

# An Inflation-linked Bond with Rising Coupons

## The Compelling Real Asset Characteristics of Preferred Infrastructure

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It is claimed that Warren Buffett once described the perfect investment as ‘an inflation-linked bond with rising coupons’. This concept—an investment combining a low risk of capital loss with robust inflation protection and real growth—arguably captures what investors are looking for in ‘real assets’. But does such an investment exist in the real world? We believe that a select pool of real assets does in fact possess many of the characteristics of Buffett’s purported ideal investment. They are what we call ‘Preferred Infrastructure’.<sup>1</sup> In this paper we will argue that these assets can provide a contractual inflation-linkage in cash flows, stable returns through economic cycles, a low risk of capital loss, ‘rising coupons’ through real earnings growth, and, finally, diversification benefits via low volatility and low correlations to other asset classes.

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## Why Real Assets?

**Real assets provide an inflation hedge.** Real asset investments include Treasury Inflation Protected Securities (TIPS), real estate, timber, commodities and, increasingly, infrastructure assets. Infrastructure assets include public facilities such as roads, airports, and utilities. We call ‘Preferred Infrastructure’<sup>1</sup> those infrastructure assets that are regulated monopolies, providing essential services such as transport, energy, and water. Their status as regulated monopolies provides a competitive advantage over other infrastructure assets.

**Real assets provide diversification.** As well as offering a strong measure of protection against inflation, real assets may also provide diversification: real asset investments have historically demonstrated low correlation with other asset classes such as equity and fixed income.

**Real assets can provide growth opportunities.** Real assets such as Preferred Infrastructure may provide growth opportunities as budget-constrained governments in the developed world look to private infrastructure operators to refurbish an ageing infrastructure asset base. For example, the American Society of Civil Engineers estimates that approximately \$2.2 trillion is required over the next five years to bring the United States’ infrastructure up to acceptable levels,<sup>2</sup> and the OECD estimates \$35 to \$40 trillion in infrastructure spending is needed globally over the next 10 years.<sup>3</sup>

## Real Assets’ Key Characteristics

Few, if any, traditional real assets have met Buffett’s definition of “inflation-linked bonds with rising coupons”. For example: the strength of each asset’s link to inflation and the underlying risk of each asset may vary significantly. Since not all real assets are created equal, we believe that there are three key factors to consider while considering investing in real assets:

- The strength of the inflation pass-through mechanism;
- The risk/return profile of the assets; and
- Valuation—that is, the prevailing market price relative to the intrinsic value of the assets

### Strength of the Inflation Pass-through Mechanism:

**Contractual versus Market forces.** The mechanism with which real assets pass through inflation into revenues can be broadly divided into two categories: contractual and market forces. A contractual pass-through mechanism is effectively guaranteed and enforced via a contractual obligation. TIPS and Preferred Infrastructure’s cash flows have a contractual inflation pass-through mechanism. On the other hand, a market-based inflation pass-through mechanism is based on the forces of supply and demand—i.e., the amount of inflation that is passed through is dependent on the prevailing balance of supply and demand in the market place. Real estate, timber, and commodities’ pass-through mechanisms are market-based. (See Exhibit 1.) As will be clear

### Exhibit 1 Strength of Inflation Pass-through

Contractual	Market Forces
<ul style="list-style-type: none"> <li>• TIPS</li> <li>• Preferred Infrastructure</li> </ul>	<ul style="list-style-type: none"> <li>• Real Estate</li> <li>• Timber</li> <li>• Commodities</li> </ul>

Source: Lazard

later in this paper, real assets that have contractual inflation pass-through have stronger inflation protection than those that rely on market forces.

**Risk/Return Profile.** Real assets have different levels of risk attached to their cash flow streams, which in turn affect their asset values. The real assets that are often considered the lowest risk are TIPS. As government-guaranteed fixed income instruments, TIPS provide a fixed yield with an automatic inflation pass-through.

The remaining real asset classes are typically either equity-based investments or product-based assets, such as commodities, which fluctuate with the supply and demand cycle. Understanding the different risk/return profiles is critical for investors in real assets.

**Valuation.** Similarly, different categories of real assets may have varying levels of price stability around their intrinsic values, trading at above or below those intrinsic values during the economic cycle. As we will show later in this paper, we believe that the intrinsic value of Preferred Infrastructure assets tends to be more stable than that of other real assets.

## Investing in Preferred Infrastructure

**What is Preferred Infrastructure?** To qualify as Preferred Infrastructure, companies must have monopoly or monopoly-like characteristics; show a low elasticity of demand, typically because they provide essential services such as gas, water, electricity, or transportation; have either an implicit or explicit linkage to inflation in their contractual or regulatory arrangements; be located in stable political and regulatory environments with a track record of consistency and respect for investor rights; and have sustainable levels of financial leverage.

Infrastructure companies that have significant exposure to competition, commodity price volatility, excessive financial leverage, exposure to risky political environments or inadequate asset lives will not possess the unique characteristics that Preferred Infrastructure companies can provide to investors.

### Unique Economic Characteristics of Preferred

**Infrastructure.** The concept of increasing prices with the rate of inflation is not unique to real assets or infrastructure. In theory, any business can increase prices to pass inflation on to the consumer, but few can do so without a negative impact on demand. This does not apply to Preferred Infrastructure assets. Preferred

## Exhibit 2 Real Assets' Pricing Mechanism and Market structure

Asset Type	Contractual		Market Forces		
	TIPS	Preferred Infrastructure	Real Estate	Timber	Commodities
Pricing Mechanism	Contractual (CPI)	Contractual or Regulated (Tariffs/Rates)	Supply & Demand (Rents)	Supply & Demand (Marginal Cost)	Supply & Demand (Marginal Cost)
Market Structure	NA	Monopoly	Competitive	Competitive	Competitive

Source: Lazard

Infrastructure companies are regulated monopolies that provide essential services, therefore when they implement price increases, consumers typically do not have an alternative. Hence, demand is far less affected than it would be in a competitive market.

The nature of Preferred Infrastructure companies gives them an enviable 'moat', even in times of economic uncertainty. Regardless of the economic environment, people need to travel and commute to work (using toll roads, rail lines, and airports), turn on the water (using water utilities), and power their homes and businesses (using power transmission and distribution grids)—yet they may delay purchasing new cars, shoes, and computers. For example, Consolidated Edison, the monopoly provider of electricity to New York City and Westchester County, N.Y., has grown volumes by 4.2% over the past five years (including the 2008-2009 recession), despite increasing average electricity tariffs by 14.4% over the same time period.<sup>4</sup>

**Unique Characteristics of the Inflation Pass-through Mechanism of Preferred Infrastructure.** Many Preferred Infrastructure assets have a contractual inflation pass-through mechanism because their cash flows (tolls, tariffs, and other usage charges) increase automatically with the rate of inflation, as part of the specific concession deeds or regulatory agreements with government entities. In short: the inflation pass-through is effectively

guaranteed and enforced through a contractual obligation. Secondly, the inflation pass-through for Preferred Infrastructure is more timely than that of other real assets because it is usually passed on into revenues with a short time lag. For example, City Link, a toll road in Melbourne, Australia, can raise tariffs at the greater of CPI or 4.5% p.a., for the life of its concession (until 2034).<sup>5</sup>

Exhibit 2 shows the differences in pricing mechanism and market structure between different types of real assets.

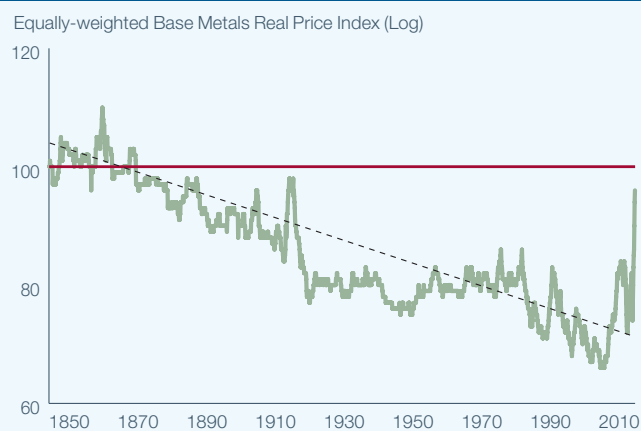
Unlike Preferred Infrastructure, the real assets that rely solely on market forces for their inflation pass-through mechanism do not have the two above-mentioned unique pass-through characteristics. This is because the effects of supply and demand may weaken (or strengthen) depending on the stage of the economic cycle and/or the specific location of the assets. In short: real assets that rely on market forces for inflation pass-through are dependent on the prevailing balance of supply and demand. Commodities and real estate are a case in point.

In the commodity market, inflation is effectively passed on through increases in the marginal cost-curve over time. In the short- to medium-term, a shortage or excess of supply can force prices above or below the cost curve. This means that commodity prices may increase above the rate of inflation (as we have seen in recent years), or below it (as has happened from the late 1970s to the late 1990s). Moreover, investors should be aware that in the long-run, as technology improves, commodity prices tend to decline in real terms. This is why commodity prices have historically produced negative real returns, as illustrated in Exhibit 3.

Real estate assets pass through inflation via the rents they receive from tenants. In a stable market with reasonable real estate supply and stable demand, this inflation pass-through mechanism may be robust. However, overcapacity in real estate markets in a particular region and/or sector may result in rents falling below inflation. Many commercial, residential, and industrial real estate markets around the world have experienced this occurrence over the past two years.

To conclude: investors seeking inflation protection in real assets that rely on market forces for their inflation pass-through mechanism (such as commodities and real estate), must assess the state of supply and demand before investing in them. This is not the case

## Exhibit 3 Commodity Prices Over the Long Term



Source: Credit Suisse, International Monetary Fund

#### Exhibit 4 Inflation Pass-through Mechanism of Some Preferred Infrastructure Sectors

Preferred Infrastructure Sector	Inflation pass-through mechanism
Toll roads	CPI-linked toll charges
Airports	Regulated, CPI-linked aeronautical fees (landing charges); rents
Utilities (Europe, Latin America, and Australia)	Regulated Asset Base (RAB)
Utilities (United States and Japan)	Nominal regulated allowed rate of return
Pipelines	Directly negotiated tariffs or regulated returns
Railroads (United States and Japan)	Tariffs negotiated with captive customers
Seaports	Direct tariff negotiation with customers
Broadcast Towers	CPI-linked long-term contracts

for Preferred Infrastructure because, as regulated monopolies, supply and demand is largely irrelevant.

While the inflation pass-through mechanism clearly shows how Preferred Infrastructure provides a contractual link to inflation (see Exhibit 4), we have not analysed the actual observed historical asset price correlation to inflation for two reasons. First, most economies have experienced disinflation over the last 20 years, therefore it is not clear whether historical analysis of any given asset's correlation to inflation over this period would be meaningful; nor can it provide a reasonable 'stress test' of how such assets would perform in an inflationary environment. Second, many of the listed infrastructure assets were government-owned during the last period of high inflation in the 1970s and 80s, therefore they are not available for analysis.

#### Exhibit 5 Examples of Some Toll Roads and their CPI-linkages

Toll Road	Location	Tolling Formula	Concession Expiration	Comment
City Link	Australia	CPI+	2034	Greater of quarterly CPI or 4.5% p.a.
Hills M2	Australia	CPI+	2042	Greater of CPI or 1.0% per quarter
407 ETR	Canada	Unconstrained	2088	Cannot double tolls within six months
M6 Toll	England	Unconstrained	2054	Management discretion
APRR	France	CPI+/-	2032	85% of CPI + 0.5% from 2011-2013
Dulles Greenway	USA	CPI+	2056	Greater of CPI + 1%, real GDP or 2.8%
Indiana Toll Road	USA	CPI+	2081	Greater of 2%, CPI or nominal GDP
A4	Italy	CPI+/-	2026	70% of CPI, + 14% p.a. from 2010-2014
Autostrade per l'Italia	Italy	CPI+/-	2038	70% of CPI, + 1%-3% p.a. from 2010-2018
Sanef	Spain	CPI-	2029	70% of CPI
AUCAT	Spain	CPI	2039	CPI
Costanera Norte	Chile	CPI+	2034	CPI + 3.5% p.a.
Vespucio Sur	Chile	CPI+	2032	CPI + 3.5% p.a.

Source: Lazard, Company data

## Examples of Preferred Infrastructure and Their Pass-through Mechanisms

### Toll roads

Toll roads are perhaps the best example of Warren Buffett's purported 'inflation-linked bond with rising coupons'. Toll road concessions are simple businesses: the owner of a concession, the average contract life of which is between 20 and 50 years, charges tolls in exchange for building and maintaining the road. The formula to calculate the tolls are almost always explicitly linked to the level of inflation. Exhibit 5 shows a selection of toll roads around the world and the specific CPI linkages allowed in their tolling formulas.

Toll road revenues are driven both by toll price and car volume. Hence, they have a real component to their revenue streams and will generate 'rising coupons' over the life of their concession.

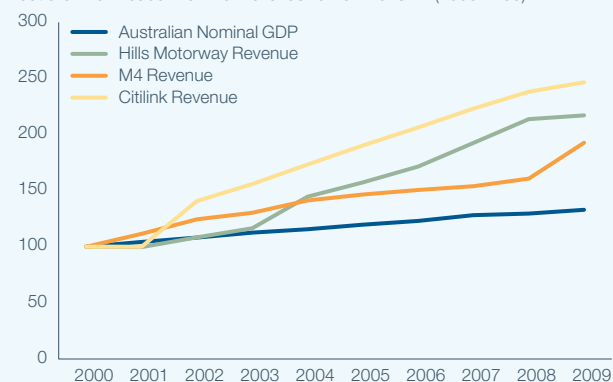
Exhibit 6 shows a sample of the historical revenues of Australian and Italian toll roads indexed to nominal Gross Domestic Product (GDP). The combination of CPI+ tolling regimes and GDP-linked traffic growth has meant that revenues have consistently exceeded nominal GDP. Note that operating profit growth was even stronger than revenue growth due to the natural operating leverage toll roads enjoy as capacity utilisation increases.

### Airports

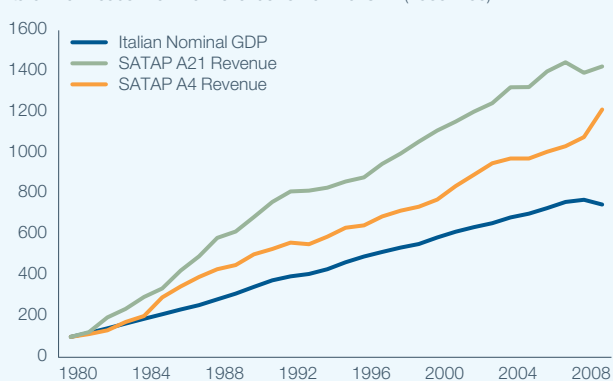
Airports also enjoy a strong inflation linkage as they are typically regulated under a 'dual-till' regime. The 'dual-till' structure provides airports with a regulated real return on the assets for their aeronautical services and an unregulated return on non-aeronautical businesses located in the airports (e.g., duty free and car parking). CPI pass-through is typically guaranteed on the regulated assets

### Exhibit 6 Historical Revenues of Australian and Italian Toll Roads Indexed to Nominal GDP

Australian Toll Roads' Nominal Revenue vs Nominal GDP (2000 = 100)



Italian Toll Roads' Nominal Revenue vs Nominal GDP (1980=100)



Source: Lazard, Company data

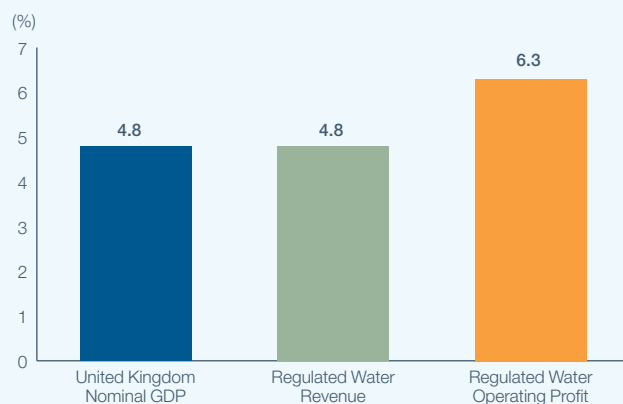
(aeronautical services), while the airport's real revenues grow through increases in passenger traffic and spending on non-aeronautical services. Historically, falling real air fares have driven passenger growth rates above that of GDP in most developed countries.

For example, Sydney Airport in Australia is regulated on a dual-till structure. Since privatisation in 2002, it has grown regulated revenues at 10.4% p.a., unregulated revenues at 8.4% p.a., and operating profits at 11.8% p.a. This compares to Australian CPI and nominal GDP growth of 2.0% p.a. and 5.0% p.a., respectively.<sup>6</sup>

## Utilities

Regulated gas, electric, and water utilities in Europe, Latin America, and Australia are monopolies; therefore they are regulated and allowed to earn a real return on their asset base. Since utilities cannot set tariffs, investors require the regulator to let them pass on inflation every year in order to protect their real return. The mechanism for this inflation pass-through is the Regulated Asset Base (RAB), which is a proxy for Replacement Cost. RAB is increased every year at the prevailing level of CPI. It is important to note that this mechanism is not used in the

### Exhibit 7 Annualized Growth Rates, 1991-2010



Source: OFWAT

United States and Japan, where inflation pass-through is effected implicitly through a nominal allowed rate of return.

The U.K. water utility sector has been privatised since 1991 and enjoys full inflation pass-through via its RAB. As Exhibit 7 shows, this has enabled the sector to achieve revenue growth equivalent to nominal GDP growth in the United Kingdom, whilst growing operating profits in excess of GDP. Exhibit 8 illustrates the revenue structure of a typical U.K. regulated utility.

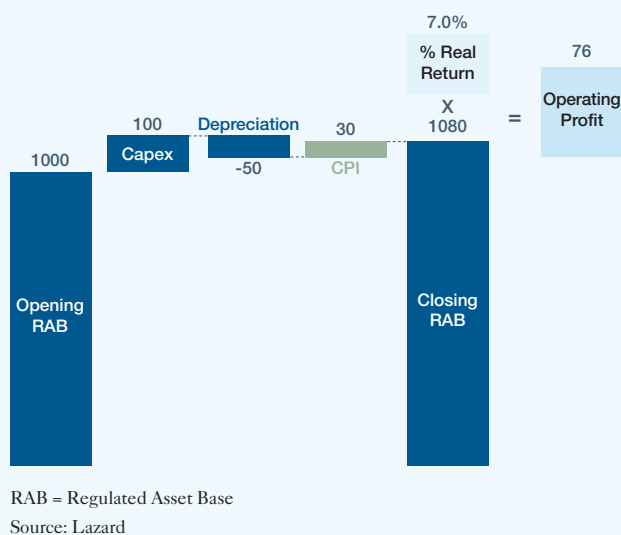
**Valuation of Preferred Infrastructure.** The valuation of Preferred Infrastructure is subject to less uncertainty than that of other real assets.

First, the cash flows associated with Preferred Infrastructure assets tend to be very stable. The reason for this cash flow stability is twofold: Preferred Infrastructure assets enjoy a monopoly-like position as providers of essential services and they also have contractual or regulated tariff arrangements.

Second, as a function of the regulatory regime, the operating returns of Preferred Infrastructure assets tend to track real and nominal interest rates levels over time, thus acting as a natural stabiliser of the value of Preferred Infrastructure across economic cycles. As a consequence, the intrinsic values should be relatively stable over time.

It is worth noting that the unique investment characteristics of Preferred Infrastructure assets also typically require specialised valuation techniques. Standard equity valuation methods using Price-to-Earnings, EV/EBITDA, Dividend Yield, etc. are rarely applicable to Preferred Infrastructure analysis and their use, we believe, can result in material valuation errors. Many assets—particularly toll roads and airports—have finite lives (typically 30–50 years) as a function of the concession agreements with local government, hence discounted cash flow is the most appropriate valuation method. Moreover, accounting earnings can be mislead-

**Exhibit 8**  
Example of a U.K. Regulated Water Utility

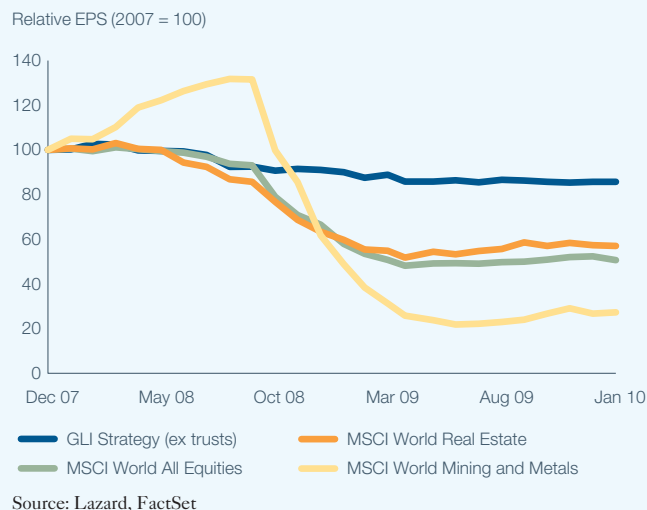


ing due to significant differences in depreciation relative to actual capital expenditures as well as tax-driven financing strategies. Finally, complex regulatory regimes around the world can have a material impact on the cash flows, return profiles, and, therefore, valuation of otherwise comparable assets.

On the other hand, the valuation of other real assets may be subject to significant uncertainty. For example, investors who buy commodities or commodity producers' stocks when commodity prices are materially above long run marginal cost (as may be the case today) run the risk that prices will revert to marginal cost (as they have done historically) and therefore fall in real terms. In such a scenario high inflation would not be sufficient to bail out investors from having paid too much for their commodity assets.

**Risk/Return Profile of Preferred Infrastructure.** As regulated monopolies providing essential services, Preferred Infrastructure assets typically enjoy highly inelastic demand

**Exhibit 9**  
FY09 Consensus EPS: Lazard's GLI Strategy vs Global Equities, Real Estate, and Metals/Mining Companies



profiles. Moreover, with very high operating profit margins and stable regulated returns, profits are also relatively protected from any given fall in revenues. The recent global financial crisis provided a stress test for real assets.

Exhibit 9 shows consensus earnings per share for Lazard's portfolio of Preferred Infrastructure companies over the course of the global financial crisis, compared to a range of other real asset classes and securities during the same period. Earnings expectations for global equities, real estate and metals/mining companies were cut by 40%–80% during the global financial crisis. On the other hand, earning expectations for Preferred Infrastructure companies were reduced by less than 15%.

As would be expected, over time the low risk characteristics of infrastructure assets have been reflected in their relative and absolute share price movements. When compared to other real asset types, infrastructure has provided investors with attractive returns

**Exhibit 10**  
Annualized Real Asset Returns and Volatility over Five, Ten, and Fifteen Years

Description*	5 Years		10 Years		15 Years		
	Return	Volatility	Return	Volatility	Return	Volatility	
U.S. Inflation (CPI)	1.8	0.3	1.9	0.3	2.1	0.3	
Real Assets	U.S. TIPS	5.3	7.3	7.1	6.8	NA	NA
	Infrastructure	5.8	18.3	7.6	16.3	7.4	14.1
	Commodities	-5.7	27.5	1.8	25.0	5.2	23.0
	REITS	3.0	32.3	10.8	24.9	10.8	21.1

As of 31 December 2010

\* Real asset returns data represented by monthly returns (annualised) derived from the following indexes: CPI-U All Items Less Food And Energy U.S. City Average SA, Barclays Capital US Govt Inflation-Linked, UBS Global Infrastructure & Utilities 50-50 Index, S&P GSCI, FTSE NAREIT All Equity REIT's

Source: FactSet

with relatively low volatility, as seen in Exhibit 10. Historically, the addition of infrastructure would have significantly enhanced the risk-adjusted returns of a real assets portfolio.

## Conclusion

We believe that the case for Preferred Infrastructure within a broad based allocation of real assets is compelling. However, historically, investors have had difficulties in accessing Preferred Infrastructure assets due to a limited universe of publicly-traded companies and lack of available investment strategies from global investment managers. To overcome these hurdles Lazard has built a proprietary universe of over \$0.5 trillion worth of such assets, and we launched the Global Listed Infrastructure strategy over five years ago.

As we have illustrated in this paper, there are three key criteria for assessing real assets: inflation protection, risk profile, and valuation. On all three of these criteria, Preferred Infrastructure assets compare well against other real assets because they aim to produce stable, inflation-linked returns, with risk and return between equity and debt. They enjoy strong inflation linkage by virtue of contractual or regulatory arrangements that explicitly or implicitly link revenues to annual CPI; their status as regulated monopolies providing essential services means that their returns have proven highly stable across economic cycles; and, finally, at the present time, we believe many areas of the listed infrastructure market universe offer compelling values, which may support solid returns regardless of the level of inflation in coming years.

## Notes

- 1 Preferred Infrastructure is Lazard's definition of a select group of infrastructure assets which have characteristics such as a high degree of revenue certainty, high operating profits, and longevity.
- 2 Source: American Society of Civil Engineers, Report Card, 2009. <http://www.infrastructurereportcard.org>
- 3 OECD, Infrastructure to 2030, OECD, Paris, 2007
- 4 Consolidated Edison, 10K, 2010
- 5 Transurban, Annual Report, 2010
- 6 MAP Group, company data, 2002-2010

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Published on 18 April 2011.

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