

# Infrastructure Investing

## The myths and realities

What you need to know about infrastructure



# A growing opportunity in an evolving asset class



Private infrastructure has over a trillion dollars of assets under management. This asset class now covers a broad range of businesses such as energy, transportation, digital and social infrastructure. It has also gained the reputation of being a stable safe haven especially during the market turmoil in recent years.

However, investors are grappling with rapidly changing dynamics around issues such as environment, politics, technology and competition. This paper serves as a compendium for both veterans and newcomers of the industry and explores the ins and outs of the infrastructure asset class beyond just the typical catchphrases and buzzwords.

# The evolving definition of infrastructure

Infrastructure covers a wide range of sectors that provide essential services to citizens, including assets that satisfy the energy, transportation and communication needs of society. Infrastructure can also extend to other industries such as waste and water, healthcare, and other necessities (See Figure 1).

Historically, governments around the world were the main investors of infrastructure, and in many places, they still are. However, private capital has become increasingly more important. The trend started in Australia in the 1990s, with the privatization of state- owned infrastructure assets, and

has spread across the world to Europe, Canada, the US, and eventually even emerging markets.

Private infrastructure funds have displayed a strong track record in operating infrastructure assets efficiently, often enhancing their performance relative to under state ownership, whilst also satisfying the investment return requirements of their investors. These investment vehicles have therefore become an integral part of the infrastructure ecosystem for many countries around the world.

**Figure 1: Examples of infrastructure assets**

Energy transition	Oil and gas	Power & utilities	Telecom	Transport & logistics	Others
<ul style="list-style-type: none"> <li>– Renewable power (wind, solar, hydro, biomass)</li> <li>– Energy storage</li> <li>– EV charging</li> <li>– Clean fuels</li> </ul>	<ul style="list-style-type: none"> <li>– Pipelines</li> <li>– Processing plants</li> <li>– LNG export / import</li> <li>– Storage</li> <li>– Refineries</li> <li>– Chemical plants</li> </ul>	<ul style="list-style-type: none"> <li>– Conventional power (gas, nuclear, coal)</li> <li>– Transmission lines</li> <li>– Distribution networks</li> </ul>	<ul style="list-style-type: none"> <li>– Broadband internet (fiber networks, fiber backbone, subsea cable)</li> <li>– Data centers</li> <li>– Telecom towers</li> </ul>	<ul style="list-style-type: none"> <li>– Airports</li> <li>– Railroads</li> <li>– Toll roads</li> <li>– Car parks</li> <li>– Ports</li> <li>– Equipment leasing</li> </ul>	<ul style="list-style-type: none"> <li>– Waste / water treatment</li> <li>– Recycling plants</li> <li>– Social infrastructure (healthcare, education, government buildings)</li> </ul>

Source: UBS Asset Management, May 2023.

However, there is some nuance around what actually qualifies as an infrastructure investment. If it is simply based on the delivery of essential services, then even the local supermarket or pharmacy would be considered infrastructure – yet they are not.

Traditionally, infrastructure investments are not just hard assets that provide essential services to society, but they also include other attributes such as high capital costs, long asset life, technological maturity, stable cash flows, and long-term contracts. We provide a summary of these types of attributes in Figure 2.









In the past, an investment would have to check most of the boxes on the list to qualify as infrastructure. But now, beyond the “essential service” and “long asset life” requirements, other characteristics are more flexible. The number of boxes that still need to be checked depends on the specific investor’s risk tolerance and strategy.

The importance of some of these attributes has diminished over time, simply due to the natural evolution and maturation of the asset class.

For example, generous subsidies across renewable energy incentivize investors to accept risk in the adoption of newer technologies. Also, given the tailwinds in businesses such as telecom / digital infrastructure, there is less demand for long term contracted cash flows, as the high visibility to growth mitigates some risks. Investors are also more willing to deploy capital in competitive markets, as long as fundamentals are attractive.

What qualifies as essential can also change. For example, investors recognized the importance of telecom infrastructure particularly during the COVID-19 pandemic, when work-from-home became the norm, and broadband internet became as essential as heating and water. Telecom went from 7% of global infrastructure deal flow in 2017 to 16% in 2022.

**Figure 2: Current infrastructure investments no longer check all the boxes of “traditional” definitions**

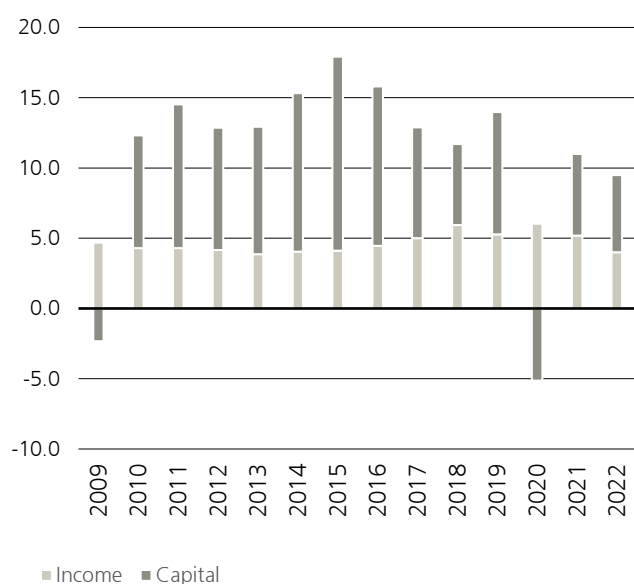
“Traditional” infrastructure characteristics	Current importance	Changing definition
Provides an essential service		Still a key attribute, although what is "essential" evolves (e.g. broadband is now essential)
Long asset life		Still a key attribute; if anything, useful life assumptions are being stretched
Mature technology		Subsidies could increase risk-taking around newer technologies
High upfront capital costs		Some smaller assets (e.g. distributed resources, digital edge) require less capex
Monopolistic / high barriers-to-entry		Shifting away from regulated assets means more exposure to competitive markets
High credit quality counterparties		Counterparties such as customers can now be smaller enterprises or retail clients
Stable and reliable cash flows		Growth platforms or development assets generate less near-term cash flows as they reinvest their cash to drive longer term growth and value
Long-term contracts		Focus less on contracted cash flows and more on quality of cash flows, even if this means shorter contracts or more market/merchant exposure

Source: UBS Asset Management, May 2023.

# Unique investment characteristics

Despite the evolution of the infrastructure asset class, one defining feature of infrastructure that remains relatively stable is its performance. If we look at MSCI's private infrastructure index, returns have not deviated much from year to year except during the financial crisis and during the height of the COVID-19 pandemic (see Figure 3). Even during those challenging years, the asset class still outperformed public markets.

**Figure 3: Infrastructure performance**  
(Gross total return %, local currency)

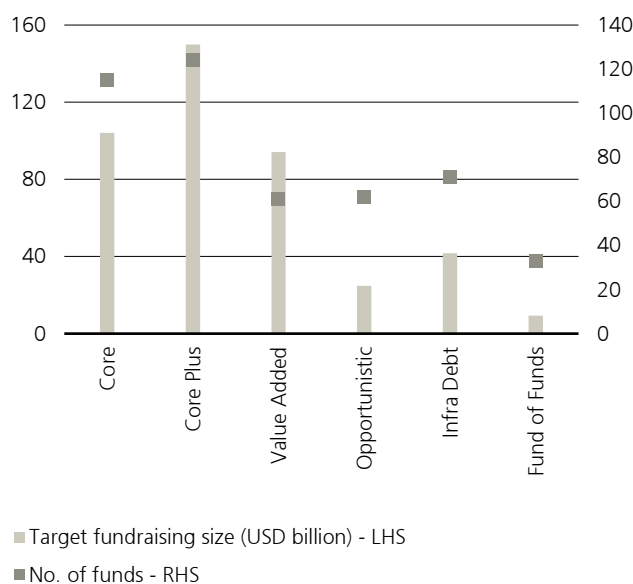


Source: MSCI Global Quarterly Private Infrastructure Index, May 2023. Past performance is not a guarantee for future results.

Another important investment characteristic is the high contribution of income to total returns (vs. capital appreciation). The generation of stable cash flows has always been a hallmark of infrastructure investments, and those income returns remained remarkably stable in the last 10 years.

The balance of income vs capital appreciation in returns is also an important element in investment strategy. Similar to private real estate investments, infrastructure risk appetite can vary from the lower risk core or super core strategies, to higher risk core-plus strategies, to the highest risk value-added strategies (see Figure 4). Traditionally, moving up through the risk categories implies an increased weighting of capital appreciation to total return generation.

**Figure 4: Infrastructure funds currently in the market**  
(by type)



Source: Preqin, May 2023.

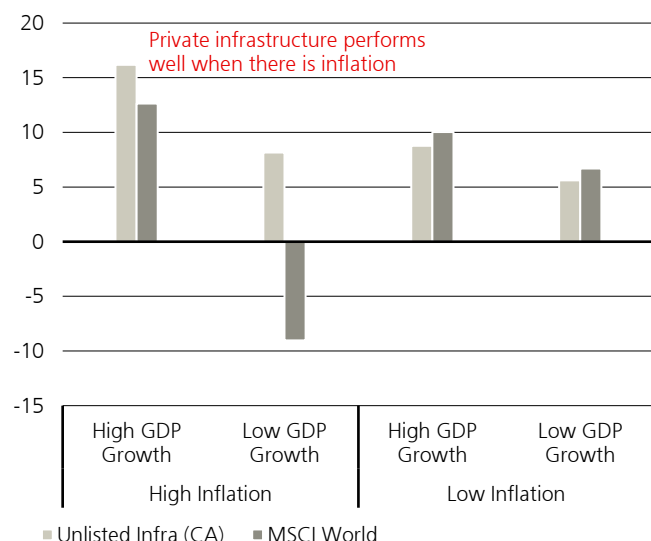
Overall, investors can expect lower risk core strategies with an increased focus on the income component of returns, while higher risk value added strategies would focus more on capital appreciation. Depending on economic and market conditions, investors will have different preferences for these strategies.

Another investment characteristic that attracts investors to infrastructure is its performance during inflationary environments. Since infrastructure assets provide essential services and tend to have monopolistic characteristics, they also have pricing power. That means that when there is inflation, these assets can pass costs down to end users. Some infrastructure assets also have contracts that include explicit inflation linkages.

Historical performance supports this idea. On average, from 2005 to 2022, infrastructure outperformed public markets when there was high inflation. This outperformance was most pronounced when high inflation was combined with low GDP growth (see Figure 5).

Infrastructure's strong performance in 2022 when OECD inflation averaged 10% further highlights this unique feature of the asset class (see Figure 6).

**Figure 5: Private infrastructure performance under different GDP/CPI scenarios 2005-2022 (%)**



Sources: Cambridge Associates, Bloomberg, MSCI, OECD, May 2023.  
 Notes: Data based on quarterly Y/Y data; unlisted infrastructure based on Cambridge Associates data; GDP and CPI data based on OECD countries; threshold for high vs. low GDP and CPI are both ~2% (based on median quarterly data of observation period). Past performance is not a guarantee for future results.

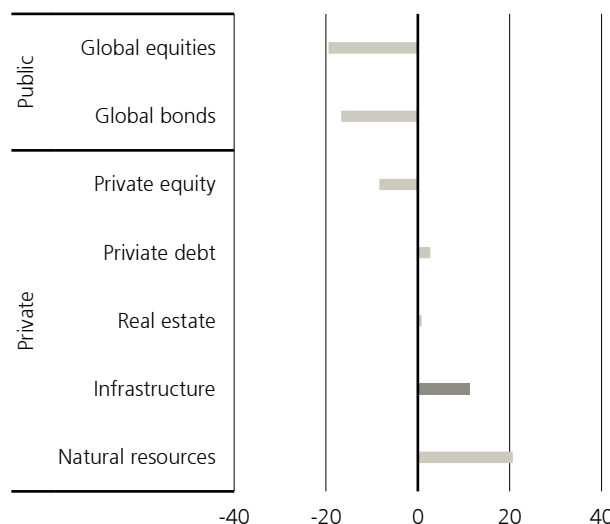
Investors should be aware that although a diversified infrastructure portfolio has shown strong inflation protection, individual sector and asset performance can vary. When we look at inflation for specific infrastructure exposed industries and their relationship to overall inflation, we see a wide variety of sensitivities. Energy and transport exposed industries tend to show a stronger correlation to overall inflation, while telecommunication exposed industries tend to be less sensitive (see Figure 7).

This is relatively intuitive, as most individuals notice how their energy bills go up when there is high inflation, while their telecom and internet bills do not usually see much change in price.

In no ways does this mean that telecom assets do not perform well when there is inflation – the sector is simply more focused on growth. As long as growth is intact, performance can still remain strong regardless of the inflationary environment.

Going back to Figure 3 and Figure 5, we believe the myopic focus on inflation also misses a bigger point – that infrastructure tends to exhibit stable performance in most economic environments. The macro environment can change quickly, and even in 2023, we are already seeing less concerns around inflation as commodity prices and inflation expectations have fallen.

**Figure 6: 2022 performance by asset class (return %, local currency)**



Source: Burgiss, Bloomberg, May 2023.  
 Note: Private market data from Burgiss; Global equities based on MSCI World; Global Bonds based on Bloomberg Global Bonds Index. Past performance is not a guarantee for future results.

It is also entirely possible that in the next few years, investors will focus on completely different issues (e.g. recession, deflation, or something we have not thought about yet), but what will likely remain true is that infrastructure will continue to have a unique and irreplaceable role in society, adding to its resiliency. The uniqueness of infrastructure assets means that this asset class tends to show relatively low correlations versus other asset classes. If we look at historical MSCI private infrastructure performance data, the correlations versus public markets would be close to zero.

However, as much as we would like to see zero correlation for infrastructure, this also seems slightly unreasonable, since infrastructure is still exposed to many of the same macro-economic drivers as public markets.



What we discovered is that when we lag private infrastructure data by 2 quarters, then the correlation increases to 0.15 vs. global equities and 0.20 vs. listed infrastructure. This makes sense as private markets tend to lag public markets given less frequent mark-to-market.

However, these correlations still remain very low, which means for average investors, infrastructure provides positive diversification benefits to most portfolios (see Figure 8).

**Figure 7: Inflation sensitivity by industry**

PPI - industry	vs. overall PPI (2012-22)	
	Correlation	Beta
Oil and gas extraction	0.76	8.7
Electric power generation	0.60	4.7
Air transportation	0.76	3.1
Marine transportation	0.85	2.7
Truck transportation	0.97	1.8
Rail transportation	0.84	1.0
Wireless telecom services	0.56	0.7
Waste collection	0.60	0.5
Electricity transmission and control	0.34	0.3
Wired Internet service	0.07	0.0
Data processing, hosting	0.02	0.0

Note: Beta is the "slope" of the correlation, which is a measure of sensitivity. For example, a 1% overall PPI inflation would imply a 8.7% PPI inflation for the oil and gas extraction sector, since the beta is 8.7. Source: Bureau of Labor Statistics, May 2023.

**Figure 8: Private infrastructure has some correlation to public markets if we lag the data**

Correlation (2Q08-4Q22)	Global equities	Global corp. bonds	Global govt. bonds	Listed infra	Private infra – 2Q lag
Global equities	1.00				
Global corp. bonds	0.72	1.00			
Global govt. bonds	0.20	0.72	1.00		
Listed infra	0.83	0.63	0.21	1.00	
Private infra – 2Q lag	0.15	-0.01	-0.20	0.20	1.00

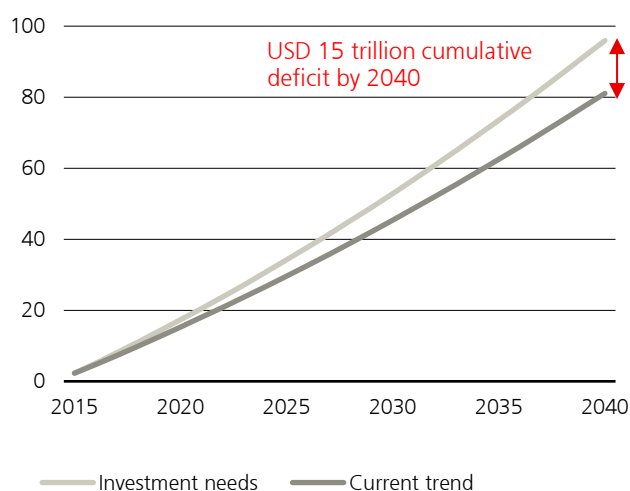
Note: The following indices are used for the above benchmarks – MSCI World (global equities), ICE BofA global corporate bonds (global corp. bonds), FTSE world government bonds (global govt. bonds), GLIO index (listed infra), MSCI private infrastructure (private infra). Source: Bloomberg, MSCI, GLIO, May 2023.

# Infrastructure investments – why now?

Infrastructure plays a critical role in modern societies as it is a driver of economic growth, and it enhances the quality of life for citizens. Their importance is rarely questioned by anyone – yet infrastructure investments often fall short of actual needs.

According to the Global Infrastructure Hub (a G20 Initiative), the world will need almost USD 100 trillion of cumulative infrastructure investments between 2015 and 2040, yet we are currently on track to miss this number by around USD 15 trillion (see Figure 9).

**Figure 9: The widening infrastructure gap**  
(USD trillion)



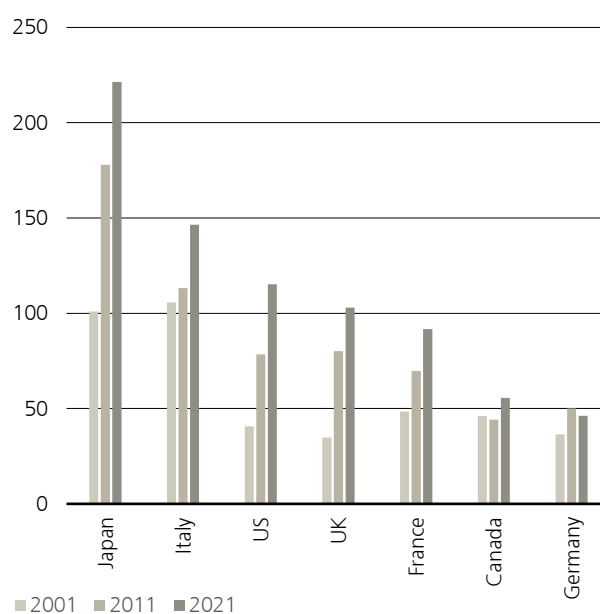
Source: Global Infrastructure Hub (G20 Initiative), December 2015.

The big debate around the world is: who pays for infrastructure? In the past, governments were responsible for much of the investments especially in more traditional and simple projects like roads and bridges. However, as complexity of infrastructure increases, most governments simply do not have the expertise to operate or even to build these assets.

In addition, when politics are involved, other government spending programs such as healthcare, welfare, education, and defense are often prioritized, as they provide more instant gratification to voters during short election cycles. This is particularly true in developed markets, where the temptation to apply quick and temporary fixes to outdated infrastructure is politically more expedient than building something new from scratch.

Rising government debt loads (see Figure 10) and fiscal constraints that have worsened during the COVID-19 pandemic further limit the funds that governments have available for infrastructure. This is why private infrastructure capital, with its deep pockets and long-term investment horizon, has become the most immediate solution to bridge this gap.

**Figure 10: Rising government debt-load means private capital is more important now than ever**  
(Government debt as % of GDP)



Source: IMF, May 2023.

Governments recognize these opportunities, which is why many of the recent landmark policies such as the EU's green deal and the US's Inflation Reduction Act (IRA) and Bipartisan Infrastructure Law all have a heavy focus on enabling private capital investments. This is achieved through the use of subsidies, tax credits, grants, financial guarantees, or risk-sharing mechanisms, and the acceleration of project approval processes through the streamlining of bureaucracies.

Finally, the infrastructure sector is exposed to a number of exciting secular trends that give what is already a stable asset class some attractive growth tailwinds.



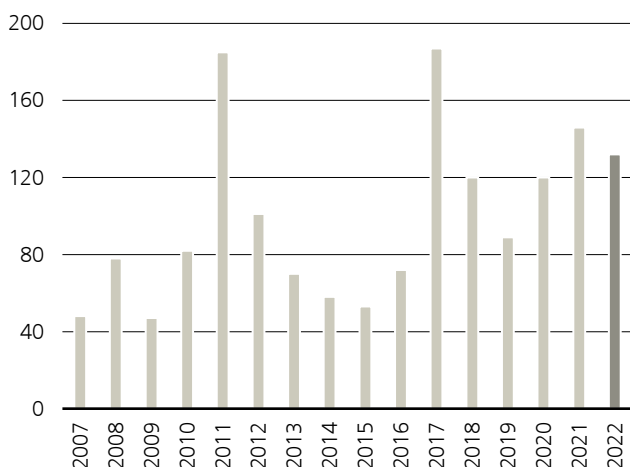
These secular trends are commonly known as the 3 Ds – decarbonization, digitalization and demographic change, although in our view, there is also a “4th D” that is quickly emerging as an important trend. We will discuss all of them in more detail below.

### Decarbonization

Arguably one of the most important investment themes across any asset class, the world’s efforts to decarbonize have created one of the largest investment opportunities in a generation. In the last 20 years, climate change has gone from just academic theory to something that everyone is now experiencing with extreme weather events and natural disaster.

The economic impact of climate change has also become more tangible, as global insured losses have been trending up in the past decade (see Figure 11). In the US, the National Oceanic and Atmospheric Administration reported that the number of billion-dollar disaster events have increased from an average of 6 per year from 1990 to 2010, to 15 per year between 2011 and 2022.

**Figure 11: Weather-related disaster** (global insured losses, 2022 USD billion)

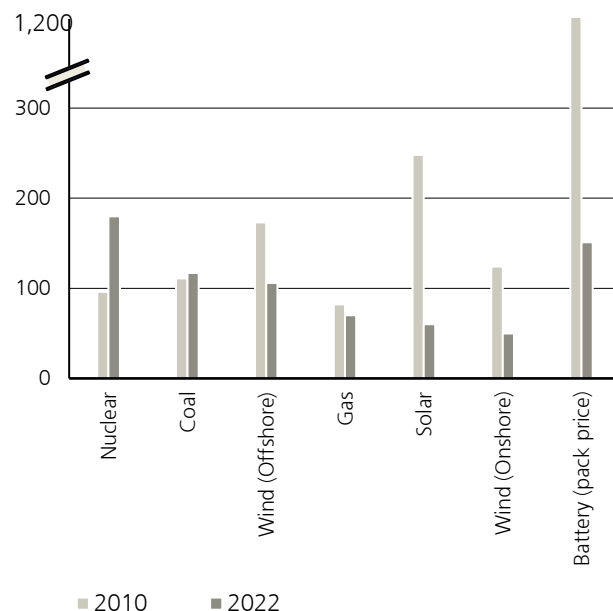


Source: Aon 2023 Weather, Climate and Catastrophe Insight report, January 2023.

Clean energy technology costs have fallen significantly in the past decade (see Figure 12), thus improving project economics, and enabling the rapid expansion of renewable energy penetration.

**Figure 12: Renewables and batteries have become cost competitive**

(USD / MWh) for renewables; (USD / KWh) for battery



Source: Lazard LCOE Analysis 16.0, BNEF, April 2023.

According to the IEA, investments in clean energy have reached USD 1.4 trillion in 2022, and could accelerate further given aggressive government policies such as the EU green deal and the US IRA.

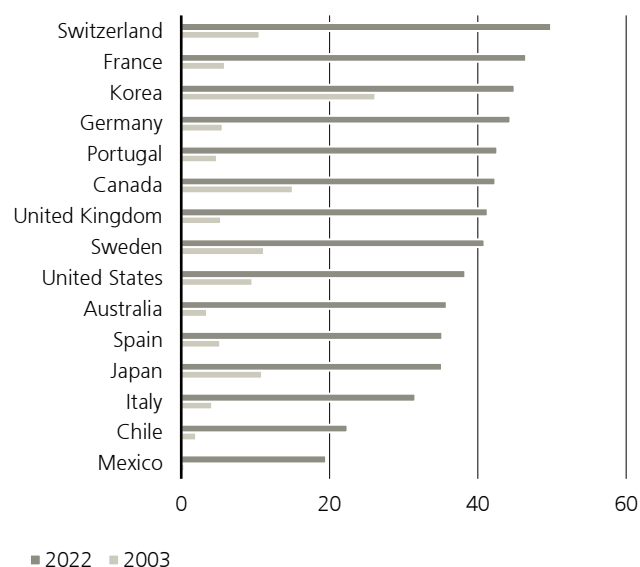
### Digitalization

Digitalization is a universal theme. Gartner, a US technological research firm, forecasts that global IT spending will reach USD 4.6 trillion in 2023, up 5.5% versus 2022. Data consumption growth continues to drive digital infrastructure investments.

High-speed internet also became a necessity for most households during the pandemic with remote work and school, cementing digital infrastructure as an absolute essential service (see Figure 13).

Infrastructure investors will continue to support the growth of this industry, although there are some regional differences to how high-speed internet infrastructure is being rolled out (fiber vs. 5G, private vs. public financing for fiber). For example, European investment continues to go into full fiber with strong government support, as the number of fiber-to-the-home (FTTH) subscribers is expected to more than double between 2021 and 2026. On the other hand, US high-speed internet rollout is a mix between 5G and fiber.

**Figure 13: Broadband subscriptions per 100 inhabitants**



Source: OECD, May 2023.

For investors, telecommunication infrastructure across towers, fiber and data centers are all attractive investments, given the long runway for global data consumption growth.

However, the pandemic has also put a huge spotlight on the sector. This can be viewed as a double-edged sword: on the one hand, it could attract more market liquidity and government support, but on the other, it could also attract more competition and regulatory scrutiny.

**Demographic change**

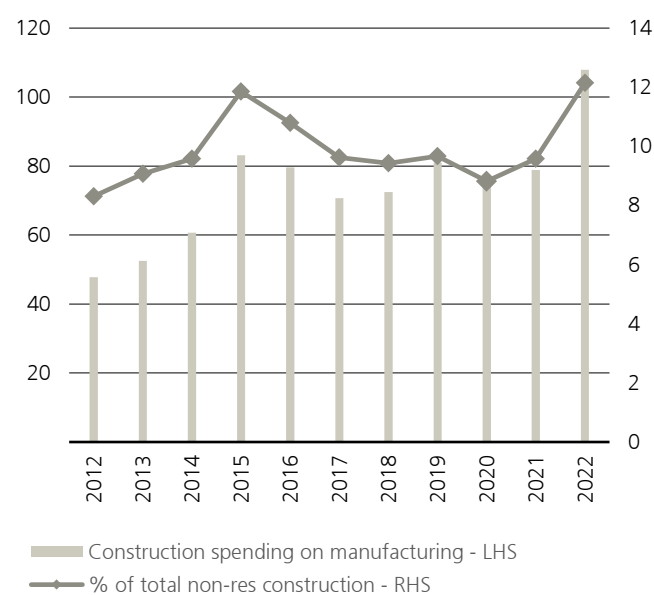
The global population is ageing rapidly around the world, in both developed and emerging markets. In addition, the recent pandemic showed the importance of social infrastructure related to healthcare and retirement living. These businesses tend to be more niche for infrastructure investors, as they often come in the form of public-private partnerships or involves medical equipment leasing.

The trajectory of ageing population is much more certain than the growth rates of the first 2 Ds (clean energy growth and data consumption growth), which adds to the appeal of the demographic change investment theme. However, the industry is also highly scrutinized and contains significant operational and reputational risks. It is therefore more suited for investors that specialized in the industry.

**Deglobalization (a potential 4<sup>th</sup> D?)**

The 3 Ds are fairly mainstream investment themes that many investors are already targeting. In our view, a more underrated and less discussed 4<sup>th</sup> D is deglobalization. Geopolitical tensions and recent supply chain issues have revitalized the demand for domestic manufacturing capacity in the developed world. For example, capital spending in US manufacturing capacity has reached an all-time high in 2022 (see Figure 14).

**Figure 14: US capital spending in manufacturing and share of total non-res spending (USD billion)**



Source: US Census Bureau, May 2023.

This is further accelerated by the IRA, which is as much industrial policy as it is energy policy, as it provides generous subsidies to domestic clean energy and domestic manufacturing. For example, there are over USD 50 billion of battery manufacturing investments currently planned in the US. Other sectors like semiconductors have also announced over USD 150 billion of manufacturing investments. Similarly, the EU is also looking to implement a “Green Deal Industrial Plan” to reinvigorate its domestic manufacturing.

This could provide a potential tailwind for infrastructure, as the onshoring of manufacturing will require upgrades to the current transportation networks like roads, rails and ports, as well as other adjacent infrastructure that would support population growth in new industrial areas.

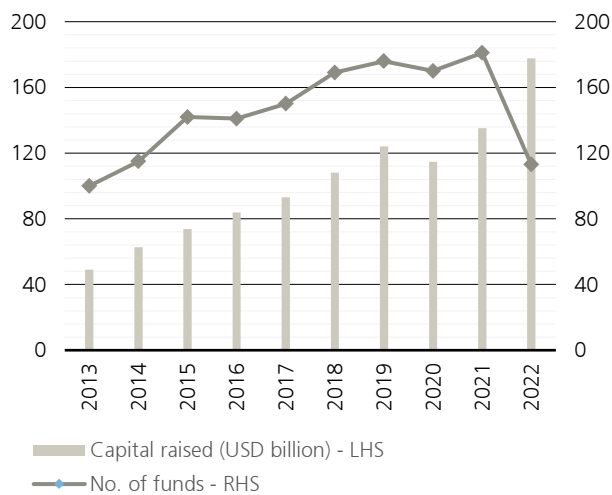
# How, where and what to invest?

Earlier in this paper, we highlighted the types of infrastructure strategies that are available to investors by risk appetite (see Figure 4). In reality there are an endless number of strategies and fund types available to investors, with a combination of the following key variables (and many others):

- Size of investments (large vs. middle markets)
- Industries targeted (diversified vs. concentrated)
- Geographies targeted (diversified vs. concentrated)
- Risk appetite (cash generation vs. capital appreciation)
- Investment horizon (generally medium or long term)

In 2022, private infrastructure saw record fundraising at USD 180 billion, yet the number of funds that raised money was almost at a 10 year low (see Figure 15), as fundraising was dominated by mega funds.

**Figure 15: Private infrastructure fundraising** (USD billion and # of funds)



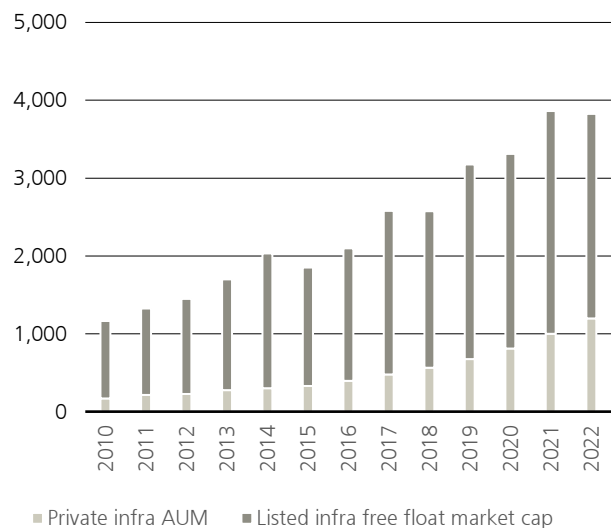
Source: Preqin, May 2023.

Since mega funds generally have an appetite for larger acquisitions, the taking private of publicly traded companies have become a natural solution for them to deploy large sums of capital quickly in attractive industries.

We believe that this trend will continue, as many infrastructure investments with long useful lives find a more natural fit under the ownership of private infrastructure funds that have long investment horizons.

There are also certain subsectors where the most scaled infrastructure portfolios are typically found in the public markets (e.g. investor owned utilities, Class I US railroads, data center platforms), which make these investments appealing to mega-funds.

**Figure 16: Private infrastructure AUM vs. listed infrastructure market capitalization** (USD billion)



Source: Preqin, GLIO, Bloomberg, May 2023.

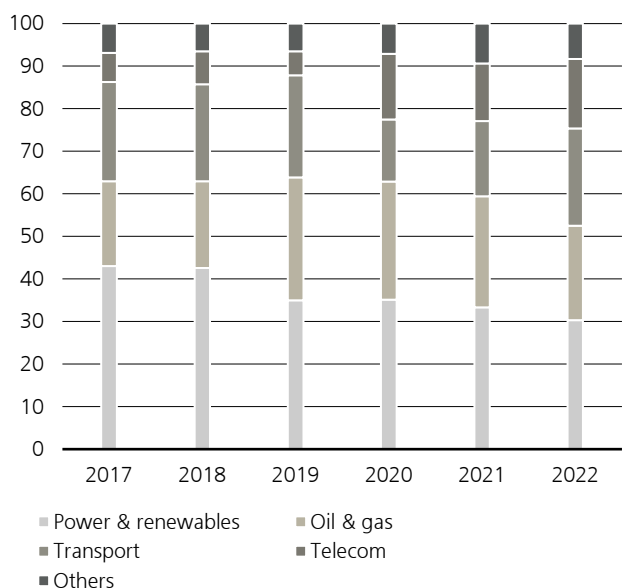
Although mega-funds may be capturing all of the attention (and capital), smaller funds that target middle-markets also have competitive advantages.

Many infrastructure businesses operate in highly fragmented or niche areas, which means middle-market investors can find more bargains, enjoy first-mover advantages in new industries, or explore roll-up and consolidation strategies. There are also more opportunities for bilateral negotiations, which means investors can avoid the pricing pressure of bidding wars.

We are also seeing more thematic infrastructure funds that target specific industries, with telecom infrastructure and energy transition strategies being the most popular.

As we have discussed earlier in this paper, the definition of infrastructure continues to evolve, as we have seen with telecom infrastructure (see Figure 17), and more new industries will undoubtedly emerge and become mainstream infrastructure investments.

**Figure 17: Private infrastructure closed transactions**



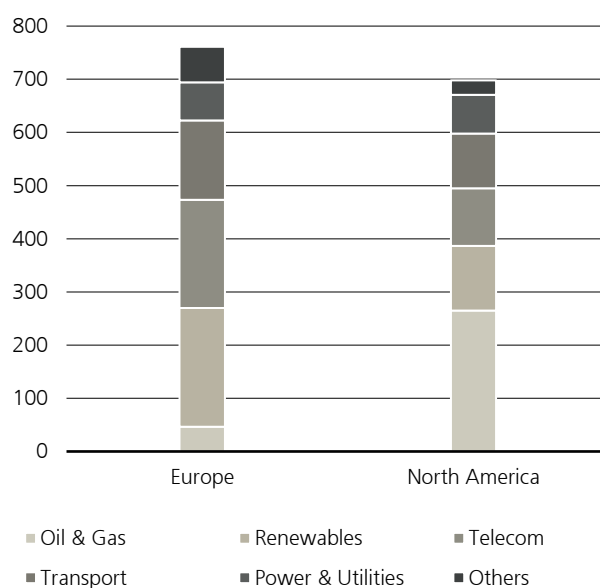
Source: Inframation, May 2023.

Some funds also have geographic focuses, although certain regions or countries may inherently have more sector concentration. For example, in North America, energy related investments (including power, utilities, renewables, oil and gas) tend to account for a much larger portion of the overall deal flow (see Figure 18). On the other hand, the European infrastructure markets tend to be more diverse on a sector level.

There is no right or wrong strategy, and often, it depends on an investor’s own risk, geography or sector preferences, as well as how these investments complement with their broader portfolio of investments.

In Figure 19, we summarize the main infrastructure sectors, sub-sectors and their key trends.

**Figure 18: 2018-2022 private infrastructure investments by region (USD billion)**



Source: Preqin, May 2023.

## Conclusions

The next several years will be an exciting time for the infrastructure industry. Governments around the world and their citizens have recognized that infrastructure investments will have an important role to play to drive future economic growth, support decarbonization, and enhance quality of life.

Recent policies such as the US Inflation Reduction Act, the US Bipartisan infrastructure Law and the EU Green Deal have significantly broadened the investable universe for infrastructure investors.

Private infrastructure has gained the reputation of a safe haven that also happens to enjoy secular tailwinds – a rare combination across any investments. With persistent market volatility, economic uncertainties and geopolitical tensions, private infrastructure’s diverse product offering and resilient performance through economic cycles should appeal to most investors.

**Figure 19: Infrastructure investment sectors and key trends**

Sector	Sub-sectors (examples)	Key trends
Energy transition	<ul style="list-style-type: none"> <li>– Renewables (wind, solar, hydro, biomass)</li> <li>– Energy storage (batteries, pumped hydro)</li> <li>– Emerging tech (RNG, hydrogen, CCUS)</li> <li>– EV infrastructure (charging, fleet servicing)</li> <li>– Other (energy-as-a-service, energy efficiency)</li> </ul>	<ul style="list-style-type: none"> <li>– Renewables IRRs have compressed due to maturity</li> <li>– Secular decarbonization policy tailwinds</li> <li>– Funds acquiring developers rather than assets</li> <li>– Investors are willing to increase commodity exposure</li> <li>– More untested technologies and business models</li> </ul>
Oil and gas	<ul style="list-style-type: none"> <li>– Midstream pipelines</li> <li>– LNG export &amp; import terminals</li> <li>– Oil &amp; gas storage</li> <li>– Other (refineries, petrochemical plants)</li> </ul>	<ul style="list-style-type: none"> <li>– Strong near-term economics due to the Ukraine war</li> <li>– Strong LNG demand from EU and Asia</li> <li>– Sustainability and stranded asset concerns longer term</li> <li>– Some repositioning towards cleaner fuels</li> </ul>
Power and utilities	<ul style="list-style-type: none"> <li>– Conventional power (coal, gas, nuclear)</li> <li>– Combined heat and power systems</li> <li>– Utility networks (transmission, distribution)</li> <li>– Other (smart grids, smart meters)</li> </ul>	<ul style="list-style-type: none"> <li>– Sustainability and stranded asset concerns longer term</li> <li>– Some power plants have more commodity exposure</li> <li>– Regulated utilities are politically sensitive</li> <li>– Gas remains a cleaner alternative to coal</li> </ul>
Telecom / Digital	<ul style="list-style-type: none"> <li>– Broadband networks</li> <li>– Data centers</li> <li>– Telecom towers</li> </ul>	<ul style="list-style-type: none"> <li>– Data consumption growth drives opportunity</li> <li>– Tend to require large near term capex for growth</li> <li>– Hype around small-scale "edge" opportunities</li> </ul>
Transport and logistics	<ul style="list-style-type: none"> <li>– Airports</li> <li>– Land-based (railroads, roads, car parks)</li> <li>– Water-based (ports, ferries, vessels)</li> <li>– Other (equipment leasing, cold storage)</li> </ul>	<ul style="list-style-type: none"> <li>– Onshoring increases demand for domestic transport</li> <li>– Volatile post-pandemic recovery</li> <li>– Increased deal flow in leasing, logistics services etc.</li> </ul>
Others	<ul style="list-style-type: none"> <li>– Environmental (waste, water, recycling)</li> <li>– Social (healthcare, education, government)</li> </ul>	<ul style="list-style-type: none"> <li>– Social infrastructure mainly structures as P3s</li> <li>– High political scrutiny due to nature of businesses</li> </ul>

Note: RNG = Renewable Natural Gas; CCUS = Carbon Capture, Utilization and Sequestration; LNG = Liquefied Natural Gas  
 Source: UBS Asset Management, May 2023.




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