level of underinvestment has led to a need for more private sector capital to support these long-term investments. In fact, research indicates that in order for the world to reach net-zero carbon emissions by 2050, annual private investment in the low-carbon economy over the next ten years must be as much as eight times the amount committed in 2021.²

Figure 2: Projected global infrastructure spending gap



Source: RBC GAM, Global Infrastructure Hub, [Infrastructure Outlook](#), December 2023. Any forecast, projection or target where provided is indicative only and is not guaranteed in any way. PH&N Institutional accepts no liability for any failure to meet such forecast or target.

Historically, the private sector has invested in infrastructure via a number of different means. In North America, large publicly listed railroad companies invest in and upgrade tracks and rolling stock to ensure a timely delivery of goods. In Europe and South America, privately owned airport companies ensure that borders remain open for tourists, business travel, and cargo. In

¹Global Infrastructure Hub, [Infrastructure Outlook](#), December 2023.

²BCG, Private Investors Must Commit as Much as Eight Times More to the Low-Carbon Economy, October 28, 2021.

³Prequin, 2024 Prequin Global Infrastructure Report, January 2024.

Canada, a large number of listed companies invest in the telecommunications and energy sectors. In other words, companies investing in infrastructure that is core for their business is not a new theme.

However, beyond these publicly listed companies (which fund investments from operating cash flows, or by issuing shares or raising debt), there is an established and accelerating trend whereby infrastructure projects are funded directly by private capital, especially from institutional investors such as large pension funds. Private capital has the advantage of aligning a long-term investment horizon with a long-term underlying asset, whereas listed companies are subject to the volatility of their own share price driving cost-of-capital decisions, and the potential negative impact to quarterly earnings per share (EPS) growth when they invest for the long term.

Because of the portfolio benefits to investors—outlined in the Portfolio Construction section later in this paper—there has also been an increase in the number of specialized managed solutions that provide investment access to private infrastructure assets. Funds and co-investment programs have gained considerable traction with individual and institutional investors who are seeking to replicate the investment programs of larger institutions but require the support of a partner to do so. Taken together with the aforementioned direct portfolios assembled by large institutional investors, total private capital invested in infrastructure is projected to grow from an estimated USD\$1.2 trillion in assets under management globally as of March 2023, to USD\$1.7 trillion by 2028, overtaking real estate to become the largest real asset class.³

Infrastructure 2.0: Investing in the future

One can think of well-invested infrastructure as a gift to future generations. Sometimes coined “Infrastructure 2.0,” these themes focus on ways in which investors can invest profitably with a responsible investing focus. These themes include energy transition, renewable power, the digital revolution, and clean water amongst others. Increasingly, environmental, social, and governance (ESG) factors have become key considerations in the search for responsible investing opportunities.

To implement and manage ESG considerations, investors must apply a responsible investing model that embeds risk assessment and management over both the due diligence and ownership periods, and actively considers each investment’s role within the broader ecosystem. Correspondingly, aligned values, transparency, and governance are important elements of a responsible investing platform.

Private infrastructure: Characteristics, strategies, and access

Private infrastructure assets can be characterized by the nature of their underlying businesses, and can be further categorized by sector, size, geography, or risk profile. Generally speaking, infrastructure businesses earn a revenue stream based on one of the following: usage (such as a toll road), consumption (power generation), or essential service (social housing). Infrastructure businesses tend to have value drivers based on population growth or economic (GDP) growth.

As a private market asset class, these investments are inherently illiquid. Until recently, investors with the ability to take on this illiquidity have dominated the space, but the advent of more investor-friendly structures have made this asset class more accessible.

Underlying business characteristics

The underlying revenues or cash flow characteristics of infrastructure businesses typically include:






- **Strong defensive characteristics / high barriers to entry** as these assets often exist in positions of natural monopolies, or because the significant upfront costs make for a very strong first-mover advantage and long-lived asset life.

- **Stable and predictable cash flows** since demand is predicated on the provision of an essential service—water or electricity, for example.
- **High operating margins** due to the high fixed (and low variable) cost base for these assets.
- **A compelling and predictable link to macroeconomic factors** such as inflation, population growth, and GDP growth. Assets governed by regulation or contract will often have direct inflation correlations.

Infrastructure assets can also be categorized as **contracted**, **regulated**, or **GDP-linked**, with each category exhibiting elements of the cash flow characteristics noted above. Contracted assets are supported by long-term contracts between governments and private sector providers for the construction of an asset or service such as a school or hospital. These assets generate stable and predictable cash flows and are not exposed to end-user demand. Regulated assets, such as a local utility that provides electricity to customers in its service territory, tend to be natural monopolies with high barriers to entry and pricing that is set by a government regulator to stabilize pricing in the provision of this essential service. GDP-linked assets are exposed to some degree of market risk through user demand and market prices. Examples include toll roads, airports, and seaports.

Infrastructure sectors

The primary sectors in the private infrastructure market are described below:

Energy	Utilities	Transportation	Digital	Social
				
<p>Investments in sources of energy and the transition from carbon sourced fuels (oil and natural gas) to lower-carbon solutions (renewable power generation and alternate fuels such as hydrogen)</p>	<p>Investments in electricity, heating or cooling, water and wastewater utilities. Assets may be vertically integrated with each of: generation, transport, and customer-interfacing retail being embedded within a single utility</p>	<p>Investments in assets such as toll roads/ bridges, railways, ports and airports. Some investors include vehicle parking in this sector, and an area of growing demand is electric vehicle (EV) recharging.</p>	<p>Comprises assets that keep us connected on a virtual level: towers for wireless communications (mobile phones, mobile internet), fiber optic or cable networks, and data centers. Satellites are trending; with the potential transition from traditional (geocentric) satellites to low-earth orbit (LEO) satellites.</p>	<p>Assets that support social services such as healthcare, educational facilities, judicial and correctional facilities, and social housing. The role of the private sector is to build and maintain these assets under a public-private partnership (PPP) model.</p>

Deal size

Infrastructure investments can range broadly in size, from relatively small (CAD\$10-\$200 million) investments, through mid-cap, to large-cap investments representing billions of dollars. In both mid-cap and large-cap opportunities, it is common to see consortium transactions, where the selection of co-investment partners is a crucial part of the ownership and value-creation strategy.

Geographic exposure






While the private infrastructure opportunity set is a global one, and some investment strategies focus on specific regions or countries, a common approach is to prioritize the 38 member countries of the Organization for Economic Co-operation and Development (OECD countries). These

countries may exhibit slower growth than emerging market economies, but they provide a history of predictable regulatory regime, including taxation and acceptance of foreign direct investment. An OECD-focused strategy provides size, scale, and higher perceived stability during the long duration of infrastructure investments, and many global strategies will focus on this geographic opportunity set.

Illustrative infrastructure investments

The illustration below provides some insight into the types of assets that make up the infrastructure market. From utilities, to renewable power, to fiber optics, the scope of opportunities is broad and expected returns vary depending on the nature of the asset and its revenue stream, representing a continuum of cash yield profiles.

Figure 3: Illustrative infrastructure investments

Investment	Sector	Geography	Expected total return ¹	Expected cash yield ¹	Investment thesis
	Regulated utility	U.S., Australia	7-9%	2-4%	Regulated utility supporting growth in the region. Migration to renewable power and transitioning away from legacy carbon generation.
	Fiber connectivity	Europe, U.S.	9-11%	0-2%	Enhancing broadband connectivity, well-positioned for additional investment in smart infrastructure.
	Sea ports	U.S., Asia, LatAm	9-11%	4-6%	Optimizing operations and enhancing safety.
	Renewable power generation	Canada, U.S.	6-8%	3-5%	An operating (constructed) wind farm providing power under long-term purchase agreement.
	Airport	Australia, Europe	7-11%	3-5%	Enhancing operations for a strong traffic recovery post-pandemic.

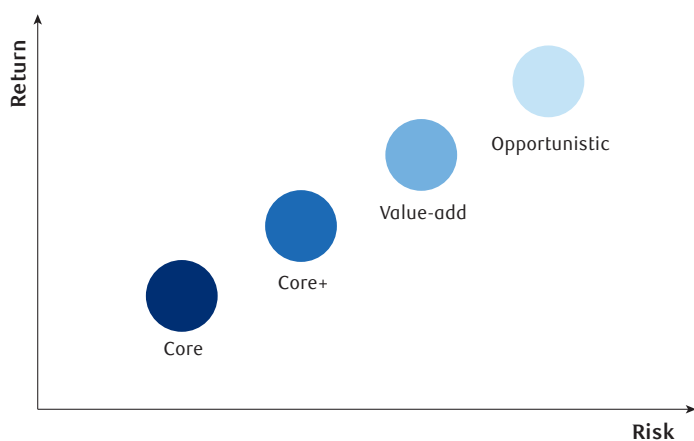
Source: RBC GAM. ¹Expected returns and yields are for illustrative purposes only. Returns and yields are estimated based on certain facts and assumptions. Actual returns and yields will differ from expected returns and yields, and the above is not meant to represent a guarantee of performance.

Risk profiles

Infrastructure investment strategies can be classified by the type of deals in which they invest, typically defined by the nature of the risk of the underlying assets. Infrastructure investment strategies will typically categorize themselves as core, core+, or value-add/opportunistic strategies:

- **Core** infrastructure assets are the most stable and lowest risk segment. They include essential services that are often in natural monopoly positions, such as electrical utilities or airports. Their income streams may often dominate their return profile and their revenues tend to be relatively stable or even government backed.
- **Core+** infrastructure assets are exposed to additional risks, including development risks. For example, a wind farm/power generation facility likely has some operational and contracted assets (core), but could also have development opportunities and risks.
- **Value-add and opportunistic** infrastructure assets tend to be the highest risk category for this asset class. These assets have typical business risks, as they operate in an adjacency to a core or core-plus asset. Examples might include a services business that provides vegetation management for a utility (e.g., tree pruning along power lines), or a jet-refueling service business at an airport. In both cases, these have short-duration contracts and do not have high barriers to entry.

Figure 4: Illustrative infrastructure strategy continuum



Source: RBC GAM

Potential risk and return values are for illustrative purposes only and are not guaranteed. This chart is shown for the purposes of illustrating and understanding the potential risk-reward trade-off of different infrastructure investment strategies. Actual risk and returns depend upon a variety of factors. No representation is being made that returns similar to those shown will be achieved.

Inflation-hedging properties

Investors often look to core/core+ infrastructure as an asset class that can, over the long term, provide some hedge against inflation. Inflation protection may be achieved indirectly through a link to long-term factors such as population growth and GDP growth. Additionally, core infrastructure in particular can provide a direct link to inflation over the long term, as these assets often come with contractual, explicitly inflation-linked revenues. It is one reason that some investors view this component of their private market allocations as a potential tool to hedge inflation.

Accessing the asset class

Private infrastructure investors typically invest either directly or through pooled investment vehicles. Pooled funds will typically be categorized as core, core+, or value-add/opportunistic.

Funds may be offered in either a closed or open-ended structure. We have witnessed significant growth in open-ended (or evergreen) strategies that allow for continual access and a certain amount of liquidity. This type of structure lends itself well to core/core+ strategies where long-term ownership adds value, returns over time benefit from attractive cash flows, and business stability supports accurate valuations for unitholder liquidity.

Portfolio construction: Adding infrastructure to a diversified portfolio

Though we have described a variety of strategies that may have a place in an investment portfolio, core/core+ infrastructure can provide an attractive tool for investors seeking to add a single allocation to an infrastructure strategy in a diversified portfolio. Contractually based returns with identifiable long-term horizons can be an attractive source of income within any portfolio.

Within a diversified portfolio, a core/core+ infrastructure investment can be complementary to many of the traditional asset classes employed in investor portfolios.

Historical investment characteristics

Core/core+ private infrastructure can act as a diversifier in traditional portfolios. As illustrated in Figure 5, correlations to traditional global equities and global bonds are low and range between +0.04 and +0.46, based on historical data since 2007. In addition, compared to global listed infrastructure, the correlation of global private infrastructure with global equities is much more attractive. As the

table illustrates, global listed infrastructure has a strong correlation to global equities and as we will show further below, the volatility of global listed infrastructure is also materially higher, thus reducing the benefits of including it as a substitute for global private infrastructure in portfolios.

Figure 5: Historical correlations

	Global bonds			
Global bonds	1	Global equities		
Global equities	0.08	1	Global listed infrastructure	
Global listed infrastructure	0.23	0.84	1	Global private infrastructure
Global private infrastructure	0.46	0.04	0.21	1

Source: RBC GAM, Bloomberg. Based on quarterly data from December 2006 to December 2023. See appendix for details on proxies. Past performance is not indicative of future results.

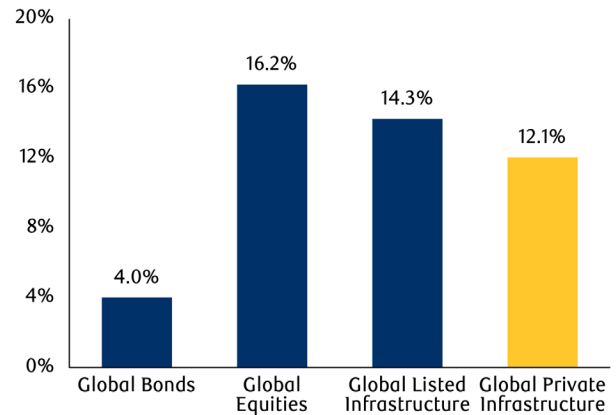
Volatility and drawdown risk

As illustrated in Figure 6, the return volatility of global private infrastructure has been lower than global equities and global listed infrastructure over the past seventeen years. At the same time, Figure 7 shows us that the maximum drawdown experience of global private infrastructure has been materially better relative to both global equities and global listed infrastructure (-13.7% vs -46.6% and -40.4% respectively) over the same time period. This period includes the market crashes that occurred during the Great Financial Crisis and early-2020, both of which introduced material volatility and drawdowns in public markets over a short but challenging period of time. Among global equities, global listed infrastructure, and global private infrastructure, the Great Financial Crisis is responsible for the largest drawdowns experienced by these asset classes over the seventeen-year time horizon depicted in Figure 7.

Returns

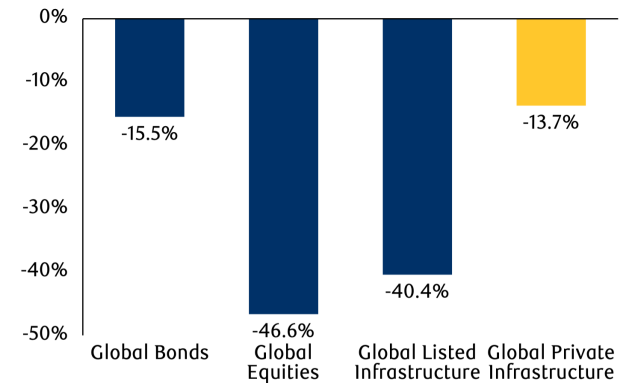
Even above and beyond their portfolio construction benefits such as attractive diversification and risk metrics, global private infrastructure allocations have the potential to enhance returns within an overall portfolio. As illustrated in Figure 8, global private infrastructure returns since 2007 have been attractive in comparison to global bond, global equity, and global listed infrastructure markets.

Figure 6: Annualized volatility



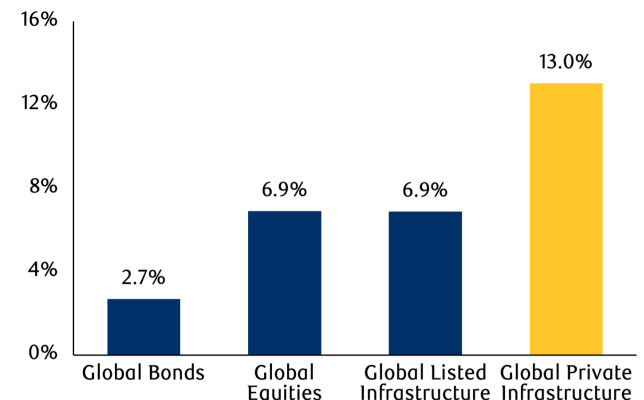
Source: RBC GAM, Bloomberg. Based on quarterly data from December 2006 to December 2023. See appendix for details on proxies. Past performance is not indicative of future results.

Figure 7: Maximum drawdown



Source: RBC GAM, Bloomberg. Based on quarterly data from December 2006 to December 2023. See appendix for details on proxies. Past performance is not indicative of future results.

Figure 8: Annualized performance



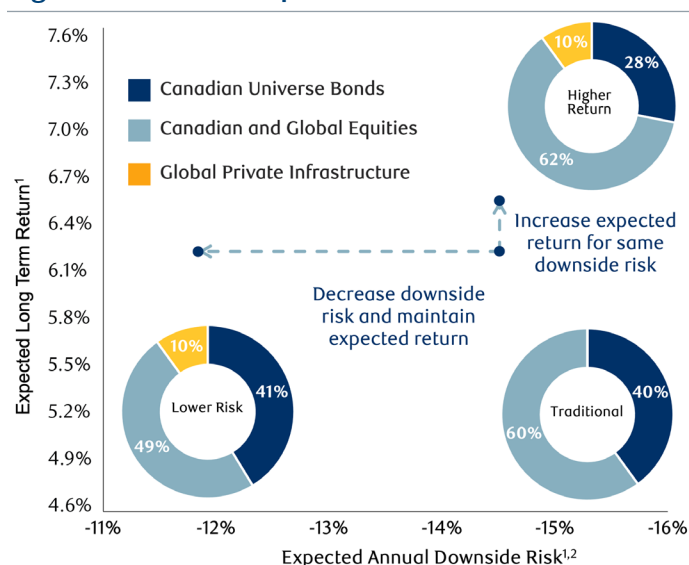
Source: RBC GAM, Bloomberg. Based on quarterly data from December 2006 to December 2023. See appendix for details on proxies. Past performance is not indicative of future results.

Portfolio implementation

As investors have progressed from traditional benchmarks to a more diversified approach, we have seen allocations to infrastructure form an increasing part of their asset mix. In Figure 9 we demonstrate the impact that adding core/core+ private infrastructure can have on a traditional portfolio's return and downside risk profile.

In this example, adding a 10% allocation to private infrastructure improves the portfolio's expected drawdown risk or its expected return profile by providing exposure to non-traditional risk and return factors. As is illustrated, sourcing the allocation from equities can lower the risk of material drawdown while maintaining expected returns, while sourcing the allocation from fixed income can increase the portfolio's return potential without incurring additional drawdown risk.

Figure 9: Portfolio implementation



Source: RBC GAM. Expected risk and return values are for illustrative purposes only and are not guaranteed. RBC GAM accepts no liability for any failure to meet such forecast. Hypothetical performance analyses are for illustrative purposes only.

¹Refer to appendix for asset allocation details, modelling assumptions, and disclosures.
²CVaR95, which represents the expected loss during the worst 5% of return outcomes.

Considerations for investors

Investing in private infrastructure is not without challenges, including the relative illiquidity of the private market asset class. While the evolution in the design of managed funds has delivered more accessible (and sometime more liquid) structures, investors must recognize that it remains best suited to a long-term investment strategy, as investors could face additional costs or difficulties in obtaining liquidity relative to traditional investments. Even in open-ended structures, liquidity may be limited by longer redemption notice periods, penalties and gates that are in place to protect the remaining investors.

An additional consideration is that private infrastructure investments are typically larger than those associated with traditional asset classes, which can make for fewer investments and therefore less diversification relative to listed strategies. A counterpoint could be that these investments may have different systematic risks, and therefore diversification could be achieved with fewer assets than a public market portfolio.

Other considerations include areas such as governance and oversight. Private infrastructure assets are complex investments and as a result, investment due diligence, ongoing monitoring, valuation, benchmarking, and reporting may be more resource intensive for fiduciaries and fees may be higher than traditional investments. That said, an allocation with the right partner, in an appropriate strategy, can add materially to portfolio construction and efficiency over the long term.

Conclusion

Over the last decade, private infrastructure has emerged as a key component of investors' portfolios, and demand is expected to increase alongside a growing investable opportunity set. Infrastructure naturally lends itself to supporting a responsible approach to investment including ESG integration. As we have illustrated in this paper, the stable, predictable, and defensive cash flow profile exhibited by infrastructure assets, along with their attractive portfolio construction characteristics, offer the potential for enhanced risk-adjusted returns within long-term portfolios.

Infrastructure investing is also not without its challenges, including investment complexity and illiquidity. Diligence must be exercised when assessing the wide range of options available to gain access to the asset class, and investors should be flexible in their approach given the investable themes are constantly evolving.

For investors seeking access to private infrastructure through a managed fund, we believe an open-ended core/core+ structure is preferable given that capital remains deployed with more certainty, long-term value creation is captured, and the more stable nature of these strategies may help limit volatility. We believe that a fund diversified by sector and invested in developed geographies will lead to an attractive portfolio of private infrastructure assets.

In many ways, this is the model employed internally by the largest Canadian pension plans, which have become amongst the largest institutional investors in this space.⁴ Given the increasing ability of pooled funds to provide effective access to this asset class, private infrastructure has become a highly compelling opportunity that investors should consider as part of their long-term investment plan.

⁴IPE, [Top 100 Infrastructure Investors, 2022](#).

Appendix

In Figures 5, 6, 7, and 8, global bonds are represented by ICE BofA Global Broad Market Index (Local); global equities are represented by MSCI World Net Total Return Index (Local); global listed infrastructure is represented by FTSE Global Core Infrastructure 50/50 Total Return Index (USD); and global private infrastructure is represented by EDHEC Infra300 Index (Local).

Asset allocation details in Figure 9 are as follows: Traditional Portfolio – 20% Canadian equities, 40% global equities; Lower Risk Portfolio – 16% Canadian equities, 32% global equities; Higher Return Portfolio – 21% Canadian equities, 41% global equities.

Capital market assumptions used for modelling in Figure 9 are as follows:

Asset classes	Representative data series	Expected long-term return	Expected annual volatility	Expected annual downside risk
Universe bonds	FTSE Canada Universe Bond Index	4.1%	5.0%	-6.8%
Canadian equities	S&P/TSX Composite Index	8.2%	16.9%	-26.1%
Global equities	MSCI World Index (CAD)	6.2%	14.4%	-24.1%
Global Private Infrastructure*	EDHEC Infra300 Index (Local)	6.7%	12.2%	-17.7%

*Expected long-term annualized return net of fees

Capital market assumptions represent the views of RBC Global Asset Management for the purposes of illustrating and understanding the potential risk-reward trade-off of different portfolio decisions and are established by considering a variety of qualitative and quantitative sources of information including: different forecasting models; internal and external research; existing and implied future conditions as priced by capital markets; and internal views of our fund managers. Expected long-term annualized returns are for a 10-year forecast time horizon. Volatilities, downside risk and correlations are estimated from historical data and adjusted as required to reflect future market conditions. Investors should be aware of the limitations using forward-looking assumptions in that there is absolutely no guarantee that future performance will occur according to any ex-ante expectation

This document has been provided by PH&N Institutional for information purposes only and may not be reproduced, distributed or published without the written consent of PH&N Institutional. It is not intended to provide professional advice and should not be relied upon in that regard.

PH&N Institutional takes reasonable steps to provide up-to-date, accurate and reliable information, and believes the information to be so when printed. The views and opinions expressed herein are those of PH&N Institutional as of the publication date and are subject to change without notice. This information is not intended to be an offer or solicitation to buy or sell securities or to participate in or subscribe for any service.

Information obtained from third parties is believed to be reliable, but no representation or warranty, express or implied, is made by PH&N Institutional, its affiliates or any other person as to its accuracy, completeness or correctness. We assume no responsibility for any errors or omissions in such information.

These materials contain statements that are not purely historical in nature, but are “forward-looking statements.” These include, among other things, projections, hypothetical performance analyses, hypothetical analyses of income, yield or return, future performance targets, sample or pro forma portfolio structures or portfolio composition, scenario analyses, specific investment strategies and proposed or pro forma levels of diversification or sector investment. These forward-looking statements are based upon certain assumptions and involve significant elements of subjective judgment and analysis. No representation is made that any returns indicated will be achieved or that all assumptions have been considered or stated. Actual events are difficult to predict and are beyond our control. Hence, actual events may differ materially from those assumed. All forward-looking statements included are based on information available on the date hereof and we do not assume any duty to update any forward-looking statement. Some important factors which could cause actual results to differ materially from those in any forward-looking statements include, without limitation, changes in general economic, market, legal and financial conditions. Accordingly, there can be no assurance that hypothetical returns or projections can be realized, that forward-looking statements will materialize or that actual returns or results will not be materially different than those presented.

Investments in alternative strategies are speculative and involve significant risk of loss of all or a substantial amount of your investment. Alternative strategies: (i) may engage in leverage and other speculative investment practices that may increase the risk of investment loss; and (ii) can be highly illiquid. In assessing the suitability of these investments, investors should carefully consider their personal circumstances including time horizon, liquidity needs, portfolio size, income, investment knowledge and attitude toward price fluctuations. Investors should consult their professional advisors and consultants regarding any tax, accounting, legal or financial considerations before making a decision as to whether the strategies mentioned in this material are a suitable investment for them.

PH&N Institutional is the institutional business division of RBC Global Asset Management Inc. (RBC GAM Inc.). Phillips, Hager & North Investment Management is a division of RBC GAM Inc.

RBC Global Asset Management is the asset management division of Royal Bank of Canada (RBC) which includes RBC GAM Inc., RBC Global Asset Management (U.S.) Inc., RBC Global Asset Management (UK) Limited, RBC Global Asset Management (Asia) Limited, and RBC Indigo Asset Management Inc., which are separate, but affiliated subsidiaries of RBC.

®/™ Trademark(s) of Royal Bank of Canada. Used under licence.
© RBC Global Asset Management Inc., 2024. Publication date: June 2024