

Infrastructure and the impact of disruptive technologies

RBC Global Infrastructure Team

Introduction

As the popularity of infrastructure investing has grown, so has the opportunity set. While traditional infrastructure continues to play an attractive role in portfolio construction, a new generation of assets presents both risk and opportunity. As investors seek exposure to this asset class, certain guidelines can help to mitigate risks.

A short review of the private infrastructure asset class

Over the course of the last two decades, we have witnessed considerable growth in investment in infrastructure in institutional portfolios. Investing in infrastructure means investing in tangible assets that support the activities of daily life, our economies, and societies. Familiar examples include power generation, toll roads, shipping ports, and transportation hubs, as well as the recent expansion of the asset class to include industries such as energy transition, renewable power, and certain digital technologies. Infrastructure investment strategies range from relatively low risk Core or Core Plus to higher risk Value-Add or Opportunistic, differentiated by stability of income, sector breakdown, exposure to economic cycles and market demand, and the magnitude of development exposure.

Figure 1: Infrastructure spans a range of sectors

Digital	Transportation		Power, Energy & Utilities		Social
Towers	Airports	Roads/bridges/tunnels	Renewable power	Electric and gas utilities	Housing
Fiber/cable	Mass transit	Ports	Transmission/distribution	Generation	Education
Data centers	Rail	Car parks	Liquids transport	Water	Healthcare

Source: RBC Global Asset Management (RBC GAM)

¹Based on latest publicly available information as of March 31, 2023.

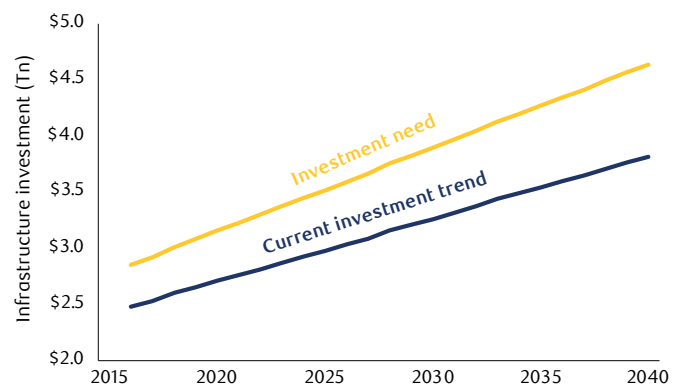
Decades of under-spending on existing infrastructure, growth in global economies, and a heightened awareness of our carbon footprint has created a material increase in the need for investment in infrastructure. Concurrently, public sector balance sheets have been stretched by a number of economic challenges. As a result, the need for private capital to bridge that spending gap has created an attractive opportunity for investors.

It is not surprising then that investments in Core infrastructure assets have become a cornerstone of many institutional investment programs, including some of Canada's largest pension plans.¹

Infrastructure assets typically provide essential products and services that often generate long-term, contractually based, or regulated cash flows from strong counterparties. They can also add value to a portfolio in numerous ways, including stable income, diversification through low correlations, and positive inflation linkages.

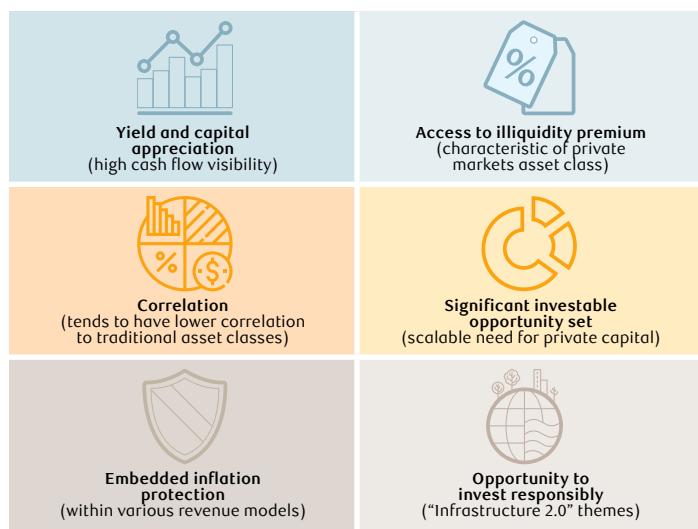
These portfolio construction attributes, along with the potential to act as a match to longer-term liabilities within a liability driven portfolio, have made infrastructure assets a material component of many institutional private market allocations.

Figure 2: Projected global infrastructure spending gap is growing



Source: RBC GAM; [Global Infrastructure Hub](#), Infrastructure Outlook, August 2022.

Figure 3: Portfolio construction benefits



Source: RBC GAM

Infrastructure 2.0: Risks and opportunities

In an investment landscape focused on balancing economic growth with environmental, social, and governance targets, the notion of investing in a new generation of infrastructure assets has become progressively important for institutional and individual investors alike. As the responsible investing theme has grown, investments that can contribute to meeting climate goals, or that promote equal access to digital connectivity, transportation, and social services have increasingly been referred to as “Infrastructure 2.0” and have broadened the scope of infrastructure investing.

For investment managers, the concept of an Infrastructure 2.0 investing platform describes both how they invest (i.e., a responsible investing model and value-creation plan), as well as what they invest in, (i.e., sectors like renewable power generation and carbon capture). As infrastructure generally consists of very long-lived assets, it is critical that investors carefully consider both the benefits and competitive threats new technology poses to existing underlying businesses, particularly over the long term.

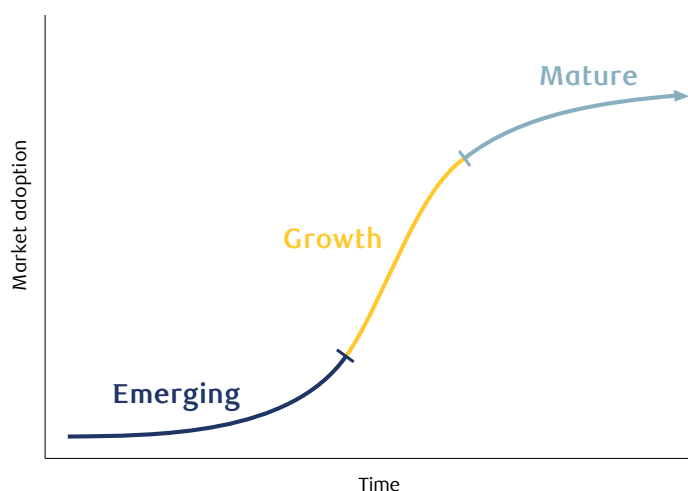
While the emergence of newer technologies can offer great promise, the existence of these technologies often precedes their commercial and economic viability. As a result, aligning the technology’s life cycle with the risk profile of an investment strategy is critical. Investment in early-stage technology is best suited to a strategy with a higher risk/return profile, whereas investment in mature technologies carries lower risk but can be vulnerable to value deterioration as newer technologies emerge. Thus, technological disruption is one of the longer-term risks that must be considered through a comprehensive due

diligence program to avoid investment in a stranded asset that might be left behind as emerging technologies erode its competitive position.

Disruptive technologies and implications

When underwriting any new investment, but particularly in sectors associated with Infrastructure 2.0 themes, infrastructure managers often separate the essential consumer need (e.g., a desire to watch television) from the technological medium enabling that service – in the case of television, this was formerly over-the-air, then evolved to cable, and is now dominated by online streaming services. Framing the investment in this way can help clarify the potential risks of disruption since the essential consumer needs are usually stable and easily agreed upon (e.g., heat, water, electricity, travel), while the technological medium that meets those needs can change over time. Understanding where a technology and its associated investment lies on the S-curve of adoption is an important conclusion of the due diligence process.

Figure 4: The “S-curve” of technology adoption

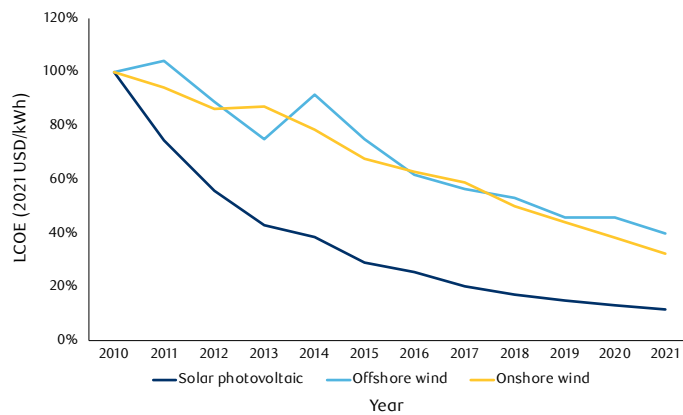


Source: RBC GAM

This framing can also help position investments in emerging technologies that may become mature over a shorter adoption period. For example:

- in geographical areas where the cost of deployment made implementation more attractive (i.e., the mountainous regions of South America), traditional land-line telephony was leap-frogged by mobile telephony; or,
- in North America, power generation has shown significant migration from coal to natural gas, which has both a lower environmental cost (carbon footprint) and a lower economic cost.

Figure 5: Renewable energy cost improvements (USD/kWh) 2010-2021



Source: RBC GAM, IRENA (2021), Renewable Power Generation Costs in 2020, International Renewable Energy Agency, Abu Dhabi [Global Trends \(irena.org\)](https://www.irena.org/Global-Trends); Global weighted average total installed costs, capacity factors and LCOE of newly commissioned projects.

Newer technologies – for example, wind and solar power generation – have demonstrated material cost efficiency gains since 2010. Evaluating the rate of these efficiency gains is another way to gain insight into the rate at which newer technologies might displace older ones.

As infrastructure managers think about the risk of protecting value in existing investments, assets that have a lower cash yield (i.e., those that have a higher value placed on long-term growth) are more vulnerable to potential disruption. Understanding the key drivers underpinning the cash yield of an investment can be a useful tool for assessing the value at risk from disruptive technologies.

Future-proofing your investment program

The tools that an investor can employ to identify and mitigate these types of risks will vary depending on the investment strategy deployed. For example, an investment manager with a direct investment strategy may implement leading practices in its investment culture and processes, whereas an externally driven program (i.e., fund of funds model) may focus its due diligence on external managers' processes and ensuring that fee structures are appropriately aligned with investor objectives.

Below we highlight five considerations for investors assessing their exposure to these risks.

1. **Underwriting methodology:** Understanding a manager's underwriting methodology can provide valuable information about how they assess and mitigate risk. For example, assessing the proportion of an asset's value that is realized in the short-term vs long-term can lead to meaningful insights about value at risk from potential disruptions.

2. **Value drivers:** What tools does the manager use to understand the fundamental question, "How does the asset make money?" One effective approach can be to build a layered model showing value in terms of different lines of business, customers, or other risk factors. Each may be subject to different risks, and at times there may be natural embedded hedges – i.e., traditional telephone companies' land-line market declines may be offset by growth in their mobile businesses.
3. **Active management and responsible governance:** How does the manager identify and adjust to emerging risks? What types of models are employed to assess these risks? For example, "real option" modelling helps demonstrate value implications of managerial capital budgeting decisions and can be an important element of developing the value creation plan.
4. **Diversification:** Is the manager's strategy overly focused on a particular sector or technology, to the exclusion of emerging technologies? For example, because natural gas is the predominant heating fuel in certain countries, it is tempting to see that as a perpetual condition; however, maintaining some exposure to emerging technologies (e.g., renewable fuels, hydrogen) can help inform investors about how long the mature technology will remain dominant and act as an explicit hedge.
5. **Clearly articulate and align interests:** Alignment of interests is a critical part of any successful investment strategy. This includes alignment on fee structures (without creating unintended risk implications or style drift), investment time horizon, and values. Where there is a pressure to deploy funds, for example, this can undermine what should be a disciplined investment process.

Conclusion

The private infrastructure asset class is well established among institutional investors. As investors expand their allocations to infrastructure, the changing investment landscape provides both opportunities and threats to mature investments. Investors must remain alert to emerging technologies to protect against the risk of obsolescence.

To ensure that disruptive technological risks are identified and mitigated, it is critical for a disciplined investment program to include active management with robust access to information, a focus on emerging threats, and an alignment of interest with partners. Such a program can help investors mitigate risks and exploit the opportunities the future will inevitably deliver.

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