



Index Insights | Infrastructure

Practical considerations for listed infrastructure

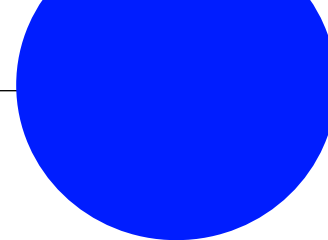
October 2024



**FTSE
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AUTHOR

Sergiy Lesyk
Director, Research and Analytics
sergiy.lesyk@lseg.com

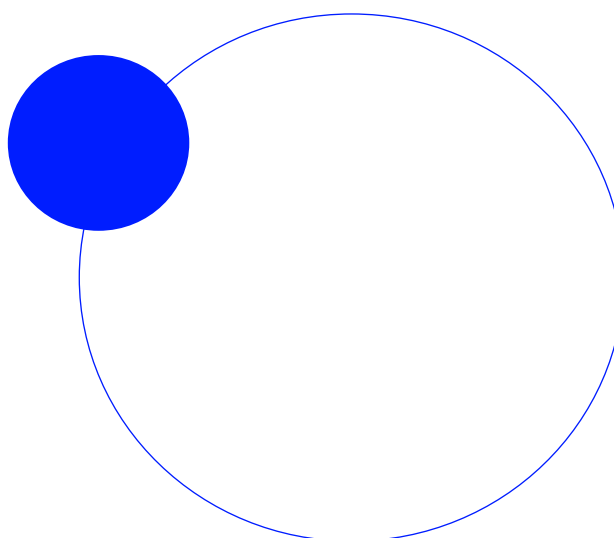


Introduction

Infrastructure is an investment category which is frequently perceived by investors as a diversifying asset from other asset classes. It has been known to provide a hedge to long-term liabilities by offering exposure to stable returns and a steady income.

This research uses the FTSE Core Infrastructure Index series¹ as a proxy for equity infrastructure investors to verify these attributes and considers the:

- Relatively high dividend yield, inflation protection and stable income
- Defensive qualities in periods of market downturns and relatively high risk-adjusted returns overall
- Overall diversification properties of infrastructure in a listed equity portfolio



¹ FTSE Russell. Ground Rules. FTSE Infrastructure Index Series. V3.8. May 2024.
https://www.lseg.com/content/dam/ftse-russell/en_us/documents/ground-rules/ftse-infrastructure-index-series-ground-rules.pdf

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Listed Infrastructure investment theses

From an investment perspective, infrastructure assets cover a range of sectors, including transportation, energy, utilities, communications and social infrastructure. FTSE Russell defines core infrastructure companies as those that own, manage or operate structures or networks used for the processing or moving of goods, services, information and data, people, energy and necessities from one location to another. This definition, therefore, includes the businesses that provide the means of processing (or moving) goods or services, but not the goods or services themselves.

Infrastructure is an investment category often seen by investors as a diversification tool that can provide a hedge to long-term liabilities by offering exposure to potentially stable returns and a steady income. Developed markets listed infrastructure indices allow investors to measure the performance of an increasingly important segment of global equity markets.

Infrastructure assets have shown the ability to generate a steady income stream, which had been a valuable feature in an environment dominated by low interest rates. Today, despite the higher interest rate environment, the high dividend yield remains an important feature for investors, who are still looking for a higher yield from equities.

In addition to higher dividend yields, listed infrastructure investments have historically offered a higher risk-adjusted return and a more resilient income profile during downturns. In this paper, we seek to substantiate these infrastructure investment theses in practice.

Infrastructure is an investment category often seen by investors as a diversification tool that can provide a hedge to long-term liabilities by offering exposure to potentially stable returns and a steady income.

Core Infrastructure Indices snapshot

The FTSE Infrastructure Index Series is a comprehensive set of indices that reflects the performance of infrastructure and infrastructure-related listed securities worldwide. The series is based on the FTSE Global All Cap Index Series, which is a part of the FTSE Global Equity Index Series ("GEIS"). Both developed and emerging markets are included.

FTSE Core Infrastructure Indices are a subset of the FTSE Infrastructure Index Series. They comprise companies, which derive at least 65% of their revenues from core activities of development, ownership, management and/or maintenance of transportation, energy or telecommunication infrastructure assets.

The indices were introduced on April 4, 2011, with the history calculated from December 29, 2005, using hypothetical data. In March 2015, the FTSE Infrastructure Index Series was complemented by a stock and sector-capped version of the Core Infrastructure Indices, called the FTSE Core Infrastructure 50/50 Indices.

The FTSE Infrastructure Index Series is a comprehensive set of indices that reflect the performance of infrastructure and infrastructure-related listed securities worldwide.

Statistics and performance of the FTSE Core Infrastructure Indices

Table 1. FTSE Core Infrastructure Indices snapshot

Parameter	Global	Developed	Emerging
Market capitalisation (USD tn)	2.52	2.30	0.22
Number of stocks	271	135	136
Countries represented	33	18	15
Largest stock MCap (USD bn)	160.3	160.3	15.4
Median MCap (USD bn)	2.2	7.1	0.7
Minimum stock MCap (USD mn)	44.5	140.2	44.5

Source: FTSE Russell. Data as of May 30, 2024. Free float adjusted.

Table 2. New ICB® Sector breakdown of FTSE Global Core and 50/50 Infrastructure Indices

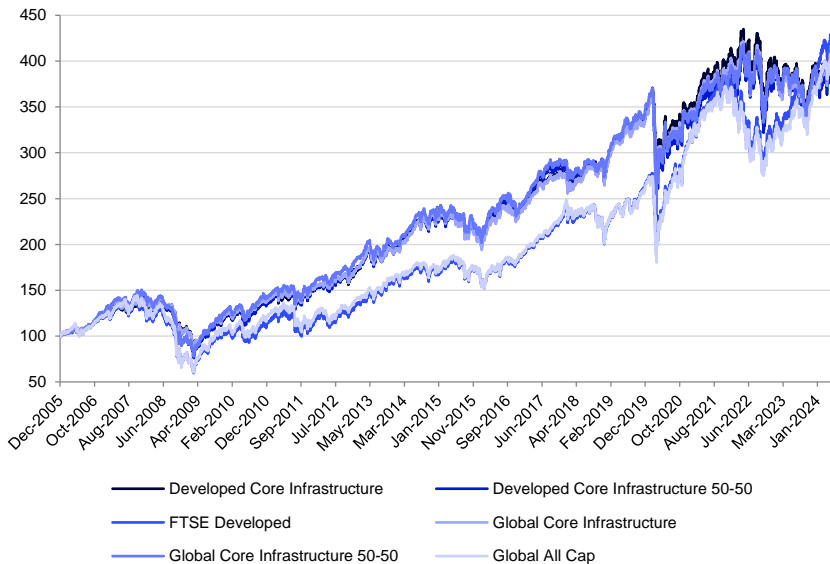
ICB Code	ICB subsector	No. of Constituents	Core Weight %	Core 50/50 Weight %
15101010	Telecommunications Equipment	6	0.4%	0.3%
15102015	Telecommunications Services	14	1.7%	1.4%
35102025	Infrastructure REITs	6	6.1%	5.3%
50101010	Construction	1	0.1%	0.4%
50206020	Railroads	16	18.2%	6.5%
50206060	Transportation Services	71	5.8%	21.4%
60101035	Pipelines	13	14.0%	12.1%
65101010	Alternative Electricity	6	0.4%	0.4%
65101015	Conventional Electricity	69	36.2%	35.3%
65102000	Multi-utilities	16	10.5%	10.2%
65102020	Gas Distribution	33	4.0%	3.9%
65102030	Water	20	2.8%	2.8%
Total		271	100.0	100.0

Source: FTSE Russell. FTSE Core Infrastructure Indices data as of May 30, 2024.

A review of the performance of infrastructure indices shows that since December 2005, the FTSE Core Infrastructure Indices have been outperforming the wider market capitalisation benchmarks by a wide margin (Chart 1). During the Covid crisis, the margin had shrunk after the movement of goods and people was severely restricted. By the end of 2021, the performance gap had almost disappeared, following the extraordinary injection of liquidity in the economy. By October 2022, higher interest rates had turned the tide and infrastructure outperformed the wider market again. Since then, the broader indices have outperformed infrastructure following the market expectation of lower interest rates, resulting in the marginal underperformance of Core Infrastructure since the end of 2005.

FTSE Core Infrastructure Indices performance is marginally below the performance of the wider indices since the end of 2005, albeit with lower volatility.

Chart 1. Cumulative total return of FTSE Global Core Infrastructure Indices and selected benchmarks, rebased, in USD



Source: FTSE Russell. FTSE end-of-month data from December 2005. Past performance is no guarantee of future results. Returns shown prior to index launch represent hypothetical, historical data. Please see the end for important legal disclosures.

Characteristics of listed infrastructure

Yield enhancement

High dividend yield is one of the primary attractions of infrastructure stocks. This characteristic is particularly appealing in a low interest-rate environment.

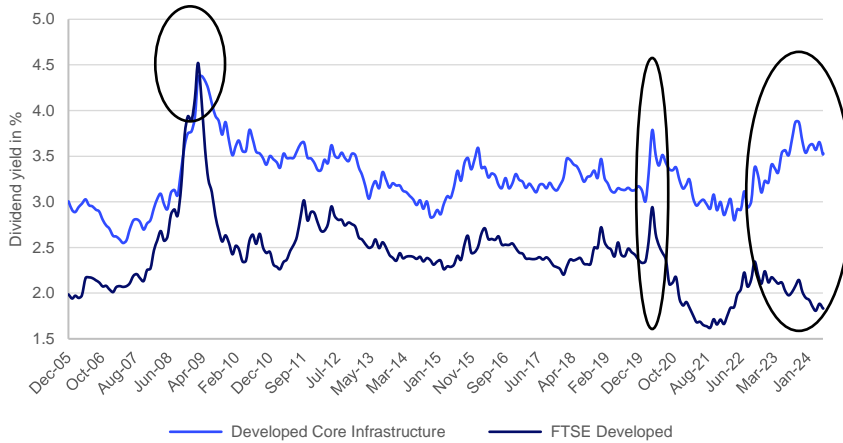
The growing expectation of lower interest rates in recent months may once again draw attention to higher yielding assets.

In Chart 2, we compare the dividend yields of the FTSE Developed and FTSE Core Developed Infrastructure Indices. During the Global Financial Crisis, dividend yields rose substantially as a result of falling equity prices. As the wider market fell more than infrastructure stocks, dividend yields on the Market Capitalisation Index and the Infrastructure Index reached similar levels, before they diverged again in 2009. The Covid shock in 2020 put to the test the resilience of listed infrastructure once again. While listed infrastructure held up, the flow of liquidity following the Covid crisis lifted the wider market more. This resulted in the overall market dividend yield falling to a low of just over 1.5%. In the last two years, expectations of lower inflation and interest rates have resulted in dividend yields diverging again: the listed infrastructure yield touched 4.0% in 2024, while the overall market dividend yield returned to 1.5%.

A comparison of the FTSE Developed Index with the FTSE Core Developed Infrastructure 50/50 Index shows the same picture.

High dividend yield is one of the primary attractions of infrastructure stocks.

Chart 2. Dividend yield history of FTSE Developed Core Infrastructure and FTSE Developed Indices



Source: FTSE Russell. FTSE Core infrastructure and Market Capitalisation Indices from December 29, 2005 to May 30, 2024. Past performance is no guarantee of future results. Returns shown prior to index launch represent hypothetical, historical data. Please see the end for important legal disclosures.

Defensive qualities of listed infrastructure

This brings us to another important characteristic of Infrastructure – its defensive qualities.

In Table 3, we show the maximum drawdown of infrastructure stocks and the market capitalisation indices. We can see that the drawdowns of the Core Infrastructure Indices have been significantly lower than those of the global indices (represented by the FTSE Global All Cap, FTSE Developed and FTSE All-World Indices) during periods of market stress.

Table 3. Drawdowns of FTSE Core Infrastructure and Market Capitalisation Indices

Index	Drawdown (%)
FTSE Global Core Infrastructure	42.0
FTSE Global Core Infrastructure 50/50	48.5
FTSE Developed Core Infrastructure	40.7
FTSE Developed Core Infrastructure 50/50	48.4
FTSE Global All Cap	58.4
FTSE Developed	57.4
FTSE All-World	57.9

Source: FTSE Russell. Daily data from December 29, 2005 to May 30, 2024. Past performance is no guarantee of future results. Data shown prior to index launch represents hypothetical, historical data. Please see the end for important legal disclosures.

Listed Infrastructure is becoming increasingly more popular with investors, looking for tactical defensive plays during market downturns.

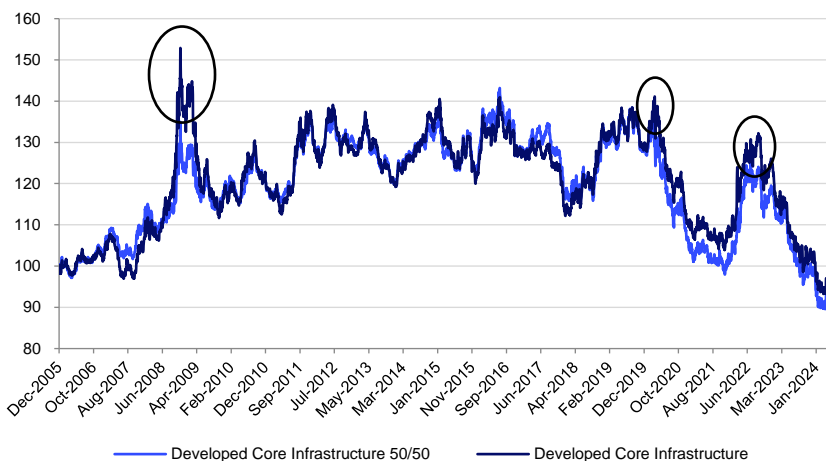
As a result, interest in defensive tools and strategies has increased (we have covered this topic extensively in our papers [1], [2]), with infrastructure becoming increasingly more popular with investors, looking for tactical defensive plays during market downturns.

In Chart 3, we show why. During the Global Financial Crisis, the FTSE Core Infrastructure Indices outperformed the corresponding Market Capitalisation Indices by around 30% between June 2008 and February 2009. More recently, during the correction at the end of 2018, the FTSE Core Infrastructure Indices also outperformed the corresponding Market Capitalisation Indices.

The FTSE Core Infrastructure Indices also rallied during the Covid crisis, but underperformed when central banks cut rates close to zero.

As interest rates started to rise, equity markets declined and listed infrastructure outperformed again up until October 2022. Then, listed infrastructure underperformed when inflation started to fall, and the broad equity market staged a recovery.

Chart 3. Cumulative total return of FTSE Developed Core Infrastructure and Core Infrastructure 50/50 Indices relative to FTSE Developed Index, rebased (USD)



Source: FTSE Russell. Daily data from December 29, 2005 to May 30, 2024. Past performance is no guarantee of future results. Returns for the FTSE Developed Core Infrastructure Index shown prior to index launch represent hypothetical, historical data. Please see the end for important legal disclosures.

The striking similarity between the performance of US government bonds and the FTSE Core Infrastructure Indices relative to the wider market capitalisation benchmark is another good illustration of the defensive characteristics displayed by infrastructure.

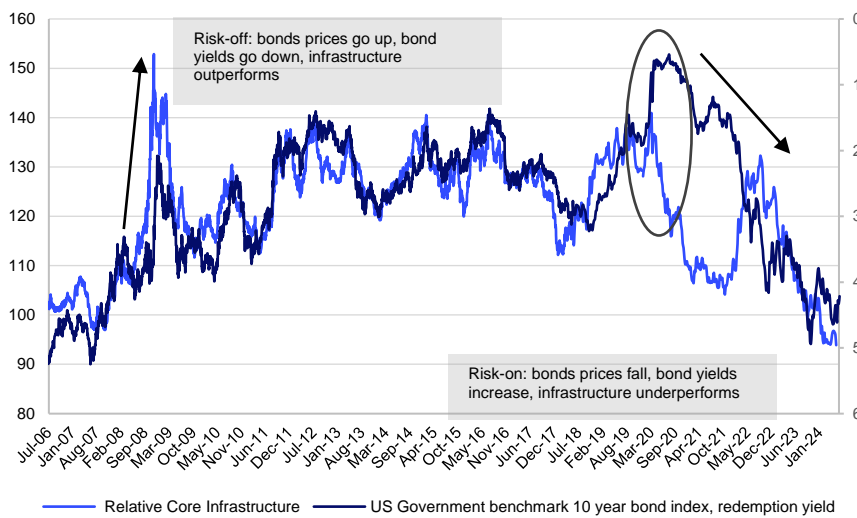
In Chart 4, we plot the performance of the FTSE Developed Core Infrastructure Index relative to the FTSE Developed Index (left-hand axis) and the yield to maturity of the 10-year US government bond index (inverted scale on the right-hand axis).

During periods of market stress, investors will typically switch from riskier assets (like equities) to more defensive ones (like bonds), causing bond prices to rise and bond yields to fall. During the 2007-2008 Global Financial Crisis, the Core Infrastructure Index outperformed the FTSE Developed Index, displaying similar defensive attributes to bonds, whose yields fell. The converse is also true; when investors turn to riskier assets, bonds sell off (yields rise), and infrastructure underperforms, as highlighted between 2016 to 2018 in Chart 4.

However, the period during and after the Covid crisis was somewhat different. In March 2020, as the Covid crisis started, the 10-year bond yield collapsed below 1%. As liquidity was pumped into the economy and fear waned, yields started to rise. The relative performance of listed infrastructure also spiked in March 2020 and fell as risk-aversion receded. Listed infrastructure had another rally between October 2021 and October 2022, during a period of rising interest rates when yields continued to rise and investor sentiment turned more defensive.

In the following section, we cover the inflation protection feature of listed infrastructure.

Chart 4. Performance of FTSE Developed Core Infrastructure Index relative to FTSE Developed Index versus 10-year US bond yield (inverted RH-scale)



Sources: FTSE Russell, for Infrastructure Index, daily observations from December 29, 2005 to May 30, 2024. LSEG, for the bond index. Past performance is no guarantee of future results. Returns shown prior to index launch represent hypothetical, historical data. Please see the end for important legal disclosures.

Inflation hedge

The relative performance of listed infrastructure and its segments was examined by AMP Capital [4]. They considered three different macroeconomic scenarios in terms of inflation expectations and real bond yields: diminishing inflation expectations, reflation and normalisation. In the first scenario, when nominal yields fell, they expected infrastructure stocks, especially longer duration infrastructure (like utilities and communication), to outperform. In the reflation case, when inflation rose as a result of macroeconomic stimuli, they expected the performance of infrastructure to be relatively neutral. In the normalisation scenario, when both inflation expectations and nominal growth returned to historical trends, general equities outperformed infrastructure.

Inflation protection is another reason why investors may look to add infrastructure to their portfolio. Typically, after an initial (positive) shock to inflationary expectations, equities recover as companies adjust their prices. This adjustment process is turbulent and uneven across equities. However, it is normally more predictable for infrastructure companies as their revenue streams are frequently directly linked to inflation.

The issue with empirically testing the inflation protection characteristic of infrastructure is that inflation has generally been benign over the calculated history of the infrastructure index. It was particularly low after the Global Financial Crisis, so beating inflation was relatively easy. First State Investments [5] has shown that since 2002, Global Infrastructure has outperformed US consumer price inflation by more than 10% per annum.

Conceptual arguments for the inflation-hedging characteristic of infrastructure, rather than statistical evidence has been given by Martin [6] and quoted by Inderst [7]: "...the relationship between inflation and infrastructure are primarily ex-ante claims based on the assumed properties of the underlying assets, i.e. the explicit link of cash flows to inflation, pricing power and economies of scale".

However, academic research on the subject has been limited. In 2012, in his dissertation [8], Maximilian Roedel puts rather strongly that "[n]o academic research has yet comprehensively analysed this [infrastructure being a good hedge against inflation] proposition. The existing studies are limited by short and insufficiently granular data (and methodology)", he says.

Earlier research of Armann and Weisdorf [9] looks at the relationship between inflation and the fundamental performance of infrastructure companies. They show that there is a relatively high 0.53 positive correlation between inflation and the EBITDA of infrastructure companies. No statistical significance of the correlation is given, however.

Both Roedel and First State suggest that not all infrastructure companies are the same in hedging inflation. Roedel introduces the notion of high and low pricing power subsets of infrastructure companies. He concludes that "[l]isted infrastructure with high pricing power hedges inflation robustly".

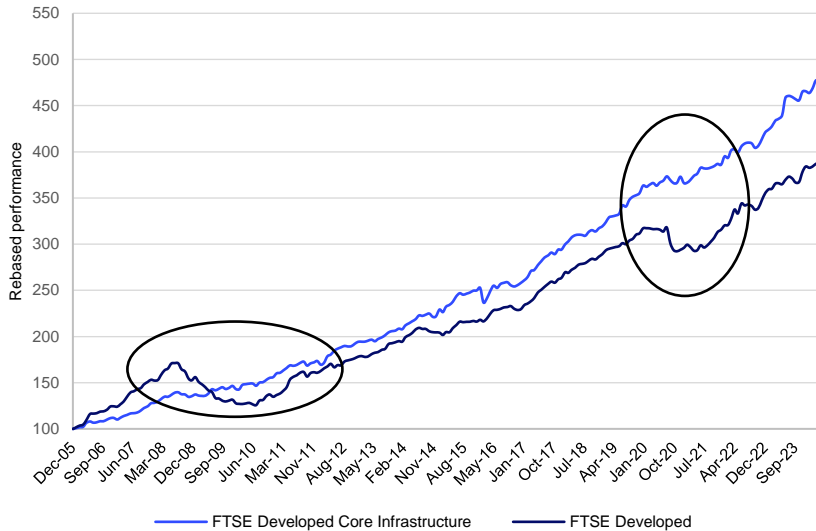
Stable income profile

One of the reasons behind the defensive qualities of infrastructure could be its stable income profile. In Chart 5, we compare the dividend per share (DPS) of infrastructure and the market capitalisation indices. Infrastructure DPS has been more stable than the wider market dividends. This was especially apparent during the Global Financial Crisis period in 2007-2011, when infrastructure DPS rose faster than FTSE Developed DPS and has resulted in a higher DPS for infrastructure overall since December 2005, although recently, both the wider market and infrastructure have exhibited similar dividend growth rates.

During the Covid crisis, the listed infrastructure DPS was also more stable than that of the wider developed equity market, increasing the DPS gap.

The defensive qualities of infrastructure are based on a stable income profile, which also demonstrates inflation protection characteristics.

Chart 5. Rebased DPS of FTSE Developed Core Infrastructure Index and FTSE Developed Index



Source: FTSE Russell. FTSE Developed Core Infrastructure and FTSE Developed Indices based on monthly data from December 2005 to May 2024. Past performance is no guarantee of future results. Returns shown prior to index launch represent hypothetical, historical data. Please see the end for important legal disclosures.

Return/risk profile

Over the last 19 years, the return-to-risk ratio has also been greater for the FTSE Core Infrastructure Indices compared to the market capitalisation indices, as shown in Table 4. Certainly, past performance has been an indication of future performance and there were several periods when infrastructure underperformed the wider market.

The fundamental reasons provided by a stable income profile over a relatively long period (which encompasses different market and macroeconomic environments) may provide some foundation to the perception that infrastructure tends to offer better risk-adjusted returns over the wider market in the long term.

Table 4. Annualised return/risk ratio of FTSE Core Infrastructure Indices and market capitalisation benchmarks

Infrastructure Index	Return (% p.a.)	Volatility (% p.a.)	Return/risk ratio
FTSE Global Core Infrastructure	8.3	12.4	0.67
FTSE Global Core Infrastructure 50/50	8.6	13.4	0.64
FTSE Developed Core Infrastructure	8.4	12.3	0.68
FTSE Developed Core Infrastructure 50/50	8.4	13.6	0.62
FTSE Global All Cap	8.9	16.4	0.54
FTSE Developed	9.1	16.0	0.57

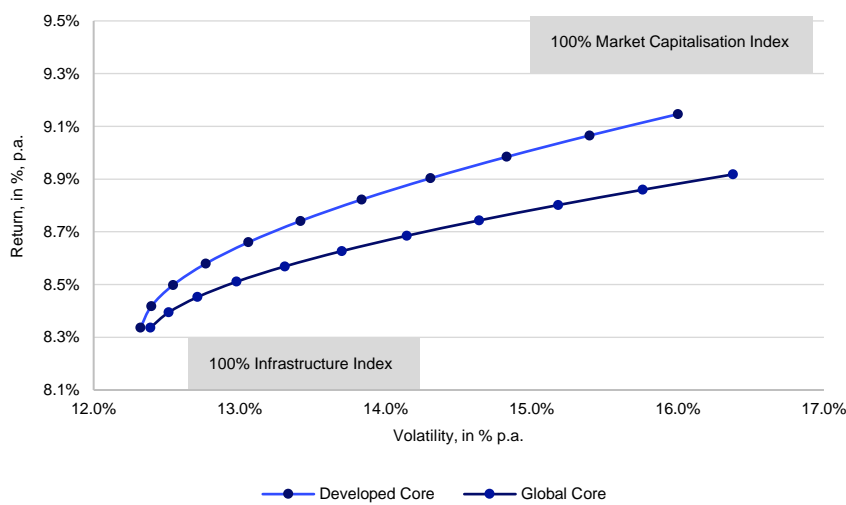
Source: FTSE Russell. Monthly observations from December 2005 to May 2024. Past performance is no guarantee of future results. Data shown prior to index launch represents hypothetical, historical data. Please see the end for important legal disclosures.

Diversification

In Chart 6, we demonstrate the risk and return outcomes as infrastructure is gradually added to a hypothetical index. Each dot represents a 10% incremental allocation to Infrastructure.

This exercise has more illustrational than practical utility. It shows the direction of impact when infrastructure weight in a hypothetical portfolio is increased, since most international equity indices already have 3-4% of their weight in infrastructure stocks. In practice, each fund will have its own liquidity and diversification constraints on how much it is allowed to increase its infrastructure holdings.

Chart 6. Risk/return profile of hypothetical blended Infrastructure and Market Capitalisation portfolios



Source: FTSE Russell. The portfolios presented is a hypothetical combination of FTSE Core Infrastructure Indices and FTSE market capitalisation indices based on monthly observations from December 2005 to April 2019. All data is hypothetical, historical data. Please see the end for important legal disclosures.

We also calculate the correlation of infrastructure indices with their corresponding market capitalisation indices. The correlation coefficients range from 0.79 for the FTSE Developed Core Infrastructure Index to 0.91 for the FTSE Emerging Core Infrastructure Index. Since the correlation is less than one, adding infrastructure to the portfolio provides some additional diversification, in addition to the greater risk-adjusted return.

Since the correlation is less than one, adding infrastructure to the portfolio provides some additional diversification, in addition to the greater risk-adjusted return.

Table 5. Correlation coefficients between FTSE Core Infrastructure and Market Capitalisation Indices²

Infrastructure Indices	Correlation
Developed Core	0.79
Global Core	0.81
Emerging Core	0.91
Developed Core 50/50	0.84
Global Core 50/50	0.86

Source: FTSE Russell. Calculations are based on end of the month index values from December 2005 to May 2024. Past performance is no guarantee of future results. Data used prior to index launch represents hypothetical, historical data. Please see the end for important legal disclosures.

Listed vs unlisted infrastructure

In the past, many institutions have preferred to invest in infrastructure via unlisted vehicles. Unlisted infrastructure assets under management exceeded US\$ 500 billion in 2019 [10], while those of listed infrastructure were around US\$ 100 billion [11]. Unlisted infrastructure investments can often involve high investment minimums, extended lockout periods, and only represent a limited portion of the infrastructure opportunity set. Many infrastructure assets are unique, so listed companies could be the only way to gain exposure to them. Unlisted funds are also quite static in their holdings, due to the size of the individual infrastructure assets and the time it takes to both acquire and dispose of them. Therefore, this limits the diversification capability of an unlisted fund. Minimum size requirements on investments in unlisted funds also put constraints on diversification for investors in unlisted vehicles.

According to the asset manager Maple-Brown Abbott [12]-[13], a firm specialising in the global listed infrastructure sector, an investment in publicly traded infrastructure equities can offer several potential advantages relative to an unlisted fund:

- A larger opportunity set – investors have greater choice in the listed infrastructure equities market
- Greater diversification – the listed equity market provides greater opportunities for diversification, as the minimum investment amount is likely to be much lower than for an unlisted infrastructure fund
- Transparency – as part of regulated stock markets, listed infrastructure companies provide high levels of disclosure and information to investors
- Daily liquidity – investors in listed infrastructure equities can exit their positions at will, whereas investors in unlisted infrastructure funds may have to wait years to redeem their holdings
- Lower fees – a listed infrastructure fund typically carries substantially lower fees than an unlisted fund, which may levy a management fee and a performance fee

An investment in publicly-traded infrastructure equities can offer several potential advantages compared to an unlisted fund.

² The correlation coefficients are calculated in respect of corresponding market capitalisation benchmarks: FTSE Developed Core Infrastructure and FTSE Developed Core 50/50 vs FTSE Developed; FTSE Emerging Core Infrastructure vs FTSE Emerging; FTSE Global Core Infrastructure and FTSE Global Core Infrastructure 50/50 vs FTSE All Stocks.

Summary

Listed infrastructure is a subset of global equities, which has a number of attractive characteristics and can be suitable for tactical and strategic asset allocation.

As opposed to unlisted infrastructure, listed infrastructure provides a practical and easy way to gain or vary exposure to this sector, as well as being cost effective and transparent in implementation.

The primary appeal of infrastructure is historically a higher dividend yield relative to the broad market, backed by defensive qualities.

The defensive qualities of infrastructure are based on a stable income profile, which also demonstrates some inflation-protection characteristics.

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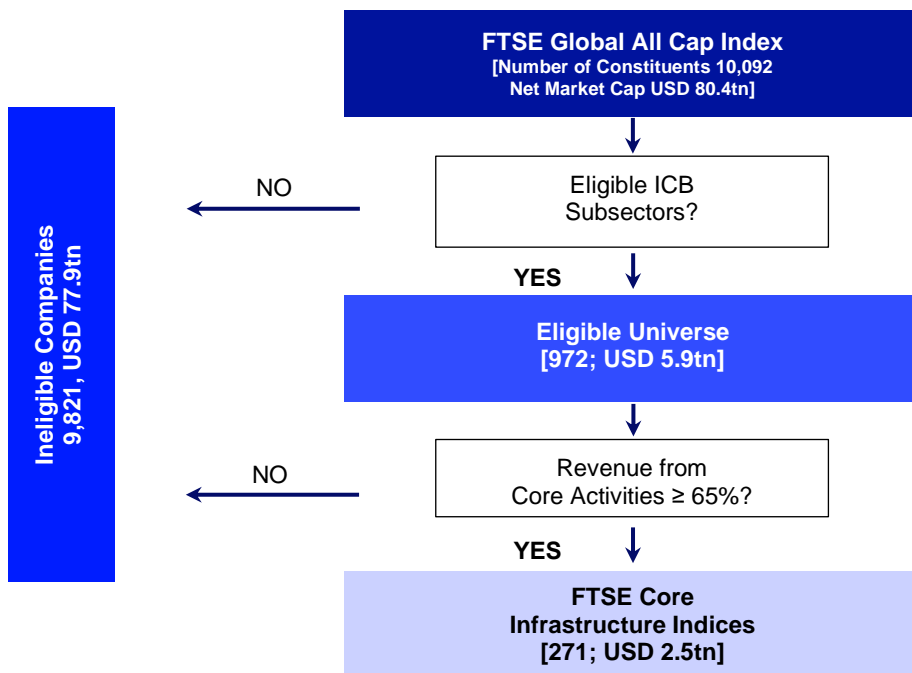
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Appendix

FTSE Core Infrastructure methodology overview

- Publicly listed companies. Transparent approach of creating investible indices. The widest possible initial universe: FTSE Global Equity Index Series.
- Eligibility. Infrastructure companies with at least 65% of revenues derived from core infrastructure activities.
- Market-capitalisation weighting. The standard market-capitalisation weighting is applied with free-float adjustments.
- Sector and stock constraints. For the core 50/50 indices, a 5% individual stock weight limit is imposed as well as a 50% limit on utilities, a 30% limit on transportation (including 7.5% limit for railways/railroad) and a 20% limit for the other sectors in the 50/50 index.
- Rebalance. Semi-annual in March and September.
- Flexibility. Definitions and approaches of investors can vary, so we provide clients an opportunity to customise indices to fit their specific requirements.

Chart 7. FTSE Core Infrastructure Index construction stages



Source: FTSE Russell as of May 30, 2024.

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