



Global
Infrastructure
Hub

Infrastructure Monitor

2021

Our annual flagship report
on the state of investment
in infrastructure



December 2021

A G20 Initiative

Table of Contents

Context and objectives	3
Executive summary	4 - 9
Overview	10
1. Private investment in infrastructure	11 - 29
2. Infrastructure investment performance	30 - 54
3. Infrastructure project preparation	55 - 66
4. Environmental, social and governance (ESG) factors in infrastructure	67 - 76
Appendices	77 - 96



Context and objectives

Infrastructure Monitor is the flagship report of the Global Infrastructure Hub (GI Hub), produced annually. It provides governments, investors, and the infrastructure industry with essential information about the state of private investment in infrastructure by:

- Quantifying the levels of private investment in infrastructure projects in primary markets globally and regionally
- Identifying trends in the types of infrastructure being invested in, and its financing
- Reporting on the performance of infrastructure investments, including financial and environmental, social, and governance (ESG) performance
- Investigating the infrastructure project preparation landscape.

The data insights included in the report help stakeholders make more informed policy, investment, and project-level decisions about the financing of future infrastructure.

As a data resource serving the G20, this report is also used to monitor progress in establishing infrastructure as an asset class, an objective set by the G20 in 2018 in its *Roadmap to Infrastructure as an Asset Class* (G20 2018a). Infrastructure Monitor insights address key priorities of the G20 and provide policymakers with global benchmarks.

To prepare this 2021 report, the GI Hub aggregated a comprehensive data set covering private sector investment in developing and developed economies. We aggregated from a record number of infrastructure databases that are confidential or not publicly available, partnering with the leading global organisations Moody's, EDHECInfra, MSCI, and GRESB as well as leveraging

data from Eurostat, the Global Emerging Markets (GEMs) Risk Database, IJGlobal, Inter-American Development Bank (IDB), International Energy Agency (IEA), International Telecommunications Union (ITU), International Transport Forum (ITF), the Organisation for Economic Co-operation and Development (OECD), Preqin, Refinitiv, and World Bank.

This edition enhances reporting on private infrastructure investment and its performance and introduces reporting on infrastructure project preparation, ESG factors in investment, and COVID-19 impacts.

With Infrastructure Monitor, our objective is to bring together in one report a global evidence base and expert data insights on the state of infrastructure investment. We accordingly welcome your feedback on this year's edition and your suggestions for the 2022 edition.

About the GI Hub

The GI Hub was created by the G20 and established in 2014 with a mission of supporting the G20 to drive an ambitious agenda on sustainable, resilient, inclusive infrastructure through action-oriented programs. Operating with an inclusive and collaborative mindset, our purpose is to accelerate infrastructure development to transform societies and empower future generations.

We work collaboratively with the public and private sectors to produce data, insights, knowledge tools, and programs that equally inform policy and delivery, helping decisionmakers and practitioners create positive impacts through infrastructure.



Executive summary

Private investment in infrastructure projects in primary markets is not increasing, but it weathered the pandemic shock.

Mobilising private capital is key to closing the infrastructure financing gap and has become even more critical as the COVID-19 pandemic has further limited the investment capacity of governments. For the past seven years, private investment in infrastructure has remained stagnant, and lower than it was 10 years ago. The USD156 billion invested in infrastructure projects by private investors in 2020 represents 0.2% of global GDP far shy of the 5% of global GDP (combining public and private investment) some studies indicate is required to close the infrastructure gap. It also pales in comparison to the USD3.2 trillion in infrastructure stimulus announced by G20 governments, identified in our InfraTracker (GI Hub, 2021).

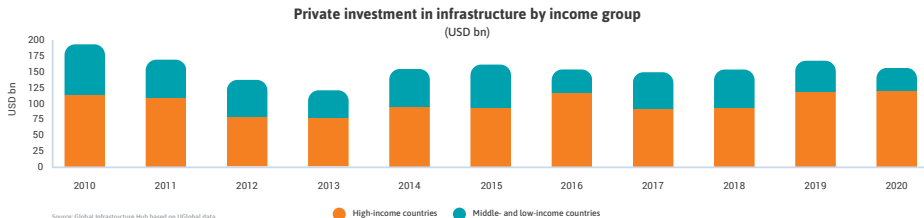
The resilience of private investment in infrastructure projects to pandemic shocks is however a positive sign. While several sectors of the economy were significantly affected by the pandemic, private investment in infrastructure projects was resilient overall in 2020 compared to 2019.

The private investment gap between low and high-income countries persisted in 2020.

High-income countries attract around three-quarters of all private investment in infrastructure projects. (To put this in perspective, high-income countries represent around 60% of global GDP and have about 50% of total public and private investment in infrastructure.) And despite severe disruption due to the pandemic, those volumes did not decrease in 2020. In contrast, private investment in infrastructure in middle- and low-income countries represents only a quarter of the total global private investment in infrastructure, and it declined by 28% in 2020.

Globally, lockdowns and restrictions in 2020 negatively impacted investments in the transport and energy sectors, while investment in the social and telecommunications sectors increased significantly – driven by the response to the pandemic and rise in online activities.

Even in the midst of the pandemic, investors showed strong appetite for renewables, with this sector attracting almost 50% of total private investment in infrastructure in 2020, mostly in wind and solar projects. However, it is notable that in high-income countries, almost 55% of the private investment in infrastructure projects went to renewable energy generation in 2020, while in middle- and low-income countries, that percentage was only around 20%, compared to over 25% for non-renewable energy generation.



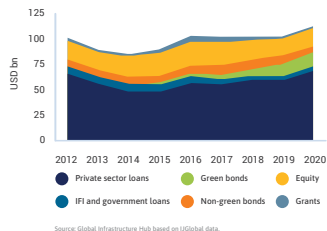
Most private investment in infrastructure projects is financed by financial services institutions, but debt capital markets are also increasing. In middle- and low-income countries, development banks play an important role as financiers, while export credit agencies are also playing an increasing role.

Around 80% of investment in infrastructure projects in primary markets is financed by debt. This financing comes mostly from commercial banks, investment banks, and financial services institutions.

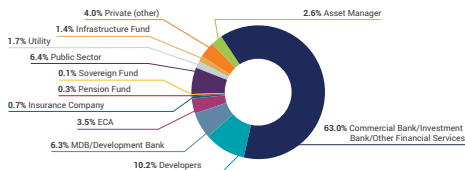
Within debt financing, loans represent 87%. However, projects in developed economies are increasingly using debt capital markets. In particular, financing through green bonds has been rising in recent years, particularly in high-income countries.

In middle- and low-income countries, non-private institutions like multilateral development banks (MDBs), export credit agencies (ECAs), governments, and others also play a significant role as financiers. In fact, 75% of private investment in infrastructure in those markets occurs in projects that involve both private sector and non-private sector financing.

Private investment in infrastructure projects by instrument type in high-income countries
(3-year moving average, USD bn)



Private investment in infrastructure by financier, 2020
(% of total value)

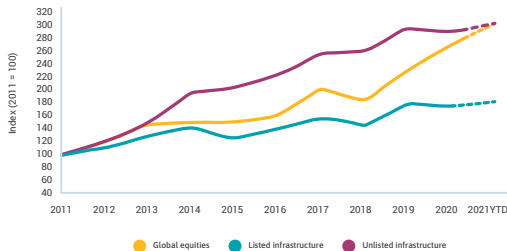


Source: Global Infrastructure Hub based on IIGlobal data.
Note: ECA = Export Credit Agency; MDB = Multilateral Development Bank; Developers = Developer/Engineering Procurement/Construction firm; Asset Manager = Asset managers, fund managers, and private equity firms; Other Financial Services includes institutions such as financial advisory firms and hedge funds, and excludes insurance companies, pension funds, and asset managers which are included as their own category for the purpose of this analysis.

Equity and debt performance show that infrastructure as an asset class provides attractive and resilient returns for investors.

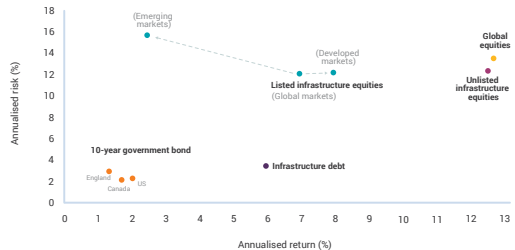
Unlisted infrastructure equities historically provide higher risk-adjusted returns than both global equities and listed infrastructure equities. In the last decade, returns for both listed and unlisted infrastructure equities have strongly increased. The COVID-19 pandemic temporarily stalled this trend in 2020, but it resumed in 2021. High dividend yields, lower trading prices, and lower volatility are the key factors driving the attractiveness of infrastructure equities.

Cumulative gross returns performance
(index)



Source: MSCI and EDHECInfra. Annual returns are based on calendar year 2021 data as of September 2021.
Note: Annual returns are based on calendar year 2021 data as of September 2021. The indices present aggregate performance levels. Global equities performance is measured by the MSCI Emerging Markets Index (EMSCI-EM), US Country World Index (MSCI-AWI), listed infrastructure equities performance is measured by the MSCI ACWI Infrastructure Capped Index (MSCI ACWI-IC) and unlisted infrastructure equities performance is measured by EDHECInfra's infra200 equity index.

10-year risk-return by asset class



Source: MSCI and EDHECInfra, S&P Global Bond Indices as of September 2021.
Note: Estimation methodology and calculations varies between index providers.

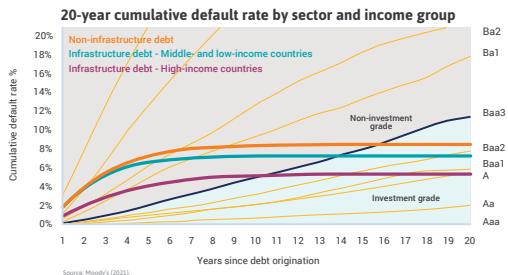
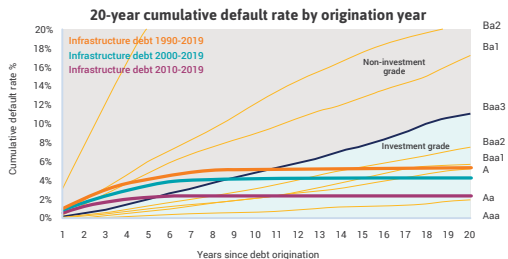
Infrastructure debt continues to consistently perform better than non-infrastructure debt worldwide.

Infrastructure debt consistently performs better than non-infrastructure debt. It has lower default rates than non-infrastructure debt and performs as an investment-grade security sooner. Moreover, this performance continues to improve, as newer infrastructure debt reaches investment grade faster than older infrastructure debt.

Infrastructure debt in high-income countries has lower default rates than that in middle- and low-income countries. But in both cases, infrastructure debt remains less risky than non-infrastructure debt. Infrastructure debt recovery rates are also higher, at 84%, than those of other assets like corporate debt and bonds at 50–60%.

Over a 10-year period, infrastructure debt provides a higher return than 10-year government bonds in developed markets, at slightly higher risk.

Infrastructure as an asset class thus provides attractive investment options for investors to diversify and optimise their portfolios. Research by EDHECInfra (2021a) suggests that the optimal portfolio allocation to infrastructure should be about 10%, with allocation between equity and debt varying based on the investor profile. Currently, for most investors, the portfolio allocation to infrastructure as an asset class is less than 5%.



There is an accessible, untapped opportunity to increase private investment in infrastructure by improving project preparation capabilities.

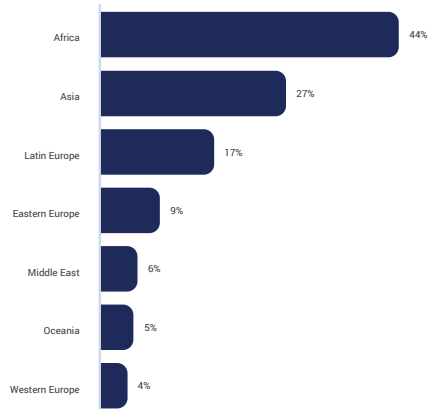
The lack of a bankable and investment-ready pipeline of infrastructure projects is often considered one of the major bottlenecks in attracting private capital to infrastructure. Unsurprisingly, enabling an investment-ready pipeline has consistently featured as a top priority of G20 Presidencies.

The bankability of an infrastructure project is mostly determined at the project preparation stage, and in almost all regions there is a need to improve project preparation capability. This is particularly the case in low-income countries. Our report attempts to explore the channelling of funds to emerging economies to improve project preparation through the lenses of Project Preparation Facilities (PPFs), which play an important role in supporting project preparation to develop bankable and investment-ready projects, providing both technical support and funding for this important project stage.

Our analysis of 130 global PPFs indicated PPFs are mainly active in developing countries and are mostly led by MDBs and international organisations (IOs). PPFs led by MDBs generally support projects of much larger values than those supported by other PPFs. While relatively few PPFs are led by national governments, these PPFs tend to support a greater number of projects, given their proximity to the market and to investors. Africa, the region with one of the lowest infrastructure project preparation scores in the GI Hub InfraCompass (GI Hub, 2020), has the highest number of active PPFs. More than half of all PPFs are mandated to support the energy, transport, and water sectors, and 80% of these support project preparation in the energy sector.

Recent years have seen significant innovation in the way PPFs are providing support, with increasing cooperation and co-funding of project preparation. This is especially valuable because project preparation costs have increased in recent years as the result of new requirements related to sustainability, regulation, inclusion, and technology, among others.

Project Preparation Facilities by region, 2020
(number)



Source: GI Hub calculations based on information published by the sample PPFs.
Note: 36 of the PPFs in the sample support two or more regions. Oceania includes Melanesia, Micronesia and Polynesia.

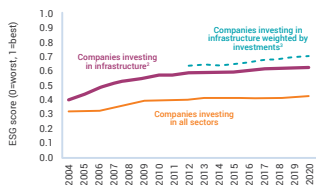


ESG factors are embedded criteria for infrastructure investors, and preliminary evidence shows sustainable investments perform better.

ESG factors are important for private investors to manage risk and return and are particularly important for infrastructure investment, given that infrastructure requires significant up-front investment in long-term assets that could become stranded.

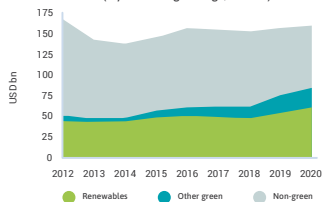
More investors are incorporating ESG factors into their investment and management decisions, particularly after the pandemic forced companies to transform and be more resilient. Notably, companies investing in infrastructure are incorporating ESG factors better than other companies, with the environmental aspect being particularly well embedded.

Companies' ESG scores¹ by sector of investment
(3-year moving average)



Source: Global Infrastructure Hub based on Refinitiv and iGlobal data
Note: ¹ Refinitiv ESG scores measure a company's relative performance on ESG attributes, commitment, and effectiveness across Environmental (E), Social (S), and Governance (G) pillars. Scores focus on a company's operations and policies rather than its products and services, and generally reflect their management approach and transparency of performance rather than direct performance. ² Companies investing in infrastructure includes those companies identified as primary infrastructure investors in the iGlobal dataset. ³ The weighted average line weights infrastructure investors by the value of their investment in infrastructure in primary markets since 2010 (from which data is available).

Green and non-green private investment in infrastructure
(3-year moving average, USD bn)

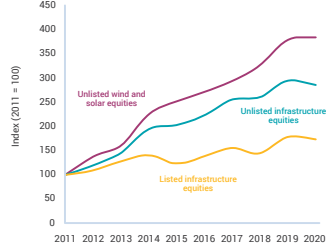


Source: Global Infrastructure Hub based on iGlobal data
Note: Green investment in infrastructure means investment in environmentally sustainable projects that support the transition to net zero emissions of carbon dioxide. Other green includes EV charging infrastructure, Carbon Capture and Storage (CCS), green buildings, and urban transit systems, such as light rail and bus networks and other green private investment in infrastructure financed by green bonds/loans.

Green private investment in infrastructure projects has been increasing since 2014, rising from USD58 billion in 2014 to USD87 billion in 2020. Today, it represents half of all private investment in infrastructure projects. The majority of this green private investment is in renewables, particularly wind and solar projects. However, global wind and solar capacity must still quadruple by 2030 to reach net zero targets, and similar efforts are needed in other infrastructure sectors – such as transport – where green private investment remains low.

Encouragingly, preliminary evidence shows sustainable infrastructure investments performing better than other infrastructure sector investments. In the last 10 years, wind and solar equities have generated a compound annual return of 16%, higher than the compound annual return of listed (6%) and unlisted (12%) infrastructure equities.

Infrastructure equity return indexes
(2011=100)



Source: EHE/Carha, MSCI

Overview

Infrastructure Monitor is the GI Hub's annual flagship report on private investment in infrastructure and progress toward the G20 objective of establishing infrastructure as an asset class. It analyses levels of private investment in infrastructure projects across regions, country income groups, and infrastructure sectors, and examines infrastructure investment performance.

In 2017, the GI Hub estimated the infrastructure financing gap at USD15 trillion out to 2040. One of the instruments to close the infrastructure financing gap is the mobilisation of private capital. This has become even more critical as the COVID-19 pandemic has further limited the financing capacity of government budgets.

This year's Infrastructure Monitor 2021 begins by presenting a comprehensive analysis of the evolution of levels of private investment in infrastructure projects in primary markets and the effects of COVID-19 on those levels across regions, country income groups, and infrastructure sectors.

It then examines how private investment in infrastructure projects is financed, a new area of analysis added to this year's report. The analysis looks at the financing instruments and financiers involved in private infrastructure investment by income group and region, and considers the roles of private and non-private financiers in high- and middle- and low-income countries.

After the above review of current private investment in infrastructure projects, the report turns to the financial performance of infrastructure investments, where there is clear evidence of the attractiveness of infrastructure as an asset class for portfolio diversification. The analysis shows the current financial performances of infrastructure equities (listed and unlisted) and debt.

Given that attracting private capital to infrastructure is one of the main instruments to close the infrastructure gap, the lack of bankable and investment-ready pipelines of infrastructure projects is a binding constraint. This bottleneck has consistently featured as a top priority of G20 Presidencies.

For 2021, Infrastructure Monitor assesses project preparation worldwide. The results confirm that project preparation capability could be substantially improved in all regions, and particularly in low-income countries. The report also attempts to explore the channeling of funds to emerging economies to improve project preparation through the lenses of PPFs. For this analysis, detailed data were collected for 130 PPFs operating across all the regions to determine the scope, size, and progress of PPFs worldwide. The data were augmented by a comprehensive review of published information and interviews with PPFs worldwide.

The final section of this year's report also presents new analysis. Because ESG factors have become increasingly important for private investors – not only as a means to manage and mitigate risk, but also as a mechanism to enhance financial performance and returns – Infrastructure Monitor 2021 analyses how companies investing in infrastructure are incorporating ESG factors and how green private investment in infrastructure is increasing with time. We are also able to present preliminary evidence of the relationship between ESG impacts and financial performance.



1. Private investment in infrastructure



Key findings

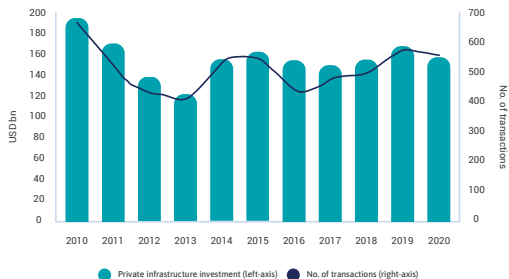
1. Over the past seven years, private investment in infrastructure projects in primary markets has remained stagnant, and lower than it was 10 years ago.
2. Private investment in infrastructure projects remained resilient to pandemic shocks in 2020 at USD156 billion (84% of which was privately financed). This represents 0.2% of total global GDP, far shy of the 5% of GDP (combining public and private investment) that some studies show is required to close the infrastructure gap. It also pales in comparison to the USD3.2 trillion of public investment in infrastructure stimulus that has been announced by G20 governments in response to the COVID-19 crisis, as identified in the GI Hub's InfraTracker (GI Hub, 2021).
3. About three-quarters of private investment in infrastructure projects occurs in high-income countries and was unhindered by the pandemic. Half of this investment occurs in renewable energy generation.
4. Middle- and low-income countries attract only a quarter of the global private investment in infrastructure projects and saw a 28% decline in private investment in 2020. Most of this investment occurs in the non-renewable energy and transport sectors.
5. Lockdowns and restrictions in 2020 negatively impacted investments in the transport and energy sectors, while pandemic control and online activities contributed to the increase in investment in the social and telecommunications sectors.
6. Even in the midst of the pandemic, investors showed strong appetite for renewables, with the sector attracting almost 50% of total private investment in infrastructure projects in 2020 – mostly in wind and solar projects.
7. Financial services providers, primarily commercial and investment banks, finance the largest share of the investment across all regions. About 80% of private investment in infrastructure projects is financed by debt. While loans represent 87% of debt financing, projects in developed economies are increasingly using debt capital markets. In particular, financing through green bonds has been rising in recent years, particularly in high-income countries.



Private investment in infrastructure projects in primary markets remained resilient to pandemic shocks in 2020.

- In 2020 several sectors were significantly affected by the COVID-19 pandemic. Although the pandemic also impacted the infrastructure sector, the impact was not as significant as in other sectors such as tourism or services.
- The decrease in the transport and energy sectors, due to lockdowns and restrictions, was almost offset by the growth in the social and telecommunications sectors that was driven by pandemic control and online activities.
- In that context, global private investment in infrastructure projects in primary markets fell 6.5% in 2020.
- Private investment in infrastructure projects in primary markets in 2020 was USD156 billion, which represents 0.2% of total global GDP – a value that is far shy of the 5% of GDP (combining public and private investment) that some studies show is required to close the infrastructure gap.

Private investment in infrastructure projects in primary markets
(USD bn and number)



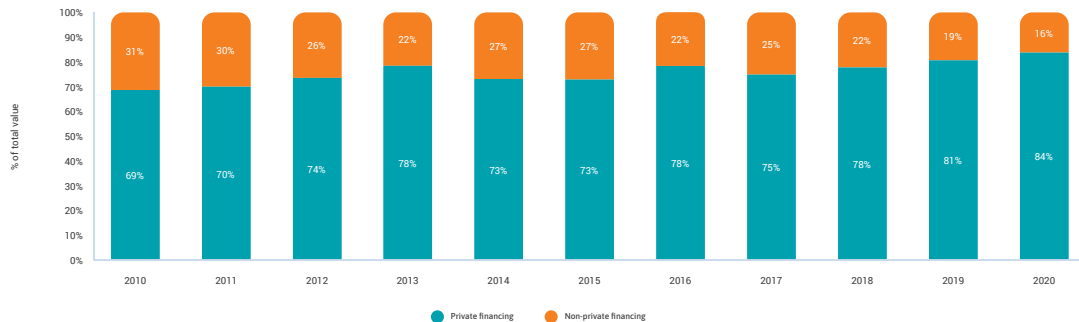
Source: Global Infrastructure Hub based on ICF Global data

Note: Throughout this report, "private investment in infrastructure projects" refers to private sector investment in infrastructure projects in primary markets (financed by private and public financing) including greenfield and brownfield infrastructure, as well as privatizations, unless otherwise specified. Investments values represent commitments made at the financial close of investment and not executed investment.

As there have been significant methodological improvements implemented in Monitor 2021, the figures presented here are not directly comparable to those presented in Monitor 2020.

Most private investment in infrastructure projects in primary markets is financed by the private sector, whose share has been steadily increasing to reach a decade-high in 2020.

Private investment in infrastructure projects in primary markets by type of financing
(% of total value)



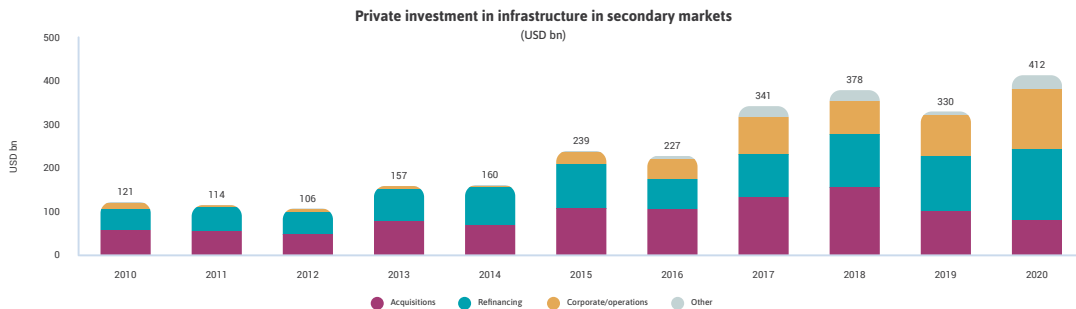
Source: Global Infrastructure Pubs based on IGlobal data.
Note: Non-private financing includes financing from institutions such as development banks (multilateral and national), export credit agencies, and the public sector (such as government authorities and state-owned enterprises).



Private investment in infrastructure in secondary markets continued to grow despite the pandemic.

- Private investment in infrastructure within the secondary market has seen a trend increase over time, almost quadrupling the levels seen at the beginning of the decade. This reflects the growth of infrastructure as an asset class and the increasing trend towards active portfolio management across all private markets, with the secondary market servicing changing investor needs and preferences over time, particularly considering the long holding periods of infrastructure assets.

- Secondary private investment in infrastructure rose by 25% in 2020, to USD412 billion across 927 transactions. This mainly reflects the needs of investors for more mature investments, particularly in a context where primary transactions are facing economic uncertainty.
- Refinancing has been increasing over time, with investors taking advantage of a low interest rate environment. In 2020, shutdowns, revenue losses, tightened liquidity, and lower interest rates due to the crisis may have led to the increase in refinancing.
- Acquisitions fell for the second consecutive year in 2020, to record their lowest share of secondary transactions in a decade (19%). Pandemic-induced uncertainty may have contributed to the cancellation or postponement of a number of acquisition deals.



Source: Global Infrastructure Hub based on IIGlobal data.

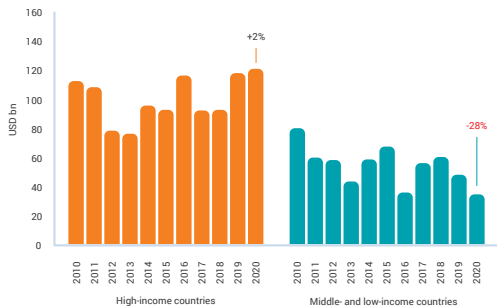
Note: Other includes securitizations, and transactions for more than one purpose. Corporate / operations refers to financing by infrastructure companies for general corporate purposes and ongoing operations. It should be noted that the observed increase since 2014 reflects, to some degree, improved data coverage for this component by IIGlobal in more recent years.



Most private investment in infrastructure projects occurs in high-income countries and was unhindered by the pandemic, but private investment in infrastructure projects declined in middle- and low-income countries.

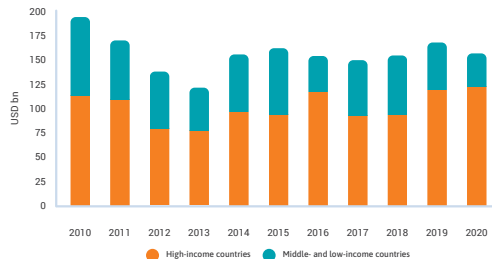
- High-income countries typically attract around three-quarters of global private investment in infrastructure projects. In 2020, 78% of private investment in infrastructure projects occurred in high-income countries, and only 22% in middle- and low-income countries. To put this in perspective, high-income countries represent around 60% of global GDP and have about 50% of total public and private investment in infrastructure.
- The 2020 decline in private investment in infrastructure projects was driven by middle- and low-income countries, which saw investment fall by 28%, while investment in high-income countries rose by 2%.

Private investment in infrastructure projects by income group 2010-2020
(USD bn and % growth in 2020)



Source: Global Infrastructure Hub based on IGlobal data

Private investment in infrastructure projects by income group
(USD bn)



Source: Global Infrastructure Hub based on IGlobal data



The decline in private investment in infrastructure projects in middle- and low-income countries started before the pandemic.

- At the beginning of the decade, private investment in infrastructure projects in middle- and low-income countries was around 0.4% of GDP, compared with 0.25% in high-income countries.
- Over time, private investment in infrastructure projects in middle- and low-income countries has declined significantly to around 0.11% of GDP in 2020, while it has remained broadly stable in high-income countries.

Private investment in infrastructure projects by income group
(% of GDP)



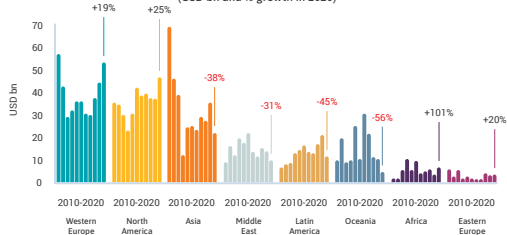
Source: Global Infrastructure Hub based on IGlobal data



In 2020, the decline in private investment in infrastructure projects in some regions was significantly offset by increases in others.

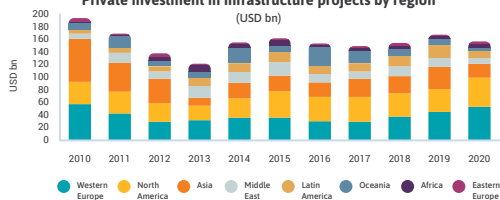
- Private investment in infrastructure projects occurs differently among regions of the world, with developed regions recording significantly higher levels of investment compared with developing regions.
- Western Europe and North America have the highest levels of private investment in infrastructure projects (together accounting for around 60% of investment) and this participation has remained consistent over the years. At the same time, these regions have seen an increase in private investment in infrastructure projects in 2020 despite the pandemic.
- Their increase (together with Africa and Eastern Europe) almost offsets the decreases in other regions resulting in a 6.5% drop of total private investment in infrastructure projects in 2020.
- Oceania was the most affected region (-56%), falling to a decade-low, mainly due to a decrease in transport investment.
- Private investment in infrastructure projects in Africa doubled between 2019 and 2020, albeit from a low base, mainly driven by the financial closure of the Cairo Monorail project.

Private investment in infrastructure projects by region, 2010-2020
(USD bn and % growth in 2020)



Source: Global Infrastructure Hub based on IIGlobal data

Private investment in infrastructure projects by region
(USD bn)



Source: Global Infrastructure Hub based on IIGlobal data



Priorities vary depending on income group. In high-income countries, half of private investment in infrastructure projects occurs in renewable energy, while in middle- and low-income countries, two-thirds occurs in transport and non-renewable energy.

In high-income countries, almost 55% of the private investment in infrastructure projects went to renewable energy generation in 2020. In middle- and low-income countries, that percentage was only around 20% in 2020 compared to over 25% for non-renewable energy generation.

Private investment in infrastructure projects by sector and income group, 2020
(USD bn)

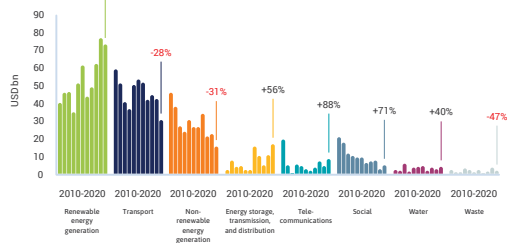


Source: Global Infrastructure Hub based on IGGI data.

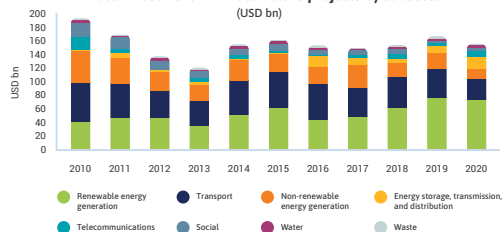
Lockdowns and restrictions in 2020 negatively impacted investments in the transport and energy sectors, while investment increased in sectors relating to pandemic control and online activities, like social infrastructure and telecommunications.

- Private investment in infrastructure projects occurs differently among subsectors, with renewables attracting the most investment and more than doubling its share from 21% in 2010 to 47% in 2020.
- Transport is the second largest sector in terms of investment share. However, unlike renewables, its share has decreased from 30% in 2010 to 20% in 2020.
- Decreasing trends can be observed for the social and non-renewable energy subsectors over the past decade, particularly the social infrastructure share, which has decreased from 11% in 2010 to 3% in 2020.
- In 2020, the behaviour of private investment in infrastructure projects by sectors aligns with the effects of the pandemic. The sectors adversely affected were those impacted by lockdowns and restrictive measures, such as transport and energy generation, while private investment in infrastructure projects increased in sectors relating to pandemic control and online activities, such as social and telecommunications.
- Private investment in telecommunications and social infrastructure projects each almost doubled in 2020, albeit from a low base.

Private investment in infrastructure projects by subsector, 2010-2020
(USD bn and % growth in 2020)



Private investment in infrastructure projects by subsector
(USD bn)



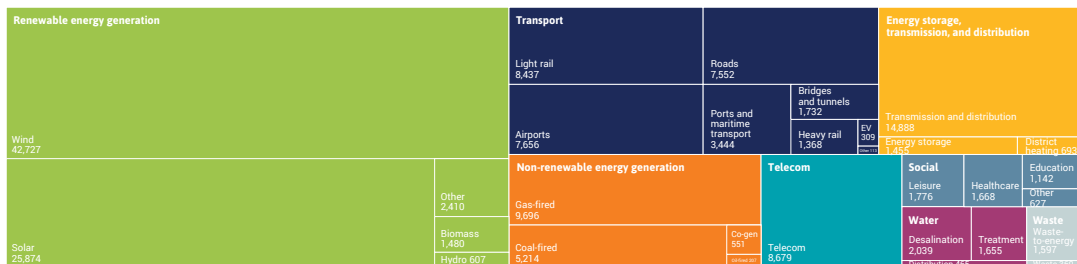
Source: Global Infrastructure Hub based on USGlobal data



Despite falling in 2020, renewables continued to attract most of the private investment in infrastructure projects, particularly into wind and solar projects ...

- Despite the pandemic, investors showed strong appetite for renewables, with the sector attracting the largest share of total private investment in infrastructure projects in 2020 (47%) – almost five times the share of non-renewables (10%) and mostly in wind and solar projects.
- The renewables sector has been dominant for much of the past decade, attracting an average 34% of total private investment in infrastructure projects each year – a share that has been increasing over time, rising from 21% in 2010 to a decade-high of 47% in 2020. This share has also been consistently higher than non-renewables, with the gap expanding since 2017 due to the continuous decrease in renewable energy costs and an increase in investments aligned with the Paris Agreement.

Private investment in infrastructure projects by subsector, 2020
(USD m)



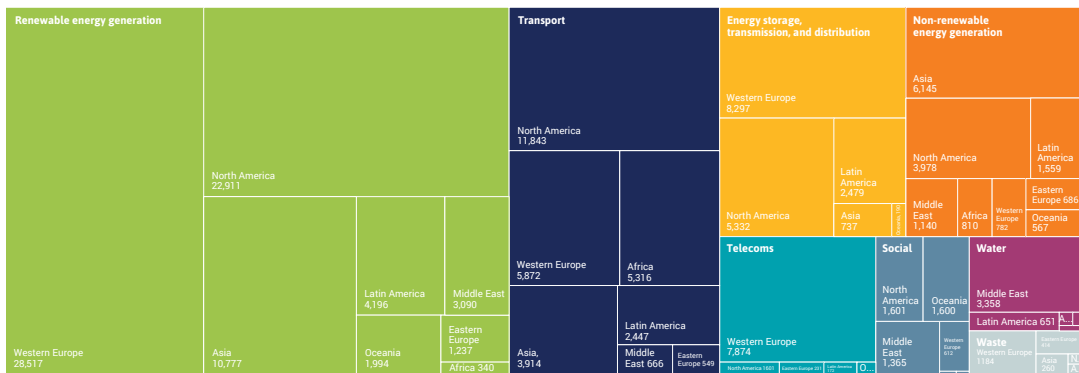
Source: Global Infrastructure Hub based on IIGlobal data.
Note: Other renewables includes biofuels, hydrogen, geothermal, marine and others. Other social includes prisons, leisure facilities, municipal street lighting, and others. Other transport includes parking facilities and others.



... and mainly within Western Europe and North America.

In 2020, more than 90% of private investment in renewable projects was in wind and solar, concentrated in Western Europe and North America.

Private investment in infrastructure projects by sector and region, 2020
(USD m)

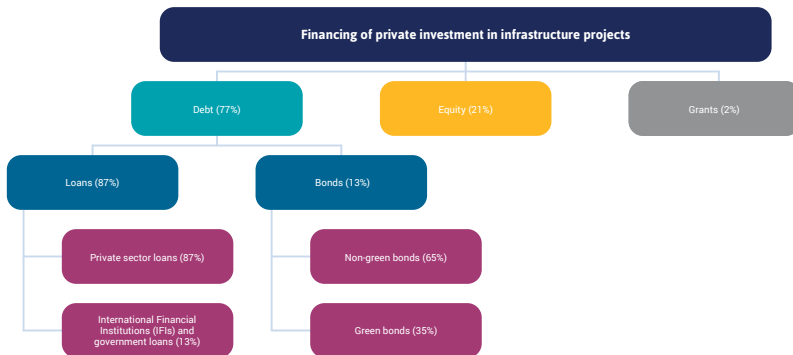


Source: Global Infrastructure Hub based on IIGlobal data.



Private investment in infrastructure projects is primarily financed by debt, mostly loans ...

Private investment in infrastructure projects by instrument type, 2010-2020
(% of total value)

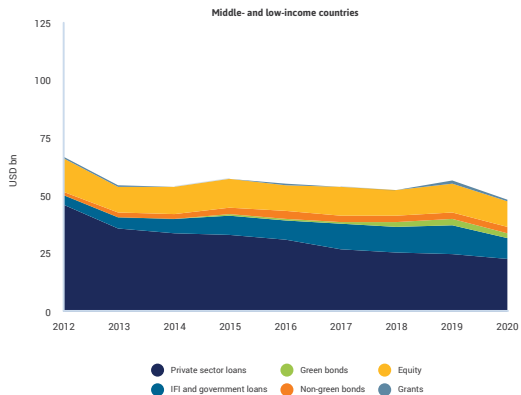
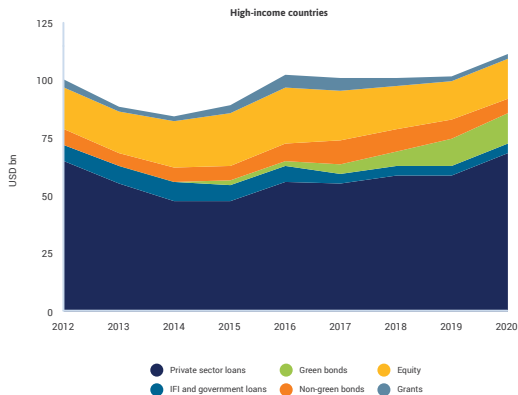


Source: Global Infrastructure Hub based on ICGIHub data.

Note: International Financial Institutions (IFI) and government loans include lending from development banks (multilateral and national), export credit agencies, and the public sector (such as government authorities and state-owned enterprises).

... but financing through green bonds has been rising in recent years, particularly in high-income countries ...

Private investment in infrastructure projects by instrument type and income group
(3-year moving average, USD bn)

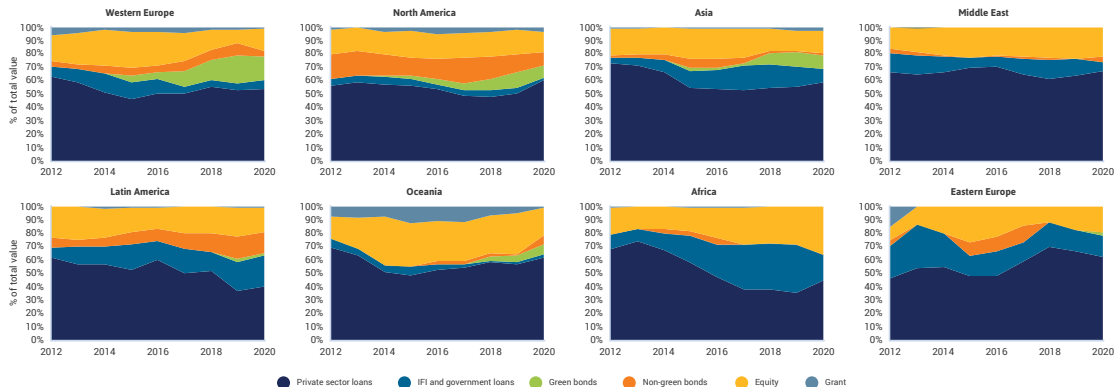


Source: Global Infrastructure Hub based on UGGlobal data.



... most notably in Western Europe, North America, and Asia.

Private investment in infrastructure projects by instrument type and region
(3-year moving average, % of total value)



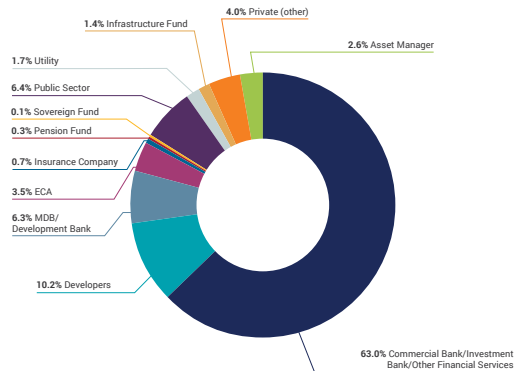
Source: Global Infrastructure HSB based on IIGlobal data.



Private investment in infrastructure projects is mostly financed by financial services institutions, primarily commercial and investment banks.

- Financial services providers, primarily commercial and investment banks, finance 63% of the private investment in infrastructure projects.
- Developers are the second largest type of financier (10.2%) mostly in the form of equity.
- Insurance companies and pension funds directly finance only 1% of private investment in infrastructure projects. They can, however, participate indirectly through unlisted funds and capital markets and have more direct participation in secondary markets.

Private investment in infrastructure projects by financier, 2020
(% of total value)



Source: Global Infrastructure Hub based on IIGlobal data.
Notes:

1. ECA = Export Credit Agency, MDB = Multilateral Development Bank, Developers = Developer/Engineering Procurement/Construction firm, Asset Manager = Asset managers, fund managers, and private equity firms.

2. Other Financial Services includes institutions such as financial advisory firms and hedge funds, and excludes insurance companies, pension funds, and asset managers which are included as their own category for the purpose of this analysis.

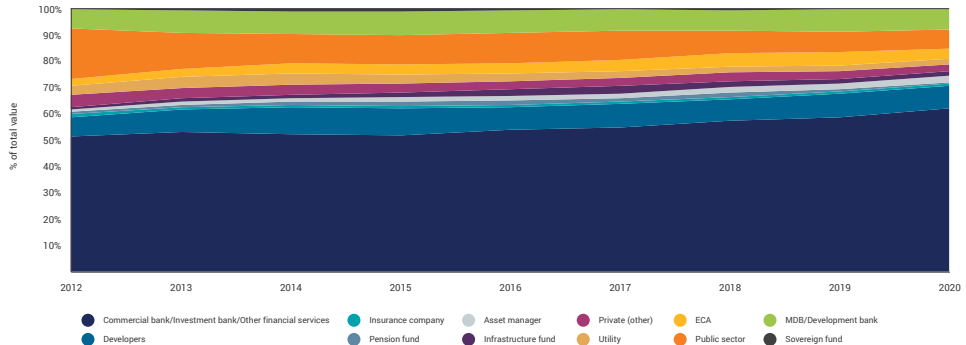




Their role as financiers has increased over time, while the public sector has reduced its financing.

Private financiers have played an increasing role in financing private investment in infrastructure projects. In contrast, within non-private financiers, the public sector has decreased its role over time, while development banks' share has remained broadly stable.

Private investment in infrastructure projects by financier
(3-year moving average, % of total value)



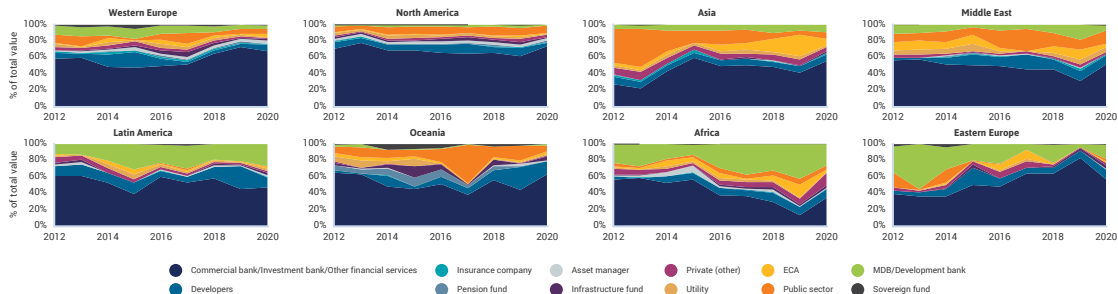
Source: Global Infrastructure Hub based on ICDGlobal data.

However, these trends vary by region.

- Financial service institutions, primarily commercial and investment banks, are the largest financiers across all regions, particularly North America. However, their participation in Africa has decreased over time.

- Although to a lesser extent than commercial banks, the public sector is an active financier in the Middle East and Oceania. However, its financing is very limited in Latin America and Eastern Europe.
- ECAs appear to have more active participation as financiers in Asia, the Middle East, and Africa.
- Although direct financing from institutional investors in primary markets is very limited in most regions, they have more active direct participation within developed regions like Oceania, Western Europe, and North America.

Private investment in infrastructure projects by financier and region
(3-year moving average, % of total value)

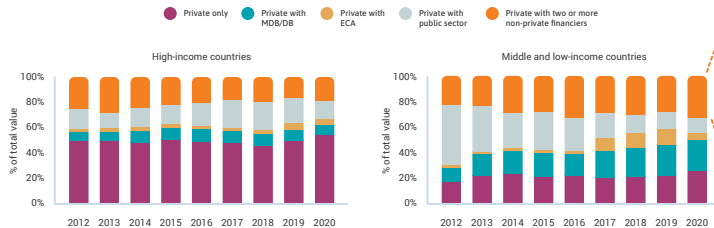


Source: Global Infrastructure Prox based on ICGlobal data.

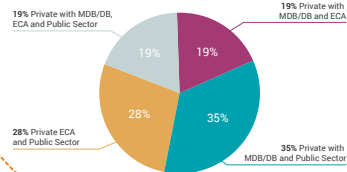
Despite private financiers increasing their role, 75% of transactions in middle- and low-income countries need financing from non-private actors such as development banks, export credit agencies, or the public sector.

- Although private financiers have increased their role over time, non-private institutions such as development banks (MDBs/DBs), export credit agencies (ECAs), and the public sector play a significant role as financiers, especially in middle- and low-income countries.
- In high-income countries, more than half of private investment in infrastructure projects is financed by the private sector alone, while in middle- and low-income countries only 25% of private investment in infrastructure projects is financed by the private sector alone.
- Non-private institutions play a much greater role as financiers in middle- and low-income countries. 75% of private investment in infrastructure projects in these markets occurs in projects that involve both private sector and non-private sector financing – most commonly private financiers and MDBs/DBs.

Private investment in infrastructure projects by income group and financier group
(3-year moving average, % of total value)



Private with two or more non-private in middle- and low-income countries
(3 year average 2018-2020, % of total)



Source: Global Infrastructure Hub based on IGlobal data.
Note: Non-private financiers include development banks (MDBs/DBs), export credit agencies (ECAs), and the public sector (such as government authorities and state owned enterprises).

2. Infrastructure investment performance

2.1 Infrastructure equity performance

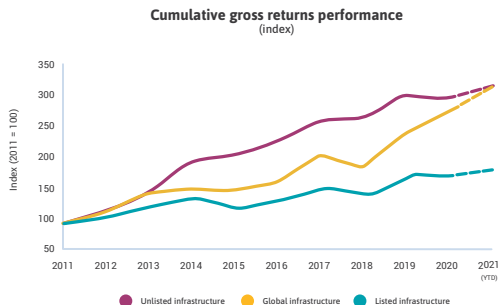
Key findings

1. In the last decade, returns for both listed and unlisted infrastructure equities have strongly increased.
2. High dividend yields, lower trading prices, and lower volatility are the key factors driving the attractiveness of infrastructure equities returns.
3. Unlisted infrastructure equities are a strong performing asset class on a risk-adjusted basis, and an attractive proposition for long-term investors.
4. Historically, unlisted infrastructure equities have provided higher risk-adjusted return than global equities and listed infrastructure equities. The market for unlisted infrastructure equities is maturing and investor demand has been increasing over time. Thus, prices have risen in line with their low-risk characteristics and returns have decreased.
5. Developed markets provided higher risk-adjusted returns than emerging markets for all types of equities across all regions of the world. Europe provided the highest risk-adjusted returns on unlisted infrastructure equities.
6. Unlisted infrastructure equities in the energy sector exhibit higher risk-adjusted returns than other sectors. The pandemic negatively impacted infrastructure sectors, especially infrastructure exposed to higher market risk.
7. Over a 10-year period, infrastructure debt provided higher returns than 10-year government bonds in developed markets, at slightly higher risk.
8. Infrastructure as an asset class provides attractive investment options for investors to diversify and optimise their portfolio. Research by EDHECInfra (EDHECInfra, 2021b), suggests that the optimal portfolio allocation to infrastructure should be about 10%, with allocation between equity and debt varying based on the investor profile. Currently, for most investors, the portfolio allocation to infrastructure as an asset class is less than 5%.



In the last decade, returns for both listed and unlisted infrastructure equities have strongly increased. The COVID-19 pandemic temporarily stalled this trend in 2020 – it resumed in 2021.

- Although the growth pattern varies, globally, investment in equities including infrastructure has provided steady positive returns to investors.
- Over the decade preceding June 2021, unlisted infrastructure equities consistently outperformed global equities, providing higher average returns.
- Returns on listed infrastructure equities also showed an increase, but not as high as unlisted infrastructure equities.
- The COVID-19 pandemic impacted these type of equities in a different way depending on the dynamics of demand and supply shocks. While global equities witnessed exceptionally strong returns, the returns on unlisted and listed infrastructure equities stagnated in 2020 due to the uncertainty resulting from the pandemic. Nonetheless, by 2021, listed and unlisted infrastructure equities recovered and are back on an increasing trend.
- Listed and unlisted equities are two complementary options to access returns on the same infrastructure asset class. The observed differences in returns reflect differences in their characteristics and investment processes. Unlisted infrastructure equities have had higher returns as a compensation for their illiquidity and higher costs of trading. Returns on listed infrastructure equities are derived from publicly traded companies, which may have other business operations or may be driven by short-term performance considerations. Unlisted infrastructure equities are often managed by private equity funds with different ownership structures and management styles compared to other investors. They are more likely to be driven by long-term considerations. Globally, the geographical and sectoral spread of investments in listed and unlisted infrastructure equities is also significantly different. Listed and unlisted equities are more concentrated in developed markets compared to developing markets, with listed equities being more highly concentrated in North America and unlisted equities more highly concentrated in Europe.



Source: MSCI (2021a) and EYH&C/H&A (2021d).

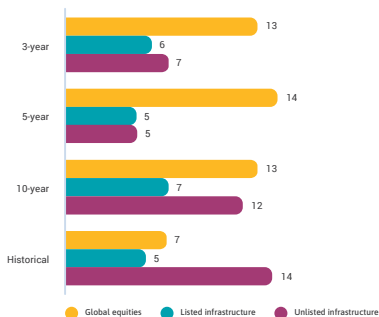
Note: Annual returns are based on calendar year. 2021 data is as of September 2021. The indices present aggregate performance levels. Global equities performance is measured by the MSCI World Index (MSCI ACWI), listed infrastructure equities performance is measured by the MSCI ACWI Infrastructure Capital Index (MSCI ACWI-IC) and unlisted infrastructure equities performance is measured by EYH&C/H&A's IRI-ASO equity index.

Unlisted infrastructure equities have provided the highest risk-adjusted return historically.

- Although global equities perform better on a short-term basis, unlisted infrastructure equities generated the highest returns historically.

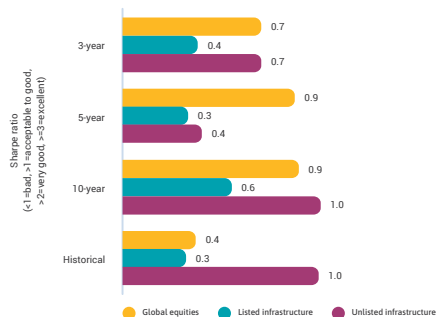
- Unlisted infrastructure equities also generated the highest returns historically on a risk-adjusted basis. High dividend yields, lower trading prices, and lower volatility are the key factors driving the attractiveness of infrastructure equities returns.
- With increasing investor demand over time, the markets are maturing for unlisted infrastructure equities. Prices have risen in line with their low-risk characteristics and returns have decreased.

Annualised total return by type of equity (%)



Source: MSCI (2021a) and EDHEC-GRIFFA (2021a) as of September 2021.
 Note: Annualised total return is a geometric average of annual total returns (price returns + dividends assumed to be reinvested excluding withholding tax, fees). Historical annualised returns were estimated since December 1980 for global and listed equities, and since inception for unlisted equities.

Risk-adjusted returns by type of equity (Sharpe ratio)

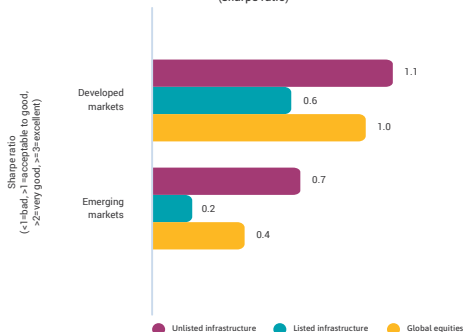


Source: MSCI (2021a) and EDHEC-GRIFFA (2021a) as of September 2021.
 Note: Risk-adjusted return is measured by Sharpe ratio, which is the ratio of excess returns to the standard deviation of returns, where excess return is total return minus risk-free return.

Unlisted infrastructure equities provide the highest risk-adjusted return in developed markets.

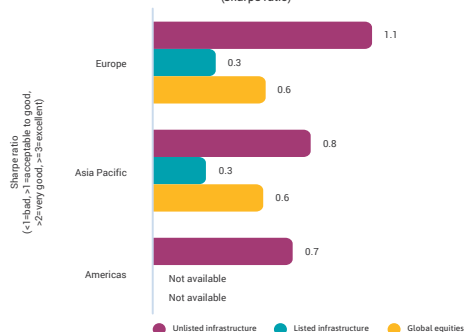
- Developed markets have higher risk-adjusted returns than emerging markets for all types of equities, with unlisted infrastructure having the highest return in the long term. Emerging markets exhibit lower risk-adjusted returns, but unlisted infrastructure equities still perform better than other types of equities.
- Unlisted infrastructure equities perform better across all regions of the world. Europe provided higher risk-adjusted returns on unlisted infrastructure equities in comparison to the Asia Pacific and Americas regions.

10-year risk-adjusted returns by type of equity and market
(Sharpe ratio)



Source: MSCI (2023a) and EDHEC/Intra (2023a) as of September 2023.
Note: Risk-adjusted return is measured by Sharpe ratio.

10-year risk-adjusted returns by type of equity and region
(Sharpe ratio)



Source: MSCI (2023a) and EDHEC/Intra (2023a) as of September 2023.
Note: Risk-adjusted return is measured by Sharpe ratio.

Unlisted infrastructure equities in the energy sector exhibit higher risk-adjusted return than other sectors.

- Infrastructure sectors have higher risk-adjusted returns in the long term.
- The renewables sector has shown superior performance compared to other infrastructure sectors in the long term. In fact, it has shown higher risk-adjusted returns than an average unlisted infrastructure equity in developed markets. Renewable unlisted equities have received greater market attention, backed by a strong global focus on decarbonisation and higher demand.

10-year unlisted infrastructure risk-adjusted returns by sector
(Sharpe ratio)



Source: EDHECifra (2021a) as of June 2021.

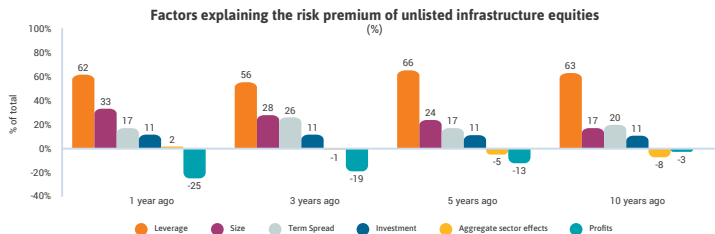
Note: Risk-adjusted return measured by Sharpe ratio.

Sectors presented are based on EDHECifra classification. Utilities include electricity transmission and distribution, gas distribution, data distribution, district cooling and heating, and water and sewerage companies. Transport includes airport, car park, port, rail, road and urban commuter companies. Social infrastructure includes defence, education, government, health, social care services, and recreational facilities.

High leverage contributes the most to the risk premium of unlisted infrastructure equities. The predictable cashflows of infrastructure assets make the high leverage sustainable.

- Unlisted infrastructure equities perform well due to several factors.
- Leverage is the key factor contributing the most to the risk of unlisted infrastructure equities (over 60% of the risk premium when measured as total senior liabilities by total assets). Leverage is generally more sustainable for infrastructure assets given that they are backed by predictable cash flows.

- The size of the asset has been adding to the risk premium more significantly in recent years and explained two-thirds of the risk premium a year ago.
- The spread between the yields of long- and short-term equities explains about 17-26% of the risk premium.
- The relative level of investment against the total assets explains one-tenth of the risk premium.
- Greater profits, which typically reduce risk premiums, explain 25% of the risk premium a year ago.

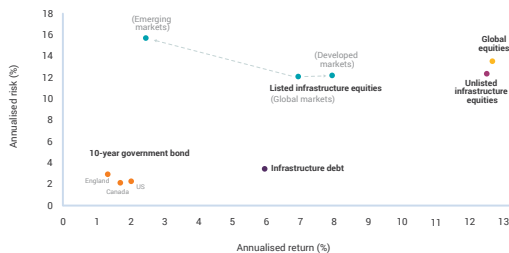


Source: EDHEC/ICF (2023a) as of September 2021.
 Note: Percentage marginal contributions (positive or negative) show how much a given factor drives the total risk premium of the index relative to other factors. Marginal contribution of each factor is its weighted average for each asset, which is the difference between total risk premium of an asset and the risk premium without the effect of the factor.
 Risk premium is a sum product of factor prices and factor loadings. Factor loadings are estimated from the observable financials and characteristics of each investment firm. Factor prices are derived from a regression of factor loadings and approximate expected returns. See glossary for more detail about the factors considered.

Infrastructure as an asset class is an attractive option for portfolio diversification.

- Infrastructure as an asset class provides attractive investment options for investors to diversify and optimise their portfolios.
- According to the EDHECInfra 2021 assessment (EDHECInfra, 2021b), the optimal portfolio allocation to infrastructure should be about 10%, with allocation between equity and debt varying based on the investor profile.
- The 2019 Global Infrastructure Investor Survey (EDHECInfra & GI Hub, 2019) found that a majority of investors (68%) allocated less than 5% of assets under management to infrastructure.
- Unlisted infrastructure equities provide high returns at a lower risk than average global equities.
- Over a 10-year period, infrastructure debt provided a higher return than 10-year government bonds in developed markets, at slightly higher risk.
- Listed infrastructure equities in emerging markets have a relatively high risk and low return profile, but developed markets provide appreciable returns at a lower risk than average global equities and could be preferred for liquidity.

10-year risk-return by asset class



Source: MSCI (2021a), EDHECInfra (2021a), Bloomberg as of September 2021.
Note: Estimation methodology and calculations varies between index providers.

2.2 Infrastructure debt performance

Key findings

1. Infrastructure debt consistently performs better than non-infrastructure debt. It performs as an investment-grade security sooner than non-infrastructure debt (year 11 versus year 16), and its accumulated default rate is lower (5.4% versus 8.2%). This keeps improving over time with newer infrastructure debt reaching investment grade faster than older infrastructure debt.
2. Infrastructure debt performs better in high-income countries than in middle- and low-income countries, but better than non-infrastructure debt in all country income groups.
3. Infrastructure debt in Western Europe is less likely to default than in other regions. The regions where infrastructure debt is most likely to default are Eastern Europe and Latin America. Although these regions have the highest expected losses from infrastructure debt defaults, the recovery rate in these regions remains higher than that for other assets like corporate debt and bonds.
4. Infrastructure debt performs differently across sectors, with telecommunications, water, and social infrastructure debt exhibiting relatively higher risk than debt in other sectors in middle- and low-income countries.
5. Infrastructure debt recovery rates are higher than those of other assets, like corporate debt and bonds. Expected losses are low, especially in high-income countries.
6. Infrastructure debt for PPPs is less risky than infrastructure debt for non-PPPs. It performs as an investment-grade security sooner than non-PPP debt (year 8 versus year 12) and its accumulated default rate is lower (3.9% versus 6.1%).
7. Infrastructure debt recovery rates are higher than those of other assets, like corporate debt and bonds. Expected losses are low, especially in high-income countries.
8. In conclusion, infrastructure assets are less risky than non-infrastructure assets, corporate debt, and bonds. The infrastructure sector is important when looking for less-risky investments with long-term maturity.



Infrastructure debt consistently performs better than non-infrastructure debt ...

- Infrastructure projects account for 82% of the total number of debt projects, but they represent a smaller share (76%) of the total number of debt defaults, indicating that infrastructure debt is less likely to default than non-infrastructure debt. (See Appendix 1 for details of the periods over which the analysis was conducted.)
- These results are consistent with the debt cumulative default rates. Default rates for infrastructure debt have been consistently lower than non-infrastructure debt.
- Infrastructure debt exhibits an increasing cumulative default risk during the initial years of the loan, but the risk slows down as the loan matures and then stabilises by year 11, after which the debt performs as an investment-grade security. Non-infrastructure debt exhibits a similar cumulative increase in default risk, but with higher marginal default rates during the initial years of the loan until it stabilises and performs as an investment-grade security by year 16.
- Over a 20-year period, infrastructure debt presents a cumulative default rate of 5.4%, significantly lower than the cumulative default rates of 8.2% for non-infrastructure debt and 11.0% for an investment grade security (Baa3).

	Years to perform like investment grade	20-year cumulative default rate
Infrastructure	11	5.4%
Non-infrastructure	16	8.2%

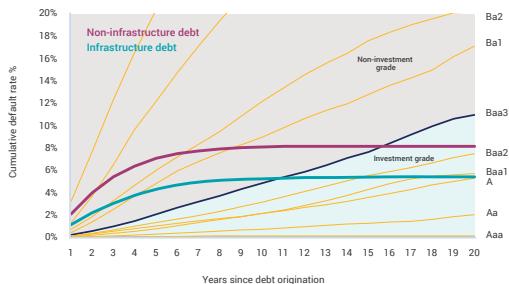
Source: Moody's (2021)

Infrastructure debt projects and defaults by sector (as % of total number of projects)



Source: Moody's (2021).
Note: Infrastructure debt includes construction, operations and refinancing loans.
Construction loans account for 70% of the infrastructure debt sample used in this analysis.

20-year cumulative default rate by sector



Source: Moody's (2021).
Note: Cumulative default rates associated with Moody's debt credit ratings for investment and non-investment grade securities are shown in the background of the default curves being Baa3 (88%) rating the frontier between investment and non-investment grade.

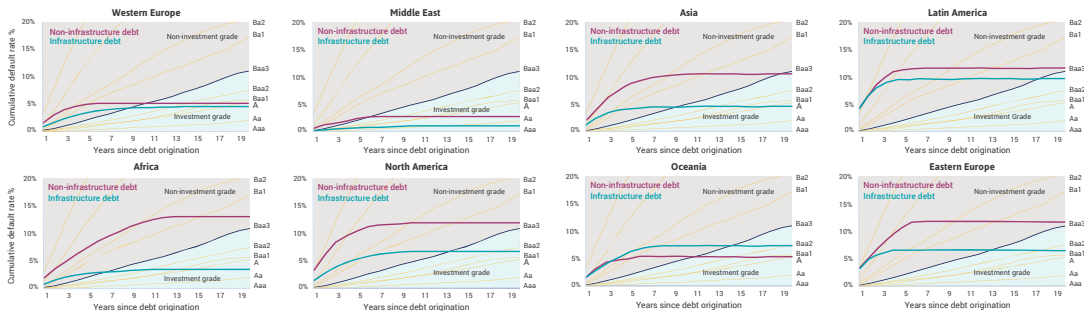


... this holds for most regions of the world except Oceania and Eastern Europe – although default rates differ.

- In most regions of the world, infrastructure debt performs better than non-infrastructure debt.
- Infrastructure debt default rates are higher than those of non-infrastructure debt in two regions – Oceania and Eastern Europe.

- In Oceania, the difference between infrastructure debt and non-infrastructure debt default rates is small. Oceania's infrastructure debt default rates are similar to some developed regions like North America.
- In Eastern Europe, higher infrastructure debt default rates may be related to volatile growth in investment in infrastructure, in part owing to fluctuations in funding for key markets.

20-year cumulative default rate by sector and region



Source: Moody's (2021).



Infrastructure debt performs better in high-income countries than in middle- and low-income countries, but better than non-infrastructure debt in all countries

- High-income countries have lower default concentration (80%) than project concentration (87%), indicating that infrastructure debt in high-income countries is less risky than infrastructure debt in middle- and low-income countries.
- These results also show within the evolution of cumulative default risk for debt since origination. Cumulative default rates on infrastructure debt in high-income countries remain significantly below those in middle- and low-income countries through most of the life of the debt. However, the gap between the marginal default rates in high-income and middle- and low-income countries decreases over time. Still, default rates on infrastructure debt in high-income and middle- and low-income countries are beneath the non-infrastructure debt default rates.
- Infrastructure debt performs as an investment grade security at year 11 in high-income countries and at year 14 in middle- and low-income countries.
- Over a 20-year period, infrastructure debt in high-income countries presents an average cumulative default rate of 5.2%. This compares to a cumulative default rate of 7.0% for middle and low-income countries, and 11% for an investment grade security (Baa3).

	Years to perform like investment grade	20-year cumulative default rate
High-income countries	11	5.2%
Middle- and low-income countries	14	7.0%

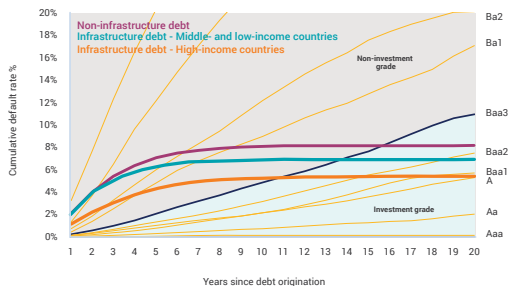
Source: Moody's (2021)

Infrastructure debt projects and defaults by income group (as % of total number of projects)



Source: Moody's (2021)

20-year cumulative default rate by sector and income group



Source: Moody's (2021)



Infrastructure debt performs differently across regions. Eastern Europe and Latin America have the highest default risks.

- Western Europe has lower default concentration (40%) than project concentration (47%), indicating that infrastructure debt in Western Europe is less risky than in other regions.
- These results also show within the evolution of cumulative default risk for debt since origination. Cumulative default rates on infrastructure debt in Western Europe remain below those in most regions through most of the life of the debt. Eastern Europe and Latin America have the highest default risk. This is likely a result of recent higher exposure – investment in infrastructure increased in these regions over the last few years, but these regions are less experienced with infrastructure projects than more developed regions.
- Infrastructure debt default rates are the lowest in the Middle East and Africa. However, the sample size of projects for these regions is small, and the projects analysed may have more guarantees that significantly offset high risks.
- Western Europe, Asia, North America, and Oceania have relatively similar default rates (4.6–7.3% in a 20-year period) and infrastructure debt performs faster as an investment-grade security in these regions than in most regions.
- Political and regulatory risks are higher in emerging markets and developing economies (EMDEs), and these risks are leading causes of defaults in EMDEs.

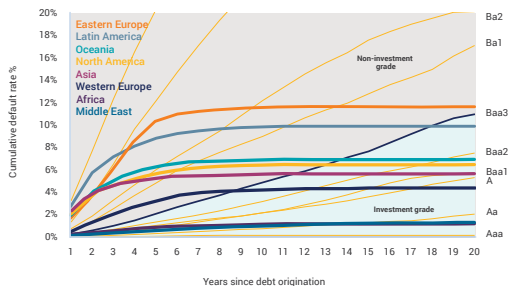
	Years to perform like investment grade	20-year cumulative default rate
Middle East	2	1.2%
Africa	3	1.1%
Western Europe	9	4.6%
Asia	13	5.9%
North America	14	6.8%
Oceania	15	7.3%
Latin America	19	10.3%
Eastern Europe	Non-Investment Grade	

Infrastructure debt projects and defaults by region (as % of total number of projects)



Source: Moody's (2021).

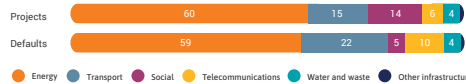
20-year cumulative infrastructure debt default rate by region



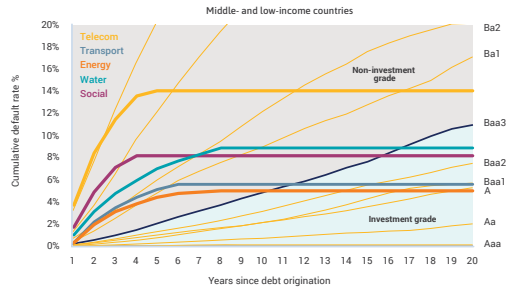
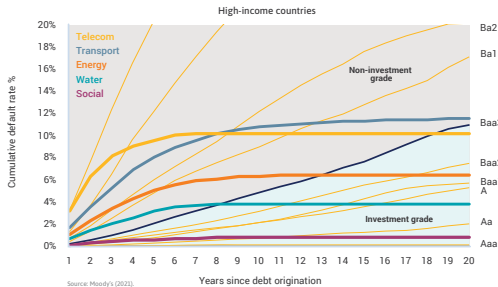
Source: Moody's (2021).

Infrastructure debt performs differently across sectors, with telecommunications, water, and social infrastructure debt exhibiting relatively higher risk in middle- and low-income countries.

Infrastructure debt projects and defaults by subsector (as % of total number of projects)



20-year cumulative infrastructure debt default rate by subsectors and income group



Infrastructure debt performs differently when the relative maturities of the market and sector are considered.

- Infrastructure debt performance varies by sector and country income group. This is related to the level of market maturity. In general, infrastructure markets in high-income countries are more experienced, which reduces risk. There is also a higher likelihood of more well-prepared projects being selected, in comparison to middle- and low-income countries. Performance is also affected by the maturity of the sectors and their business models.
- Infrastructure debt in the telecommunications, water, and social sectors has relatively higher risk than debt in other sectors in middle- and low-income countries. Social and water sectors in middle- and low-income countries are riskier because they are less mature. There is also less experience in these countries, and they face more social complexity, which makes investments riskier.

- Transport debt is riskier than in other sectors in high-income countries. This is because the sector is heterogeneous and has different business models across its subsectors and markets. In high-income countries, market risks are higher due to variances in price and volume assumptions, there is more competition, and there are less risk mitigation mechanisms than in developing economies. Particularly for roads, which represents the largest share of the transport sample, there is risk associated with traffic demand forecasting because it depends on individuals; it is difficult to quantify demand risk and hard to allocate associated risk. Tolls typically reduce traffic, making it harder to satisfy debt servicing, much less obtain a sufficient return on investment. In contrast, in developing economies the government typically guarantees a minimum demand, which lowers the risk profile.
- The telecommunications sector has high cumulative default risk compared to other sectors, especially in middle- and low-income countries. Disruptive innovations and the Internet of Things (IoT) have required high levels of investment in this sector. The associated higher debt stress and risk of default is visible, especially in middle- and low-income countries.

High-income countries

	Years to perform like investment grade	20-year cumulative default rate
Social	1	0.9%
Water	8	3.4%
Energy	12	5.8%
Telecommunications	17	9.1%
Transport	19	10.2%

Source: Moody's (2021)

Middle- and low-income countries

	Years to perform like investment grade	20-year cumulative default rate
Energy	13	6.1%
Transport	14	6.5%
Social	17	9.0%
Water	18	9.6%
Telecommunications	Non-investment grade	

Source: Moody's (2021)



Infrastructure debt default risk is lower for PPPs than non-PPPs.

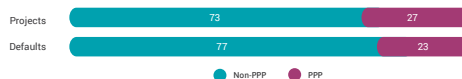
- Debt projects structured as PPPs have a lower share of debt defaults (23%) than their share in total debt projects (27%). This indicates PPP infrastructure debt is less risky than non-PPP infrastructure debt.
- Cumulative default risk has been consistently lower for infrastructure debt for PPP projects than for infrastructure debt for non-PPP projects.
- As is the case for infrastructure debt as a whole, PPP infrastructure debt exhibits an increasing default risk during the initial years of the loan. It then stabilises, and by year 9 it performs as an investment-grade security.
- Non-PPP infrastructure debt follows the same curve of increased default risk during the initial years of the loan, but it has higher marginal default rates during those initial years. This is one reason it takes longer for this debt to perform as an investment-grade security, which does not happen until year 13.
- In a 20-year period, PPP infrastructure debt presents a cumulative default rate of 4.3%, significantly lower than 6.1% for non-PPP infrastructure debt and 11% for an investment-grade security (Baa3).

	Years to perform like investment grade	20-year cumulative default rate
PPPs	9	4.3%
Non-PPPs	13	6.1%

Source: Moody's (2021)

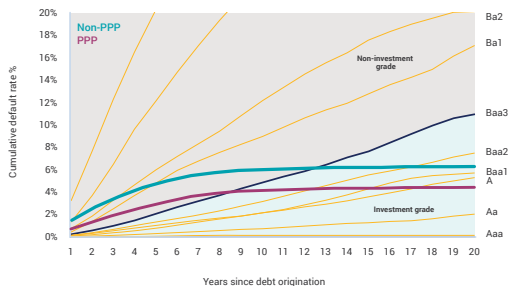
Infrastructure debt projects and defaults by contract

(as % of total number of projects)



Source: Moody's (2021)

20-year cumulative infrastructure debt default rate by contract



Source: Moody's (2021)



Debt for PPPs performs better across all income groups.

- The cumulative default risk of infrastructure debt for PPP projects is lower than for infrastructure debt for non-PPP projects, regardless of the country income group.
- On average, infrastructure debt for PPP projects performs as an investment-grade security by year 8 in high-income countries and by year 11 in middle- and low-income countries. In contrast, infrastructure debt for non-PPP projects reaches investment-grade performance four years later in high-income countries and middle- and low-income countries.
- Over a 20-year period, infrastructure debt for PPP projects in high-income countries has had an average cumulative default rate of 4.3%, compared to 5.1% for middle- and low-income countries and 11% for an investment grade security (Baa3). In the same period, infrastructure debt for non-PPP projects has had an average cumulative default rate of 5.8% in high-income countries and 7.3% in middle- and low-income countries.

High-income countries

	Years to perform like investment grade	20-year cumulative default rate
PPPs	8	4.3%
Non-PPPs	12	5.8%

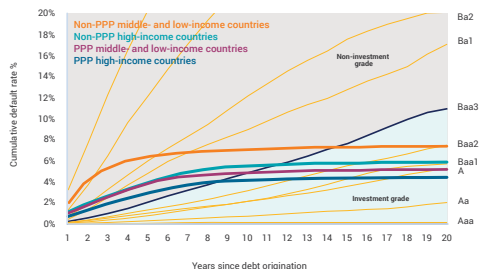
Source: Moody's (2021)

Middle- and low-income countries

	Years to perform like investment grade	20-year cumulative default rate
PPPs	11	5.1%
Non-PPPs	15	7.3%

Source: Moody's (2021)

20-year cumulative infrastructure debt default rate by contract and income group

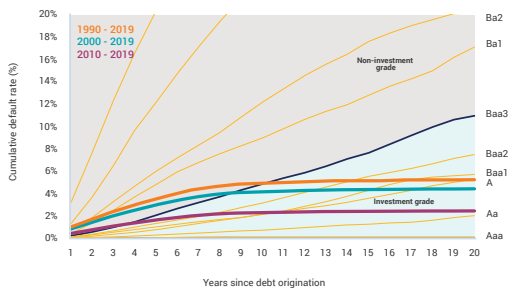


Source: Moody's (2021)

The performance keeps improving over time with newer infrastructure debt reaching investment grade faster than older infrastructure debt.

- On average, infrastructure debt performs as an investment-grade security by year 11 and presents an average cumulative default rate of 5.4%.
- As the default curve excludes older infrastructure loans, infrastructure debt becomes less risky and performs faster as an investment grade security.
- From 1990 to 2019, inclusive, infrastructure debt had an average cumulative default rate of 5.3% and performed as an investment-grade security by year 11.
- From 2000 to 2019, inclusive, infrastructure debt had an average cumulative default rate of 4.3% and performed as an investment-grade security by year 9.
- From 2010 to 2019, inclusive, infrastructure debt had an average cumulative default rate of 2.4% and performed as an investment-grade security by year 6.
- Considering that the debt composition of the sample regarding region, income group and sector has remained the same over time, these results may show that infrastructure debt is performing better over time.

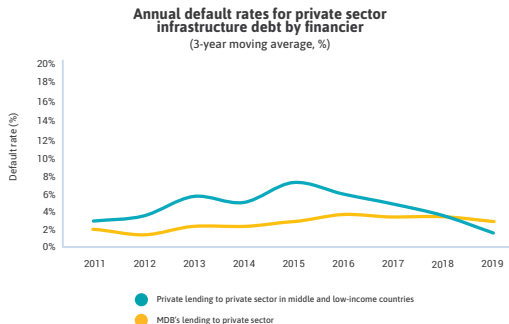
20-year cumulative infrastructure debt default rate by origination year



Source: Moody's (2023)
 Note: Considering that infrastructure debt default rates stabilize approximately around year 10 after the debt origination, defaults may still occur for projects originated after 2010. Although, these results may shift the three curves above, the gap among them will remain. Debt composition in terms of region, income group and subsector does not change among the three curves.

Are default rates for private lending converging towards the multilateral development bank debt default rates?

- Over the years, default rates for debt granted by multilateral development banks (MDBs) have been lower than those for debt granted by the private sector. This has been attributed in part to a 'halo effect', which assumes there are positive spillovers from the MDBs' involvement with a transaction. The potential sources of positive spillovers are diverse; for example, projects may undergo better project selection and preparation processes, comply with higher governance standards, and undergo transparent procurement and bidding procedures. This may lead to more confidence in their bankability and sustainability.
- Unfortunately, there is no structured framework to assess the halo effect, nor is there sufficient data. This report tries to compare data on infrastructure debt defaults granted to the private sector by MDBs with debt granted by the private sector in emerging economies.
- Data restrictions prevent us from making assumptions from the comparison presented, but the analysis raises many questions worth considering. For example: Are default rates for private lending converging towards the MDB debt default rates? Does the increase in default rates for MDBs reflect their mandate to provide more finance in frontier countries? Does the decrease in default rates for private sector lending reflect economic improvements in emerging economies?



Source: Moody's (2021)

Note: Considering that infrastructure debt default rates stabilises approximately around year 10 after the debt origination, defaults may still occur for projects originated after 2010. Although, these results may still be three curves above, the gap among them will remain. Debt composition in terms of region, income group and subsector does not change among the three curves.

Infrastructure debt performs like an investment grade security in the long run.

	Years to perform like investment grade	20-year cumulative default rate
BY SECTOR		
Infrastructure	11	5.4%
Non-Infrastructure	16	8.2%
BY INCOME GROUP		
High-income countries	11	5.2%
Middle- and low-income countries	14	7.0%
BY REGION		
Middle East	2	1.2%
Africa	3	0.8%
Western Europe	9	4.6%
Asia	13	5.9%
North America	14	6.8%
Oceania	15	7.3%
Latin America	19	10.3%
Eastern Europe		Non-Investment grade

Source: Moody's (2021)

	Years to perform like investment grade	20-year cumulative default rate
BY SUBSECTOR & INCOME GROUP		
High-income countries		
Social	1	0.9%
Water	8	3.4%
Energy	12	5.8%
Telecommunications	17	9.1%
Transport	19	10.2%
Middle- and low-income countries		
Energy	13	6.1%
Transport	14	6.5%
Telecommunications		Non-investment grade
Social	17	9.0%
Water	18	9.6%

Source: Moody's (2021)

	Years to perform like investment grade	20-year cumulative default rate
BY PPP STATUS		
PPPs	9	4.3%
Non-PPPs	13	6.1%
BY PPP STATUS & INCOME GROUP		
High-income countries		
PPPs	8	4.3%
Non-PPPs	12	5.8%
Middle- and low-income countries		
PPPs	11	5.1%
Non-PPPs	15	7.3%

Source: Moody's (2021)



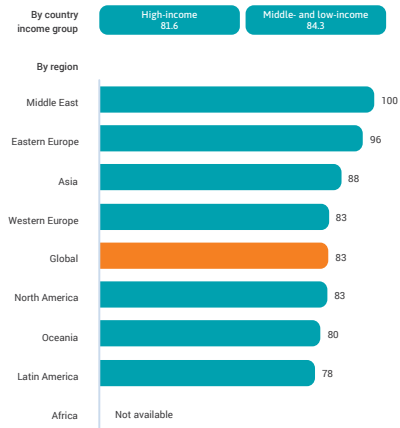
Infrastructure debt exhibits high ultimate recovery rates following default.

- Globally, infrastructure debt has a recovery rate following default of 83.3%.
- Infrastructure debt recovery in middle- and low-income countries is slightly higher than in high-income countries, probably due to high levels of guarantees that ensure recovery if default occurs.
- Performance data strongly suggests that infrastructure as an asset class is much less risky than other assets like corporate debt and bonds.

Type of debt	Recovery rate (%)
Infrastructure project finance loans	83.3%
Bank loans	82%
Non-infrastructure project finance loans	80%
Corporate debt	50-60%
Bonds	
Senior secured bonds	65%
Senior unsecured bonds	38%
Senior subordinated bonds	29%
Junior subordinated bonds	15%

Source: Moody's (2021)

Ultimate infrastructure debt recovery rate (%)



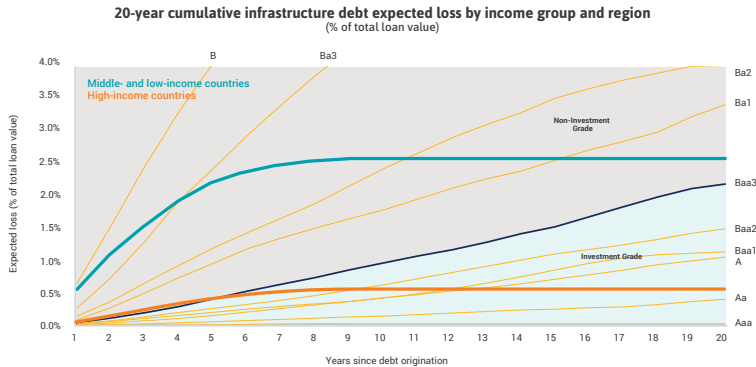
Source: Moody's (2021)



Expected losses from infrastructure debt defaults are low in high-income countries.

- Expected losses – defined as the proportion of debt value expected to be lost from potential infrastructure debt defaults – are low for infrastructure debt. This is the result of high recovery rates and low probabilities of default.

- In a 20-year period, the expected loss for high-income countries was 0.5% of the debt value, lower than the 1.1% expected losses of an investment-grade security (A-rated).
- However, in a 20-year period, the expected loss for middle- and low-income countries was 2.5%, which is higher than any investment-grade security, but lower than a non-investment-grade Ba1 security.

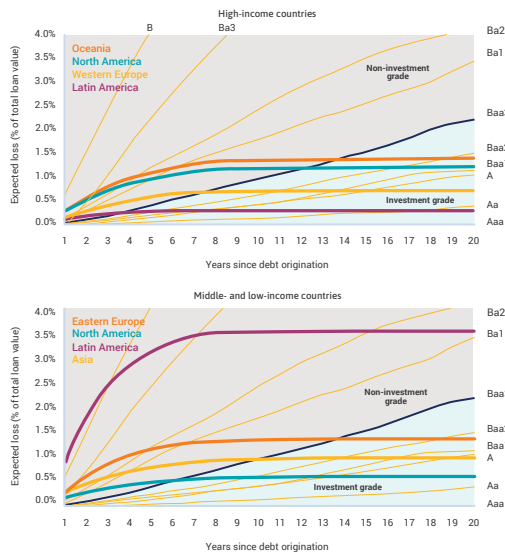


Source: Moody's (2021)

Expected loss from infrastructure debt default differs across regions. Eastern Europe and Latin America have the highest expected losses.

- Infrastructure debt expected losses vary by regions.
- In a 20-year period, the expected loss for infrastructure debt in all high-income regions was lower than that for investment-grade securities. The expected loss in middle- and low-income regions was higher than any investment-grade security but lower than non-investment-grade Ba1 securities.
- High-income regions have lower expected losses than middle- and low-income regions, with high-income Asia displaying the lowest expected loss from infrastructure debt – a level that is even lower than AAA investment-grade securities.
- In contrast, middle- and low-income regions in Eastern Europe and Latin America have higher expected losses, as a result of presenting the highest default risk among regions.
- Although infrastructure debt default rates in the Middle East show low expected loss, this may be a result of the region's reduced participation in the sample and a high level of guarantees that significantly offset high risks.

20-year cumulative infrastructure debt expected loss by income group and region



Source: Moody's (2021)

Note: Considering that infrastructure debt default rates stabilises approximately around year 10 after the debt origination, defaults may still occur for projects originated after 2020. Although, these results may shift the 3 curves above, the gap among them will remain. Debt composition in terms of region, income group and subsector does not change among the 3 curves.

3. Project preparation



Key findings

1. The lack of a bankable investment-ready pipeline of infrastructure projects is often considered one of the major bottlenecks in attracting private capital to infrastructure.
2. The bankability of an infrastructure project is mostly determined at the project preparation stage.
3. In almost all regions there is a need to improve project preparation capability. This is particularly the case in low-income countries.
4. Our report attempts to explore the channeling of funds to emerging economies to improve project preparation through the lenses of PPFs, which play an important role in supporting project preparation to develop bankable and investment-ready projects, providing both technical support and funding for this important project stage.
5. For this Infrastructure Monitor 2021 report, the GI Hub analysed a sample of 130 global PPFs operating across all regions. Our analysis indicates that PPFs are mainly active in developing countries and are mostly led by MDBs and IOs. Africa, the region with one of the lowest infrastructure project preparation scores, has the highest number of active PPFs. Almost 80% of the PPFs support project preparation in the energy sector.
6. Project preparation costs have always been significant, and they have only increased in recent years as the result of new requirements related to sustainability, regulation, inclusion, and technology, among others.
7. With preparation costs not being included in project budgets, countries facing fiscal constraints exacerbated by the pandemic, and project preparation costs increasing, PPFs are facing a resources dilemma.
8. Recent years have seen significant innovation in the way PPFs are providing support, with increasing cooperation and co-funding of project preparation to ensure sustainability and support more projects. This is especially valuable because project preparation costs have increased in recent years.



The lack of a bankable, investment-ready pipeline of infrastructure projects is one of the major bottlenecks in attracting private capital to infrastructure.

- Investors consider that the lack of a bankable and investment-ready pipeline of infrastructure projects is one of the major bottlenecks in attracting private capital to infrastructure. Unsurprisingly, enabling an investment ready pipeline has consistently featured as a top priority of G20 Presidencies.

- The Chinese G20 Presidency in 2016 pointed out a lack of rigorous national infrastructure planning, simplistic or subjective project evaluation, suboptimal project preparation, and insufficient revenue streams (B20 China, 2016).
- The German G20 Presidency in 2017 recommended boosting infrastructure finance by developing and promoting bankable and investment-ready infrastructure project pipelines and by enhancing the role of MDBs as catalysts for private sector investment (B20 Taskforce, 2017).
- The Argentinian G20 Presidency in 2018 endorsed a Roadmap to Infrastructure as an Asset Class (G20, 2018a) and principles for project preparation (G20, 2018b).

Key things that governments should do to promote private investment in the infrastructure industry, according to European infrastructure investors

Educating the public about private investment infrastructure

'Unblocking' planning approval processes

Providing a pipeline in high quality infrastructure assets

Tax stability

A willingness to underwrite contracted risks

Cleverly packaging and structuring deals

Stabilising regulatory environments

Source: Deloitte (2016).

Pillars and work streams of the G20 Roadmap to Infrastructure as an Asset Class

Improved Project Development

Contractual Standardisation

Financial Standardisation

Project Preparation

Bridging the Data Gap

Improved Project Development

Financial Engineering, Risk Allocation & Mitigation

Regulatory Frameworks & Capital Markets

Quality Infrastructure

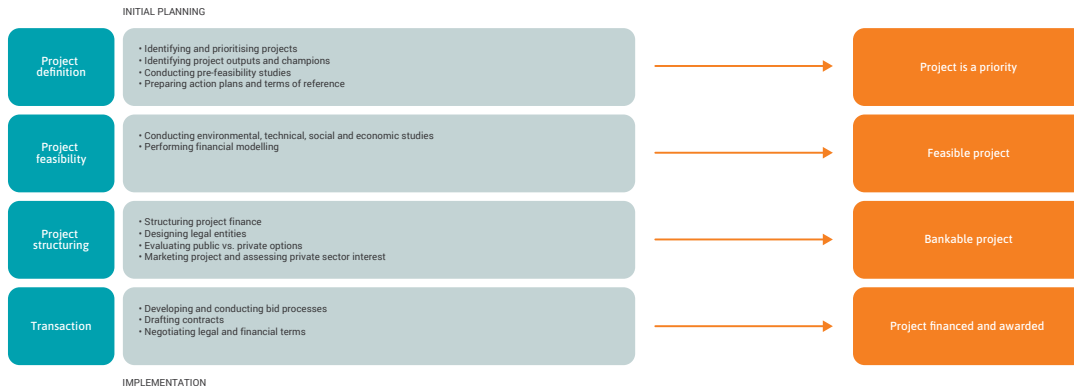
Source: G20 (2018b).



The bankability of an infrastructure project is mostly determined at the project preparation stage, which is complex ...

Project preparation is complex and involves several stages. Institutions have varying definitions of project preparation, but it is generally considered to span activities from conceptualisation and feasibility analysis to deal structuring and transaction support (GI Hub, 2019).

Project preparation stages



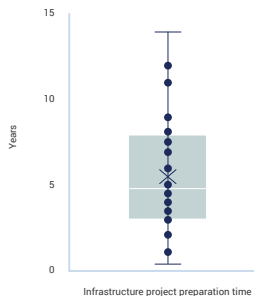
Source: Brown et al. (2020)

... and requires considerable financial resources and time.

- Project preparation requires considerable financial and time resources. The burden is even higher considering that these costs are not usually included within the estimated investment amount and need additional funding.

- Project preparation costs have increased substantially over the past two decades driven by the increasing complexity of infrastructure projects. As new issues emerge, requirements for infrastructure projects have increased (e.g. new regulations, environmental factors, social issues, governance and technology), leading to increased project preparation costs.
- There is greater understanding of the advantages of investing in the project preparation stage of many components that were not properly considered in the past. Project preparation costs have increased due to the higher investment in this pre-investment stage to avoid future inefficiencies.

In general, project preparation takes 3-8 years, with 6 years being the average. But, it can take up to 14 years if projects are not properly planned.



Source: IMF (2020)

Project preparation costs can average up to 10% of the project cost
(% of total project cost)



Developed countries

3-5%

Developing countries

5-10%

Source: G2 Hub (2020)

Current project preparation capability is weak ...

- While information to assess infrastructure project preparation is scarce, a few reports that analyse some dimensions can be used as project preparation proxies.
- The GI Hub's InfraCompass (GI Hub, 2020) assesses eight drivers of infrastructure quality. One driver, 'planning', assesses a government's ability to plan, coordinate, and select infrastructure projects.
- The InfraCompass analysis shows that planning is better in high-income countries. North America has the highest score, while the Middle East and Africa have the lowest scores.
- Nonetheless, planning still has room for improvement within all regions.

Infrastructure planning score by country income group, 2020

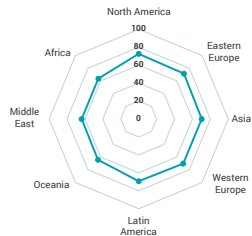
(0=worst and 100=best)



Source: GI Hub (2020)

Infrastructure planning score by region, 2020

(0=worst and 100=best)



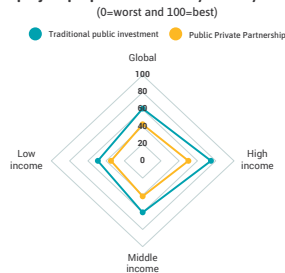
Source: GI Hub (2020)



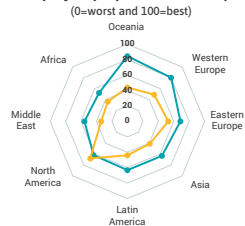
... with a need to improve project preparation capability in almost all regions, particularly in low-income countries.

- The World Bank Benchmarking Infrastructure Development 2020 report (World Bank, 2020) assesses the quality of regulatory frameworks to develop large infrastructure in four stages of a project cycle including preparation.
- Results show that project preparation is better for traditional public investments (TPIs) than for PPPs. This holds for country income groups and world regions.
- Infrastructure project preparation is better in high-income countries for TPIs and PPPs. Oceania and Western Europe are the best performers for TPIs, while North America is best for PPPs. The Middle East and Africa scores are the lowest for TPIs and PPPs.
- Despite some countries performing better than others, project preparation is a dimension that still has room for improvement across all regions and income groups, particularly for low-income countries.

Infrastructure project preparation score by country income group, 2020



Infrastructure project preparation score by region, 2020

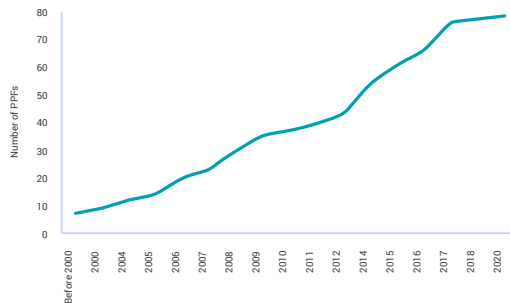


Source: World Bank (2020)
 Note: World Bank assesses the quality of regulatory frameworks worldwide to develop large infrastructure projects through both public-private partnerships and traditional public investments in different stages of a project cycle, including its preparation (which is analysed above), procurement, contract management and unutilised proposals.

PPFs play an important role in supporting project preparation to develop bankable and investment-ready projects.

- The lack of bankable, investment-ready projects is a barrier to attracting greater private sector investment in infrastructure, particularly in emerging economies.
- Governments often lack the capacity and resources for project preparation.
- Our report attempts to explore the channeling of funds to emerging economies to improve project preparation through the lenses of PPFs, which provide technical and/or funding support in the project preparation stage to develop bankable and investment-ready projects.
- Very few PPF initiatives were in place before 2000. Since 2000, their creation grew exponentially. Over 80% of the existing MDB-led PPFs were created after 2015 (GI Hub, 2019) mainly to fund and support project preparation.
- In 2011, the G20 High Level Panel on Infrastructure raised concerns about the existence of numerous PPFs and their small size, and recommended restructuring for more sustainable and impactful operations.
- For this Infrastructure Monitor 2021 report, the GI Hub collated detailed data for 130 PPFs operating across all the regions to analyse the scope, size, and progress of PPFs worldwide through a comprehensive review of published information.

Timeline of PPFs creation
(number)



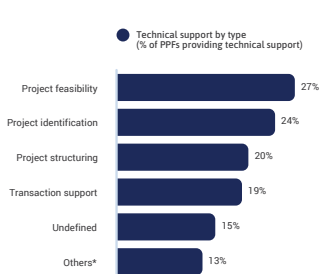
Source: GI Hub calculations based on the PPF sample.
Note: Due to missing values related to creation year, information includes 78 out of the 130 PPFs identified.

PPFs provide technical support and funding for the project preparation stage.

- The PPFs studied for this report provide technical support and funding for the project preparation stage.

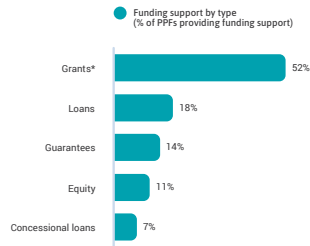
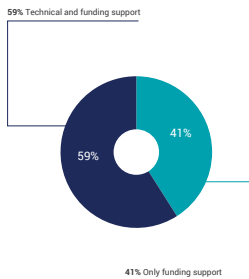
- Of the 130 PPFs studied, 59% are engaged in providing technical and funding support, while 41% are focused on providing funding and financing support for project preparation.
- Recent years have seen significant innovation in the way PPFs are providing support, with increasing cooperation and co-funding of project preparation. This is especially valuable because project preparation costs have increased in recent years.

Scope of PPF support for project preparation (% of total)



Source: GI Hub calculations based on information published by the sample PPFs.
Note: Results add over 100% because PPFs provide more than one type of technical and financial support.

*Capacity building, networking arrangements, legal support.



Source: GI Hub calculations based on information published by the sample PPFs.
Note: Results add over 100% because PPFs provide more than one type of technical and financial support.

*Very few grants include some contingencies.

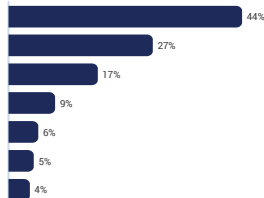
Africa, the region with one of the lowest infrastructure project preparation scores, has the highest number of active PPFs.

- PPFs provide support in every region in the world.
- The majority of PPFs have a region-specific focus, while 36% focus in more than one region.
- Currently, PPF support focuses mostly on infrastructure projects in Africa (44%). This focus is possibly related to Africa currently having the weakest scores for project preparation.

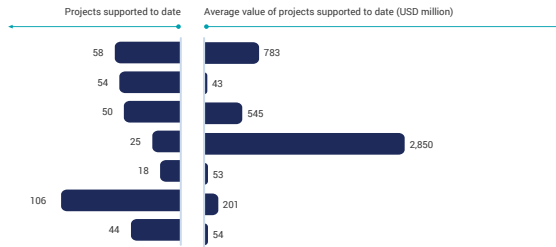
- A larger number of PPFs does not necessarily translate into better outcomes. Despite having fewer PPFs, a greater number of projects receive PPF support in Oceania than in other regions.
- Although the support provided by PPFs within Eastern Europe is limited, the projects supported have a much larger average value than in other regions.
- Although Asia has the second highest number of active PPFs, the projects supported have a significantly smaller average value than in other regions.
- PPF support lags in the Middle East, which together with Africa, has one of the lowest project preparation scores.

PPFs by region, 2020

Number of PPFs



Africa
Asia
Latin America
Eastern Europe
Middle East
Oceania
Western Europe



Source: GI Hub calculations based on information published by the sample PPFs.

Note: 36% of the PPFs in the sample support two or more regions. Oceania includes Melanesia, Micronesia and Polynesia. Reliability of insights on projects' volume and value is constrained by data availability. Only 60% of the PPFs reported the number of projects supported as well as regional presence and just 32% reported the value of projects supported as well as regional presence.

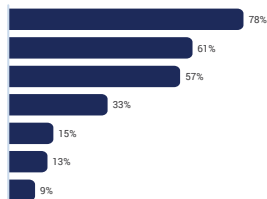
Almost 80% of PPFs support project preparation in the energy sector, while only a few support project preparation in the social and telecommunication sectors.

- PPFs provide support across all infrastructure subsectors, but some sectors receive greater attention than others.
- About three quarters of PPFs support multiple sectors.

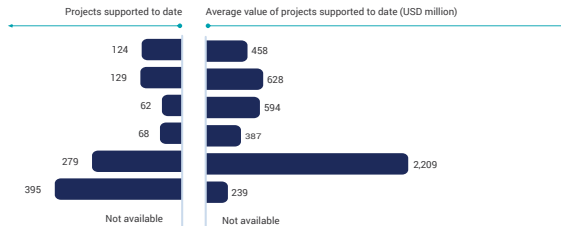
- More than half of all PPFs are mandated to support the energy, transport, and water sectors, and almost 80% support project preparation in the energy sector.
- Although only 15% of PPFs provide support for project preparation within the social sector, the projects supported are, on average, much larger than in other sectors.
- Only 13% of PPFs provide support to project preparation within the telecommunication sector. However, they support a greater number of telecommunication projects versus other sectors.

PPFs by sector, 2020

Number of PPFs



Energy
Transport
Water
Waste
Social
Telecom
Undefined



Source: G2 Hub calculations based on information published by the sample PPFs. Note: PPF support to a sector was considered if the sector was included in the PPF mandate. 77% of the PPFs in the sample support more than one sector. Reliability of insights on projects' volume and value is constrained by data availability. Only 67% of the PPFs reported the number of projects supported, as well as sector of operations, and just 32% reported the value of projects supported as well as sector of operations.



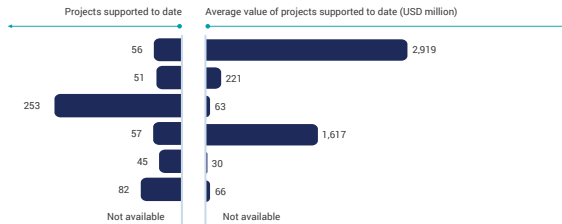
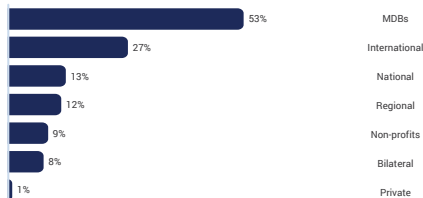
PPFs are mostly led by MDBs.

- Among the studied PPFs, most are primarily led by MDBs (53%) and international organisations (27%) to provide support in EMDEs.
- Governments typically lack the capacity and resources for project preparation, and they often budget for infrastructure investments without including project preparation costs. These fiscal restrictions (which are being exacerbated by the pandemic) explain why project preparation is increasingly being handled by MDBs through PPFs.

- Besides leading a majority of the PPFs, MDBs support much larger projects than the PPFs led by other organisations because MDBs serve as a finance source in most cases.
- The proximity to the market and investors allows PPFs led by national organisations to support a greater number of projects than other types of PPFs.

PPFs by lead organisation type, 2020

Number of PPFs



Source: ICF Hub calculations based on information published by the sample PPFs.

Note: Results add over 100% because some PPFs are co-led by two or more organisation types (22%). Reliability of insights on projects' volume and value is constrained by data availability. Only 60% of the PPFs reported the number of projects supported as well as lead organisation and just 32% reported the value of projects supported as well as lead organisation.

4. Environmental, social, and governance (ESG) factors in infrastructure



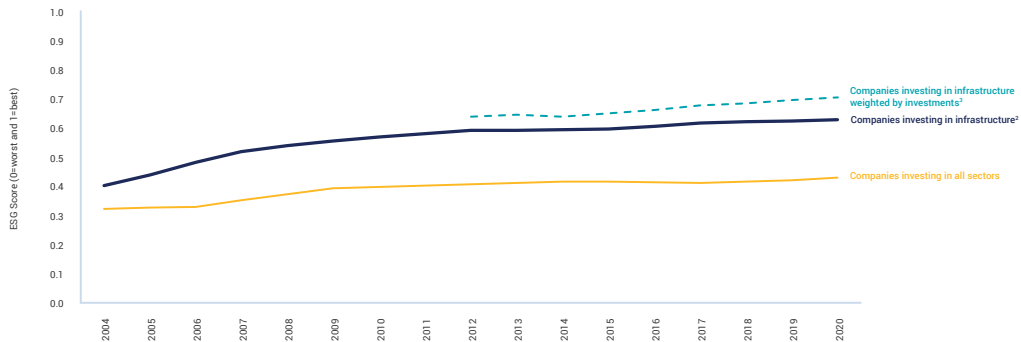
Key findings

1. ESG factors are of increasing importance for private investors looking to manage and mitigate risk and enhance financial performance and returns.
2. Consideration of ESG factors is particularly important for infrastructure investors due to infrastructure's long investment horizon and the significant upfront investment required for infrastructure assets. This locks in projects before the impact of many ESG issues – such as climate-related risks – and leaves investors facing a much higher risk of stranded assets.
3. More investors are incorporating ESG factors into their investment and management decisions, particularly after the pandemic forced companies to transform and be more resilient. Notably, companies investing in infrastructure are incorporating ESG factors better than other companies, particularly the environmental aspect. Infrastructure assets are also improving their ESG reporting and targeting.
4. Environmental factors (particularly climate-related) are the largest and most common ESG concern, whereas social and governance dimensions are less assessed.
5. Green private investment in infrastructure projects has been increasing since 2014, rising from USD58 billion in 2014 to USD87 billion in 2020 – mostly in the renewables sector although change is also being pursued in other sectors.
6. However, renewables private investment still needs to increase significantly from current levels to reach net-zero targets. Efforts to decarbonise infrastructure and reduce its significant climate footprint must also look beyond renewables and into other sectors – such as transport – where green private investment remains low.
7. Evidence on the relationship between ESG impact and financial performance is scarce. It is possible to use a renewable equities index as a proxy for equities incorporating environmental factors to show that it outperforms other infrastructure indexes. Preliminary evidence shows that investment in unlisted wind and solar equities have generated higher returns than in the overall infrastructure sector. However, more data is needed to investigate the link between ESG and financial performance for infrastructure.



Companies investing in infrastructure have incorporated ESG factors better than other companies.

Companies' ESG scores¹ by sector of investment
(3-year moving average)



Source: GI Hub based on Refinitiv and UGlobal data.

Notes: ¹Refinitiv ESG scores measure a company's relative performance on ESG attributes, commitment, and effectiveness across Environmental (E), Social (S), and Governance (G) pillars. Based on publicly reported data, scores focus on a company's operations and policies rather than its products and services, and generally reflect their management approach and transparency of performance rather than direct performance. The dataset covers over 30,800 companies. While not all companies record an ESG score in each year, the score for companies investing in all sectors is calculated as the simple average of all companies for which data is available in that year.

²Companies investing in infrastructure includes those companies identified as primary infrastructure investors in the UGlobal dataset. Refinitiv ESG data covers around 3,000 companies of the ~3,500 infrastructure private investors covered by UGlobal, representing approximately 65% of the total transaction value.

³The weighted average line weights infrastructure investors by the value of their investment in infrastructure in primary markets since 2010 (from which data is available).

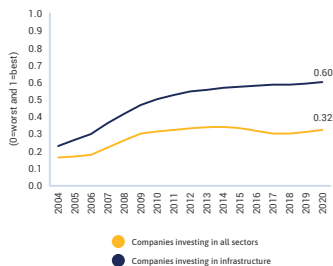


Companies investing in infrastructure outperform other companies on all three ESG components, but particularly on environmental.

- Scores within the environmental and social factors have improved for all sectors over time, while there have been minimal improvements in the governance aspect.

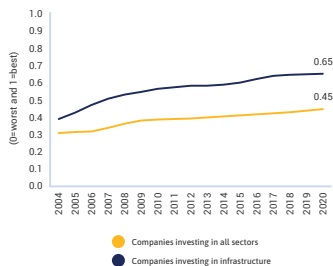
- Companies investing in infrastructure outperform other companies on all three ESG components, but particularly in the environmental component, which has a sharper increase over time, with the environmental score for companies investing in infrastructure being almost twice as high as all other sectors in recent years.
- Although the environmental aspect (such as climate-related risks) is the biggest and most common ESG concern, within the companies investing in infrastructure, social is the aspect that scores better, and for all sectors, governance is the aspect that scores better.

Environmental score by sector of investment
(3-year moving average)



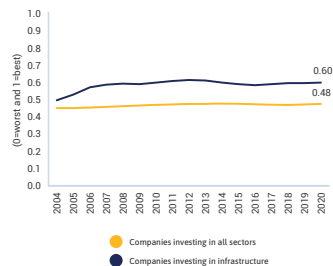
Source: GI Hub based on Refinitiv and IIGlobal data.

Social score by sector of investment
(3-year moving average)



Source: GI Hub based on Refinitiv and IIGlobal data.

Governance score by sector of investment
(3-year moving average)

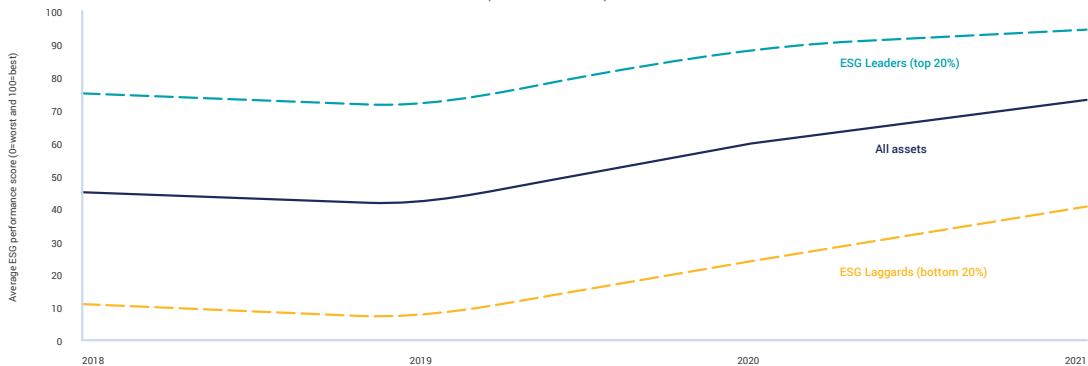


Source: GI Hub based on Refinitiv and IIGlobal data.



Infrastructure assets have also gradually improved their ESG targeting and reporting.

ESG Performance Score for infrastructure assets
(0=worst and 100=best)



Source: GRESB Infrastructure Asset Assessment.

1. GRESB Asset Performance Indicators generally reflect the extent to which assets report on their most material ESG issues and have current and future targets set. In this way, scores reflect the transparency of reporting ESG data and not actual performance. GRESB is working with the infrastructure industry towards reflecting performance in scores in future years.

2. The calculation of the GRESB Rating is based on the GRESB Score and its quintile position relative to the GRESB asset universe. If a participant is placed in the top quintile, it will have a GRESB 5Star rating; if it ranks in the bottom quintile, it will have a GRESB 1Star rating, etc.

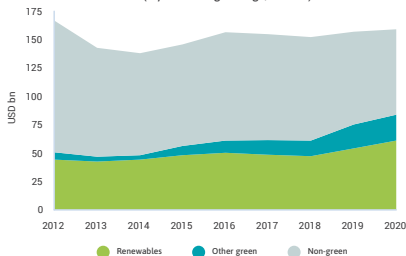
3. While ESG Performance scores reflect some methodological changes and changing component weights throughout time, they are still comparable across years.



In less than a decade, green private investment in infrastructure projects has significantly grown and currently represents half of the private investment in infrastructure projects.

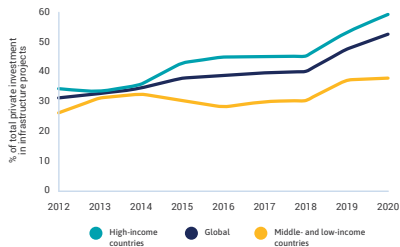
- In less than a decade, green private investment in infrastructure projects has grown significantly, and currently represents half of the private investment in infrastructure projects overall and 60% in high-income countries.
- Green private investment in infrastructure projects is dominated by renewables, particularly wind and solar projects.
- Financing through green bonds has been rising over recent years, particularly in high-income countries in Western Europe, North America, and Asia.

Green and non-green private investment in infrastructure projects
(3-year moving average, USD bn)



Source: GI Hub based on IIGlobal data.
Note: Green investment in infrastructure means investment in environmentally sustainable projects that support the transition to net zero emissions of carbon dioxide. Other green includes EV charging infrastructure, Carbon Capture and Storage (CCS), green buildings, and urban transit systems such as light rail and bus networks, and other green investment in infrastructure financed by green bonds/loans.

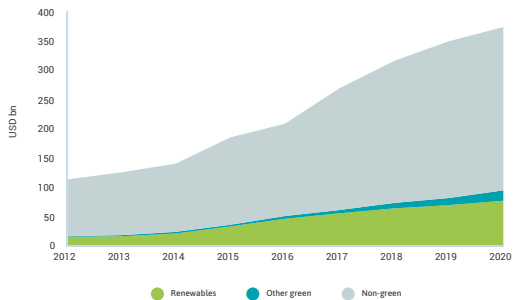
Share of green private investment in infrastructure projects by income group
(3-year moving average, % of total private investment in infrastructure projects)



Source: GI Hub based on IIGlobal data.
Note: Green investment in infrastructure means investment in environmentally sustainable projects that support the transition to net zero emissions of carbon dioxide. Other Green includes EV charging infrastructure, Carbon Capture and Storage (CCS), green buildings, and urban transit systems such as light rail and bus networks, and other green investment in infrastructure financed by Green Bonds/Loans.

This increasing trend is also observed in secondary markets, where green private investments in infrastructure projects now account for around a quarter of total private investment in infrastructure projects.

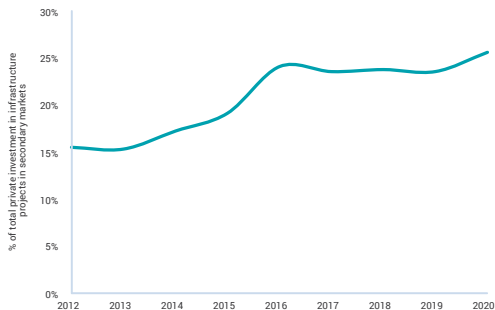
Green and non-green private investment in infrastructure projects in secondary markets
(3-year moving average, USD bn)



Source: GI Hub based on IIGlobal data.

Note: Green investment in infrastructure means investment in environmentally sustainable projects that support the transition to net-zero emissions of carbon dioxide. Other green includes EV charging infrastructure, Carbon Capture and Storage (CCUS), green buildings, and urban transit systems, such as light rail and bus networks and other green investment in infrastructure financed by green bonds/loans.

Share of green private investment in infrastructure projects in secondary markets
(3-year moving average, % of total private investment in infrastructure projects in secondary markets)



Source: GI Hub based on IIGlobal data.

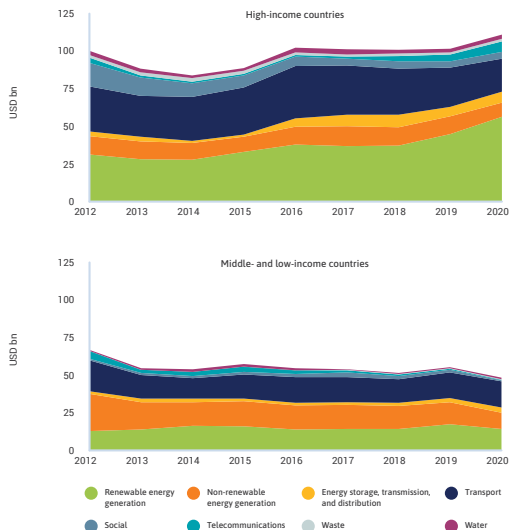
Note: Green investment in infrastructure means investment in environmentally sustainable projects that support the transition to net-zero emissions of carbon dioxide. Other Green includes EV charging infrastructure, Carbon Capture and Storage (CCUS), green buildings, and urban transit systems such as light rail and bus networks, and other green investment in infrastructure financed by Green Bonds/Loans.



Renewables dominate private investment in infrastructure projects, but there is still a long road ahead. Wind and solar capacity additions must quadruple by 2030 to reach net-zero targets. Carbon emissions reduction in other sectors needs to increase substantially ...

- Globally, renewables represented almost half the total value of private investment in infrastructure projects in 2020 (47%) – a share that has more than doubled since 2010 (21%). The strength in renewables is evident in both high-income, and middle- and low-income markets (with smaller deal sizes for the latter) and is mostly driven by wind and solar projects (over 90% of total private renewables investment).
- While this focus on renewables is encouraging, its current levels are not sufficient to reach net-zero targets. According to the IEA (2021), wind and solar capacity additions must quadruple by 2030 to reach global net-zero emissions by mid-century.
- According to GRESB (2021), few infrastructure assets currently have net-zero targets – however, fund managers representing 40% of reporting assets recently committed to including assets with net-zero targets in their portfolios.
- Currently green private investment is reflected the most in the renewables sector, while other sectors need to make changes to increase their green investment.

Private investment in infrastructure projects by subsector and income group
(3-year moving average, USD bn)



Source: GI Hub based on IIGlobal data.



... particularly as the infrastructure climate footprint is much more substantial than other sectors.

Climate footprint of global equities vs listed infrastructure equities

	Global equities (MSCI ACWI Index)	Listed infrastructure equities (MSCI ACWI Infrastructure Capped Index)
Carbon emissions (t CO ₂ e/\$M invested)	90	380
Carbon intensity (weighted average, t CO ₂ e/\$M sales)	152	786
Exposure to carbon-related assets (%)	5.8	48.8
Asset stranding (%)	0.4	2.2

Source: MSCI (2018).

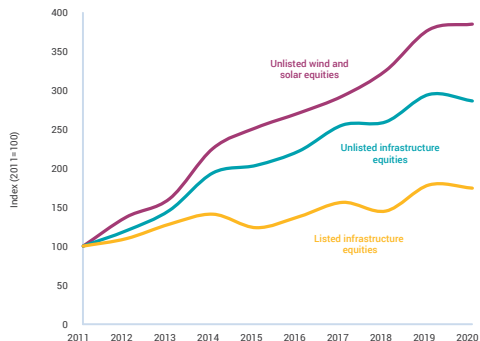
Note: Data of climate footprint of unlisted infrastructure equities is unavailable.



Preliminary evidence shows superior performance for sustainable investments.

- Although companies investing in infrastructure are incorporating ESG factors in their investment and management decisions faster than other companies, particularly regarding the environmental aspect, there is still a long road ahead.
- Sustainable infrastructure investment is constrained by limited data on how ESG factors impact financial performance.
- Analysing EDHEC's index of unlisted wind and solar equities (InfraGreen) as a proxy for equities incorporating environmental factors, we can see that it outperforms EDHEC's unlisted infrastructure equities index (infra300®) and the listed infrastructure index (MSCI). In the last 10 years, wind and solar equities have generated a compound annual return of 16%, higher than the compound annual return of listed (6%) and unlisted (12%) infrastructure equities.
- These findings are in line with other studies that have found evidence of superior performance for sustainable investments. For example, Moody's (2020) found that project finance bank loans for green projects exhibit a lower default risk than non-green projects, and the IEA (2020) found that listed renewable portfolios in select advanced economies offered higher total returns than fossil fuel portfolios, and similar or lower annualised volatility.

Infrastructure equity return indexes
(2011=100)



Source: EDHEC/Infra, MSCI

Appendices



Appendix 1: Glossary

Private investment in infrastructure

Additional Facilities	These transactions refer to additional debt required by the SPV after the initial project financing. They may be either primary or secondary market transactions.
Design-Build	A project delivery system used in the construction industry. It is a method to deliver a project in which the design and construction services are contracted by a single entity known as the design–builder or design–build contractor. The Design-Build category is generally intended for deals that do not contain any debt financing and there is no concession to operate the asset.
Financial Close	Transaction stage where all financing documentation has been signed, all conditions precedent have been satisfied or waived and initial drawdown is contractually possible. In transactions that involve no debt financing, IJ Global considers the signing of project or transaction documentation as a proxy for financial close.
Portfolio Financing	The acquisition or financing of a group of distinct assets.
Private Market	Primary market transactions include investment in greenfield and brownfield infrastructure, as well as privatisations.
Private Infrastructure Investment	Investment made by the private sector in infrastructure projects in primary markets (financed by private and public financiers). Investment values represent commitments made at the financial close of investment and not executed investment. It includes both debt and equity transactions.
Refinancing	The replacement of an existing debt obligation with a debt obligation bearing new and different terms.
Secondary market	Secondary market transactions include acquisitions, refinancing, securitisations, and financing for general corporate operations. It also includes transactions that cover a mix of primary and secondary purposes.
Securitisation	Transaction in which a pool of assets is collateralised into one vehicle of loan products for sale.



Income group classifications

High Income Countries	Åland Islands, Andorra, Aruba, Australia, Austria, Bahrain, Belgium, Bermuda, Bouvet Island, British Virgin Islands, Canada, Cayman Islands, Croatia, Curaçao, Cyprus, Czech Republic, Denmark, Equatorial Guinea, Estonia, Falkland Islands, Faroe Islands, Finland, France, French Guiana, French Polynesia, Germany, Gibraltar, Greece, Guadeloupe, Guam, Hong Kong SAR, China, Hungary, Iceland, Ireland, Israel, Italy, Japan, Korea, Kuwait, Liechtenstein, Luxembourg, Malta, Martinique, Monaco, Netherlands, New Zealand, Norway, Oman, Poland, Portugal, Puerto Rico, Qatar, Saint Helena, San Marino, Saudi Arabia, Singapore, Slovak Republic, Slovenia, South Georgia & The South Sandwich Islands, Spain, Svalbard & Jan Mayen Islands, Sweden, Switzerland, Taiwan, The Bahamas, Trinidad and Tobago, United Arab Emirates, United Kingdom, United States, Vatican City.
Middle and Low Income Countries	Afghanistan, Albania, Algeria, Angola, Argentina, Armenia, Azerbaijan, Bangladesh, Belarus, Benin, Bhutan, Bolivia, Bosnia and Herzegovina, Botswana, Brazil, Bulgaria, Burkina Faso, Burundi, Cabo Verde, Cambodia, Cameroon, Central African Republic, Chad, Chile, China, Colombia, Comoros, Congo, Costa Rica, Côte d'Ivoire, Dem. Rep. Congo, Djibouti, Dominican Republic, Ecuador, Egypt, El Salvador, Eritrea, Eswatini, Ethiopia, Fiji, Gabon, Georgia, Ghana, Guatemala, Guinea, Guinea-Bissau, Guyana, Honduras, India, Indonesia, Iran, Iraq, Jamaica, Jordan, Kazakhstan, Kenya, Lao PDR, Latvia, Lebanon, Lesotho, Liberia, Libya, Lithuania, Madagascar, Malawi, Malaysia, Maldives, Mali, Marshall Islands, Mauritania, Mauritius, Mayotte, Mexico, Moldova, Mongolia, Montenegro, Morocco, Mozambique, Myanmar, Namibia, Nepal, Nicaragua, Niger, Nigeria, North Macedonia, Pakistan, Palau, Panama, Papua New Guinea, Paraguay, Peru, Philippines, Romania, Russia, Rwanda, Sao Tome and Principe, Senegal, Serbia, Seychelles, Sierra Leone, Solomon Islands, Somalia, South Africa, South Sudan, Sri Lanka, Sudan, Suriname, Syrian Arab Republic, Tanzania, Thailand, The Gambia, Timor-Leste, Togo, Tunisia, Turkey, Uganda, Ukraine, Uruguay, Uzbekistan, Vanuatu, Venezuela, Vietnam, West Bank and Gaza, Western Sahara, Yemen, Zambia, Zimbabwe.

Sector classifications

Energy Storage, Transmission & Distribution	Investment in energy storage (such as batteries), transmission and distribution networks, and district heating.
Non-renewables Energy Generation	Investment in coal-, gas- and oil-fired power plants, IWPP, nuclear, co-generation, and carbon capture and storage facilities.
Renewables energy generation	Investment in biofuels, biomass, geothermal, hydro, hydrogen, marine, offshore wind, onshore wind, photovoltaic solar, and thermal solar.
Social	Investment in education, healthcare, social housing, fire and rescue, justice, leisure, and municipal infrastructure.
Telecommunications	Investment in data centres, digital infrastructure, mobile, internet, satellite, and terrestrial infrastructure.
Transport	Investment in airports, roads, bridges, tunnels, heavy rail, light rail, ports, maritime transport, EV charging infrastructure, and car park facilities.
Waste	Investment in waste management and treatment facilities, and waste-to-energy plants
Water	Investment in water distribution, treatment, and desalination facilities.

Region classifications

Africa	Algeria, Angola, Benin, Botswana, Bouvet Island, Burkina Faso, Burundi, Cabo Verde, Cameroon, Central African Republic, Chad, Comoros, Congo, Côte d'Ivoire, Dem. Rep. Congo, Djibouti, Egypt, Equatorial Guinea, Eritrea, Eswatini, Ethiopia, Gabon, Ghana, Guinea, Guinea-Bissau, Kenya, Lesotho, Liberia, Libya, Madagascar, Malawi, Mali, Mauritania, Mauritius, Mayotte, Morocco, Mozambique, Namibia, Niger, Nigeria, Rwanda, Saint Helena, Sao Tome and Principe, Senegal, Seychelles, Sierra Leone, Somalia, South Africa, South Sudan, Sudan, Tanzania, The Gambia, Togo, Tunisia, Uganda, Western Sahara, Zambia, Zimbabwe.
Asia	Afghanistan, Bangladesh, Bhutan, Cambodia, China, Hong Kong SAR, China, India, Indonesia, Japan, Kazakhstan, Korea, Lao PDR, Malaysia, Maldives, Mongolia, Myanmar, Nepal, Pakistan, Papua New Guinea, Philippines, Singapore, Sri Lanka, Taiwan, Thailand, Timor-Leste, Turkmenistan, Uzbekistan, Vietnam.
Eastern Europe	Albania, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Lithuania, Moldova, Montenegro, North Macedonia, Poland, Romania, Russia, Serbia, Slovak Republic, Slovenia, Ukraine.
Latin America	Argentina, Aruba, Bolivia, Brazil, Cayman Islands, Chile, Colombia, Costa Rica, Curaçao, Dominican Republic, Ecuador, El Salvador, Falkland Islands, French Guiana, Guadeloupe, Guatemala, Guyana, Honduras, Jamaica, Nicaragua, Panama, Paraguay, Peru, Puerto Rico, South Georgia & The South Sandwich Islands, Suriname, The Bahamas, Trinidad and Tobago, Uruguay, Venezuela.
Middle East	Armenia, Azerbaijan, Bahrain, Georgia, Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, Syrian Arab Republic, Turkey, United Arab Emirates, West Bank and Gaza, Yemen.
North America	Bermuda, Canada, Mexico, United States.
Oceania	Australia, Fiji, French Polynesia, Guam, Marshall Islands, New Zealand, Palau, Solomon Islands, Vanuatu.
Western Europe	Åland Islands, Andorra, Austria, Belgium, British Virgin Islands, Cyprus, Denmark, Faroe Islands, Finland, France, Germany, Gibraltar, Greece, Iceland, Ireland, Italy, Latvia, Liechtenstein, Luxembourg, Malta, Martinique, Monaco, Netherlands, Norway, Portugal, San Marino, Spain, St. Martin (French part), Svalbard & Jan Mayen Islands, Sweden, Switzerland, United Kingdom, Vatican City.



Infrastructure equity performance

Annual Total Return	Share price appreciation and income from regular cash distributions (cash dividend payments or capital repayments) reinvested on the intended date of such distributions, without consideration for withholding taxes.
Equity Investment	Money that is invested in a company by purchasing shares of that company.
Factors explaining the risk premium of unlisted infrastructure equities	<p>Leverage is measured as the ratio of Total Senior Liabilities over the Total Assets. Size is measured by total asset book value. Term spread is estimated as the difference between yields of a 20-year and a 3-month public bond. Investment level is the ratio of capital expenditure as a share of total assets. Aggregate sector effects is a factor that controls for sectors (transport, social, power, utilities etc.) and business model (merchant, regulated, contracted) while estimating the contribution of four other factors. Profits is a factor that analyses equities' profits. Equities that earn large profits typically come with little risks, which reduces risk premiums.</p>
Global Equities	Global equities performance is measured by the Morgan Stanley Capital International All Country World Index (MSCI ACWI), MSCI's flagship global equity index, is designed to represent performance of the full opportunity set of large- and mid-cap stocks across 23 developed and 27 emerging markets. As of June 2021, it covers more than 2,900 constituents across 11 sectors and approximately 85% of the free float-adjusted market capitalisation in each market.
Listed Infrastructure	Listed infrastructure equities are publicly traded on a stock exchange. Listed infrastructure equities performance is measured by the MSCI ACWI Infrastructure Capped Index (MSCI ACWI-IC) comprises a global opportunity set of companies that are owners or operators of infrastructure assets, selected from MSCI ACWI , the parent index, which covers mid and large cap securities across 23 Developed Markets and 26 Emerging Markets, for five infrastructure sectors: Telecommunications, Utilities, Energy, Transport, and Social.
Sharpe Ratio	Ratio of excess returns to the standard deviation of returns, where excess return is total return minus risk-free return.
Unlisted Infrastructure	Unlisted infrastructure equities are generally offered through private placements made by the project company signatory of the project or concession agreement. Unlisted infrastructure equities performance is measured by EDHEC Infra's Infra300 equity index , which comprises a sample of 300 unlisted infrastructure companies (often private equity funds) representing 6,000 firms in 22 countries across all infrastructure sectors.



Income group classifications

Developed Markets

MSCI ACWI includes Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Hong Kong, Ireland, Israel, Italy, Japan, Netherlands, New Zealand, Norway, Portugal, Singapore, Spain, Sweden, Switzerland, the UK, and the US.

EDHECInfra includes Australia, Austria, Canada, Chile, Finland, France, Germany, Ireland, Italy, Netherlands, New Zealand, Norway, Poland, Portugal, Singapore, Spain, Sweden, the UK, and the US.

Emerging Markets

MSCI ACWI includes Argentina, Brazil, Chile, China, Colombia, Czech Republic, Egypt, Greece, Hungary, India, Indonesia, Korea, Kuwait, Malaysia, Mexico, Pakistan, Peru, Philippines, Poland, Qatar, Russia, Saudi Arabia, South Africa, Taiwan, Thailand, Turkey, and United Arab Emirates.

EDHECInfra includes Philippines, Brazil, and Malaysia.



Infrastructure debt performance

Cumulative Default Rates

Cumulative default rates are calculated from the weighted average marginal default rates (hazard rates) for all cohorts. The marginal default rate (hazard rate) is the ratio of the number of project defaults in a specific time period divided by the number of projects exposed to the risk of default at the beginning of that time period. For the purposes of this study, marginal default rates have been calculated on a monthly basis.

Investment Grade

Debt that is believed to have a lower risk of default and thus receives higher ratings by the credit rating agencies, Baa3 or higher (by Moody's) or BBB- or higher by S&P and Fitch.

Project Finance

Method of funding in which the lender looks primarily to the revenues generated by a single project, both as the source of repayment and as security for the exposure. This type of financing is usually for large, complex, and expensive installations. This might include, for example, power plants, chemical processing plants, mines, transportation infrastructure, environment, and telecommunications infrastructure. Project finance may take the form of financing of the construction of a new capital installation, or refinancing of an existing installation, with or without improvements.

In such transactions, the lender is usually paid solely or almost exclusively out of the money generated by the contracts for the facility's output. This includes the electricity sold by a power plant. The borrower is usually an SPV that is not permitted to perform any function other than developing, owning, and operating the installation. The consequence is that repayment depends primarily on the project's cash flow and on the collateral value of the project's assets. In contrast, if repayment of the exposure depends primarily on a well-established, diversified, credit-worthy, contractually obligated end user for repayment, it is considered a secured exposure to that end user.

Public Private Partnership (PPPs) and non-PPPs

'A long-term contract between a public party and a private party, for the development and/or management of a public asset or service, in which the private agent bears significant risk and management responsibility through the life of the contract, and remuneration is significantly linked to performance, and/or the demand or use of the asset or service'. (World Bank PPP Reference Guide). This broad definition can be used to distinguish PPP as an alternative to conventional procurement.

PPPs are one way / method / tool to procure and deliver infrastructure and services (including finance, construction, operations, and maintenance) with private finance participation. It has multiple variations across the globe. The respondents in Moody's global survey self-identify projects as PPPs. The interpretation could broadly vary as any form of association or co-operation between the public and private sectors.

Projects delivered under non-PPP schemes refer to other types of contracts between the government and private companies like design-build, or turnkey contracts, financial lease contracts, management contracts, affermage contracts, among others. Unfortunately, the dataset does not provide the type of contract for non-PPPs.

Ultimate Recovery

A default for which recoveries have been realised following emergence from default. For a loan that has defaulted, emergence from default is deemed to occur following any of the events set out below.

- Repayment of overdue interest
- Restructuring with no subsequent default
- Restructuring with lender being taken out of the deal—for example, by repayment of the defaulted loan with no participation in a restructured debt facility
- Material restructuring
- Liquidation

Income group classifications

High Income Countries

The report includes countries classified by the World Bank Group as high-income, in 2019 and includes: Australia, Austria, The Bahamas, Bahrain, Belgium, Bermuda, Brunei, Canada, Cayman Islands, Chile, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Guam, Hong Kong, Hungary, Iceland, Ireland, Israel, Italy, Japan, Kuwait, Lithuania, Luxembourg, Macau, Malta, Mauritius, The Netherlands, New Zealand, Norway, Oman, Panama, Poland, Portugal, Puerto Rico, Qatar, Romania, Saudi Arabia, Singapore, Slovakia, Slovenia, South Korea, Spain, Sweden, Switzerland, Taiwan, Trinidad and Tobago, Turks and Caicos Island, United Arab Emirates, United Kingdom, United States, Uruguay.

Middle and Low Income Countries

The report includes countries classified by the World Bank Group as middle- and low-income, in 2019 and includes: Albania, Algeria, Angola, Argentina, Armenia, Azerbaijan, Bangladesh, Belize, Benin, Bolivia, Botswana, Brazil, Bulgaria, Burkina Faso, Cabo Verde, Cameroon, Chad, China, Colombia, Costa Rica, Democratic Republic of the Congo, Djibouti, Dominican Republic, Ecuador, Egypt, El Salvador, Equatorial Guinea, Ethiopia, Fiji, Gabon, Ghana, Guatemala, Guinea-Bissau, Guyana, Honduras, India, Indonesia, Iran, Ivory Coast, Jamaica, Jordan, Kazakhstan, Kenya, Laos, Lebanon, Lesotho, Liberia, Macedonia, Madagascar, Malawi, Malaysia, Mali, Marshall Islands, Mauritania, Mexico, Moldova, Mongolia, Morocco, Mozambique, Myanmar, Namibia, Niger, Nigeria, Pakistan, Papua New Guinea, Paraguay, Peru, Philippines, Russia, Senegal, Serbia, Sierra Leone, Solomon Islands, South Africa, Sri Lanka, Syria, Tanzania, Thailand, Timor-Leste (East Timor), Tunisia, Turkey, Turkmenistan, Uganda, Ukraine, Uzbekistan, Venezuela, Vietnam, Yemen, Zambia, Zimbabwe.

Sector classifications

Energy

Energy project loans for the construction and maintenance of renewable and non-renewable power plants, transmission and distribution, and oil refineries.

Infrastructure

These comprise selected subindustries within Water, Waste, Transportation (Roads, Bridges, Tunnels, Rail, and Ports & Terminals); Media Distribution & Telecom (Media Distribution and Telecom); and Oil & Gas Refining and Power (Transmission and Distribution, Renewable and Non-Renewable Electricity Generation).

Non-Infrastructure

Project loans for the construction and maintenance of Chemicals Production - Petrochemicals & plastics, Leisure & Recreation (casinos, lodging and other - not "real estate"), Manufacturing, Media & Telecom - Media content (motion pictures, etc.), Metals & Mining - Mining (ores, coal, etc.), Metals & Mining - Processing (smelting, refining, foundries, etc.), Oil & Gas - Biofuels, Oil & Gas - Exploration & Production, Oil & Gas - LNG, Oil & Gas - Other, Oil & Gas - Storage, Other.

Other Infrastructure

Project loans for the construction and maintenance of social, transportation and water systems, water desalination, waste treatment, waste to energy and other, but were only identified as "infrastructure."

Social

Social infrastructure project loans for the construction and maintenance of facilities that support social services. Types of social infrastructure include healthcare (hospitals), education (schools and universities), and public facilities (community housing and prisons).

Transport

Transportation project loans for the construction and maintenance of roads, bridges, tunnels and rail services, and ports and terminals.

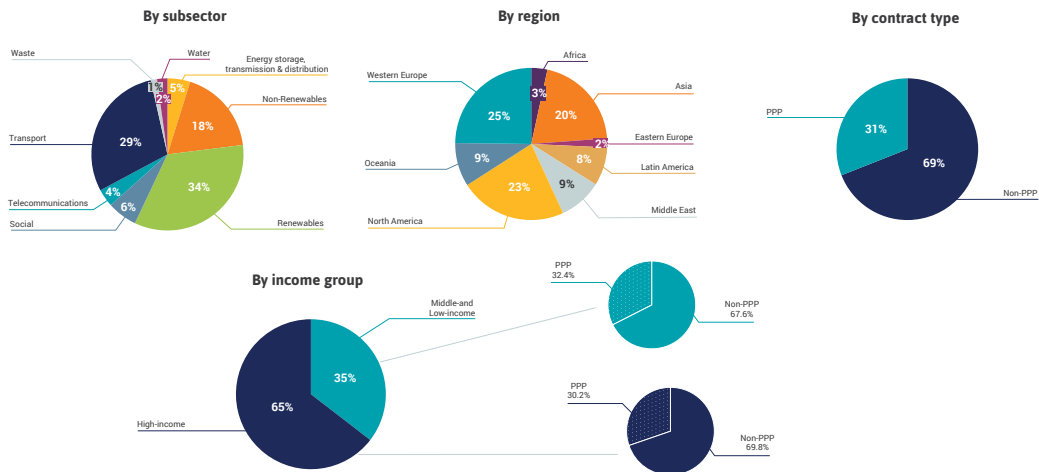
Water & Waste

Water & Waste subsector includes water systems, water desalination, waste treatment, waste to energy.

Appendix 2: Sample distribution

Private investment in infrastructure

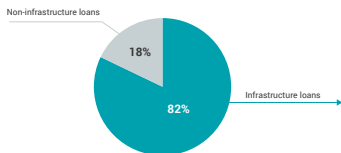
As % of total value of private infrastructure transactions, 2010-2020



Infrastructure debt performance

As % of total loans, 1983-2019

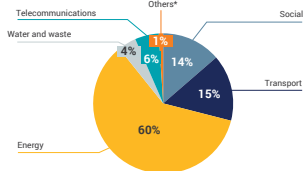
Project finance loans sample



Note: Non-infrastructure loans include chemicals production, leisure & recreation, manufacturing, media content, metals & mining

Infrastructure loans

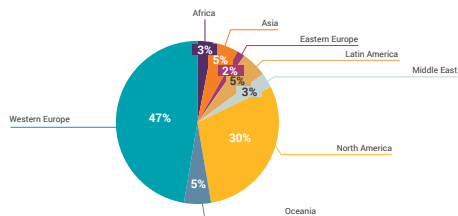
By subsector



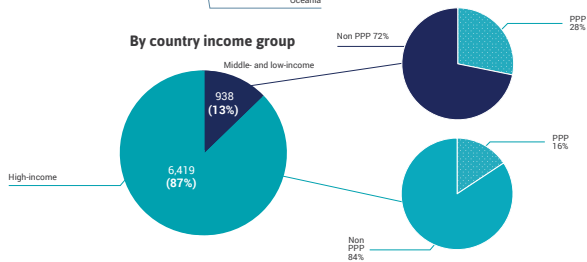
*Other infrastructure includes projects that could not be mapped to any one infrastructure subsector

Infrastructure loans

By region



By country income group



Project Preparation Facilities (PPFs)

The PPFs studied for this report provide technical support for infrastructure project preparation, and funding to support infrastructure project preparation. The sample of 130 PPFs is primarily sourced from the PPFs list published by the Overseas Development Institute (ODI), Cities Climate Finance Leadership Alliance (CCFLA), and Sustainable Development Investment Partnership (SDIP), which were validated by the GI HUB.

Global

- Access Co-development Facility
- Adapt-Asia Pacific Project Preparation Facility (AAPP)
- African, Caribbean and Pacific - European Commission Energy Facility II
- AIIB Project Preparation Special Fund
- Arab Financing Facility for Infrastructure
- Asia Pacific Project Preparation Facility (A3PF)
- C40 Cities Finance Facility
- Cities Development Initiative Asia
- City Climate Finance Gap Fund
- Climate Investment Funds
- Climate Support Facility
- EBRD Technical Cooperation Funds
- EIB FEMIP Trust Fund (FTF)
- EIB Water Project Preparation Facility
- EU Technical Assistance Facility (TAF)
- Financing Energy for low-carbon Investment – Cities Advisory Facility (FELICITY)
- Global Environment Facility Sustainable Cities Impact Program (SCIP)
- Global Infrastructure Facility (GIF)
- Green Climate Fund PPF
- Public-Private Partnership Project Preparation in the Southern and Eastern Mediterranean – MEDSP
- Mobilize Your City (MYC)
- Municipal Project Support Facility (MPSF)

- Nature Based Solutions PPF
- PIDG Technical Assistance
- PIDG DEVCO
- Private Financing Advisory Network (PFAN)
- Public Private Infrastructure Advisory Facility (PPIAF)
- Scaling Solar
- SEED capital assistance facility
- Technical Assistance Facility of International Municipal Investment Fund
- The OPEC Fund for International Development – OFID
- US Trade and Development Agency (USTDA)
- UNCDF – Local Finance Initiative (LFI)
- Urban Projects Finance Initiative (UPFI)

Europe

- EIB's EPEC
- European Bank for Reconstruction and Development (EBRD)'s Infrastructure Project Preparation Facility (IPPF)
- European Local Energy Assistance (ELENA)
- Natural Capital Financing Facility
- Rural Community Energy Fund
- Urban Investment Support (URBIS)
- Western Balkans Investment Framework Infrastructure Project Facility

Asia

- Asia Infrastructure Centre of Excellence
- Clean Energy Financing Partnership Facility (CEFPF)
- Climate Change Fund
- Energy and Environment Partnership Mekong (EEP Mekong)
- Green Finance Catalytic Facility's Project Preparation Unit (ADB GFCF PPU)
- India Infrastructure Project Development Fund (IIPDF)
- Indonesia: Infrastructure Project Development Facility
- InfraCo Asia
- Japan Fund for Poverty Reduction
- Japan Fund for the Joint Crediting Mechanism
- Philippines: Infrastructure Preparation and Innovation Facility
- PPPTAF Bangladesh
- Project Development and Grant Fund (PDGF)
- Project Preparation and Startup Support Facility
- Public Private Partnerships Centre - China
- South Asia Infrastructure for Growth Trust Fund
- Tamil Nadu Urban Development Fund (TNUDF)
- The Philippines PPP Centre
- Urban Environment Infrastructure Fund (UEIF)
- USICEF – US India Clean Energy Finance Facility
- Vietnam Project Preparation Technical Assistance Facility
- Water Financing Partnership Facility

Africa

- Africa Clean Energy (ACE) Programme Competitive Business Facility
- Africa Climate Resilient Investment Facility (AFRI-RES)
- Africa Renewable Energy Access Program (AFREA)
- Africa Renewable Energy Fund Project Support Facility (AREF-PSF)
- Africa50
- African Development Fund Project Preparation Facility
- African Legal Support Facility
- African Water Facility (AWF)
- Cities and Climate Africa(CICLIA)
- Common Market for Eastern and Southern Africa (COMESA) Project Preparation and Implementation Unit (PPIU)
- Covenant of Mayors in Sub-Saharan Africa
- DBSA EIB Project Development and Support Facility (PDSF)
- DBSA Project Preparation Fund
- ECOWAS infrastructure Projects Preparation and Development Unit (PPDU)
- ECREEE-GIZ Technical Assistance Facility for Grid-Connected RE Project
- Energy4Impact
- EU-Africa Infrastructure Trust Fund
- European Union – European Development Finance Institutions Private Sector Development Facility (EU-EDFI EEDF)
- Fund for African Private Sector Assistance (FAPA)
- Sustainable Use of Natural Resources and Energy Finance (SUNREF)
- Infra Co Africa
- Infrastructure Investment Programme for South Africa (IIPSA)
- Kenya Climate Innovation Centre (CIC)
- NEPAD IPPF
- PPP Commission Africa
- PPP Transaction Advisory Services (TAS)
- Program for Infrastructure development in Africa (PIDA) Service Delivery Mechanism
- Project Preparation Fund (Part of PPP Unit)

- Kenya Climate Innovation Centre (CIC)
- NEPAD IPPF
- PPP Commission Africa
- PPP Transaction Advisory Services (TAS)
- Program for Infrastructure development in Africa (PIDA) Service Delivery Mechanism
- Project Preparation Fund (Part of PPP Unit)

Latin America

- Brazil Infrastructure Project Preparation Fund (PSP)
- Estruturadora Brasileira de Projetos (EBP)
- Finance Line - River Plate Basin Development Fund (FONPLATA)
- IDB AquaFund
- Infra Fund
- Interamerican Development Bank Project Preparation and Execution Facility (PROPEF)
- Interamerican Development Bank Project Preparation Facility
- National Infrastructure Fund Trust Fund (FONADIN)
- NDC Pipeline Accelerator
- Project Preparation Facility in Cuba
- Regional Public-Private Partnership Support Facility
- Sustainable Cities and Climate Change
- Sustainable Energy and Climate Change (SECCI Fund)
- TheCityFix Labs
- Transformative Actions Program (TAP)
- UK-Caribbean Infrastructure Partnership Fund

Appendix 3: Methodology notes

Private investment in infrastructure

1. Data for private infrastructure investment is drawn from IJ Global's transactions database. It covers the period from 2010 to 2020, as of 30 September 2021.
2. IJ Global's dataset is focused on project-based private investment and does not capture most corporate private investment in infrastructure.
3. Throughout this report, "private investment in infrastructure projects" refers to private sector investment in infrastructure projects in primary markets (financed by private and public financiers) including greenfield and brownfield infrastructure, as well as privatisations, unless otherwise specified. Investment values represent commitments made at the financial close of investment and not executed investment.
4. IJ Global's database represents the best available comparable data for project-based global private infrastructure investment. Yet, the list of transactions it covers is not exhaustive. In particular, coverage of developing countries is limited and should be interpreted with care. The estimates in this document are most safely interpreted as indicative of the broad trends in the size and nature of private infrastructure investment.
5. **Methodological Changes:** Since the release of Monitor 2020, the GI Hub has implemented a number of methodological changes to improve and refine the private investment in infrastructure projects analysis presented in this section. The main changes are as follows:
 - **Improving the definition of primary market transactions:** In Monitor 2020, private investment in infrastructure projects in primary markets reflected only transactions classified as "primary financing" or "privatisation" as defined in the IJ Global transactions dataset. However, to improve the accuracy of the analysis presented in Monitor 2021, the GI Hub identified further primary market transactions that were classified as secondary financing given the lack of data, such as "additional facilities", "portfolio financing" and "design-build" transactions in the IJ Global dataset. These transactions underwent extensive review by GI Hub to determine whether they were primary or secondary market transactions and appropriately classified.
 - **Refining the approach used to determine private vs non-private financing:** In Monitor 2020, private financing was primarily identified using tranche roles in the IJ Global transactions dataset. For Monitor 2021, the GI Hub updated this approach to incorporate additional data from IJ Global's company dataset, allowing for a more accurate determination of private vs non-private financiers.
 - **Shift from private financing to private investment:** In Monitor 2020, headline figures throughout the private investment in infrastructure projects in analysis reflected only private financiers for private investment. In Monitor 2021, these headline figures reflect both private and non-private financiers of private investment in infrastructure projects.
6. **Impact of Methodological Changes:** For the period 2010 to 2019, around 25% of additional facilities transactions and around 80% portfolio financing transactions have been reclassified as primary investment in Monitor 2021. All Design-build transactions are now also classified as primary, although they comprise less than 0.5% of total transaction value. These methodological changes improve the accuracy of the private investment in infrastructure projects numbers in Monitor 2021, but do not allow a direct comparison with numbers in Monitor 2020.

Infrastructure equity performance

Infrastructure equities performance is assessed based on performance trends seen for indices capturing the global universe of listed and infrastructure equities in a representative, credible and exhaustive manner. The following indices were used for this analysis:

Global equities (Benchmark)	MSCI All Country World Index	The MSCI ACWI Index, MSCI's flagship global equity index, is designed to represent performance of the full opportunity set of large- and mid-cap stocks across 23 developed and 27 emerging markets. As of June 2021, it covers more than 2,900 constituents across 11 sectors and approximately 85% of the free float-adjusted market capitalization in each market.
Listed infrastructure equities	MSCI All Country World Index Infrastructure Capped Index	Global opportunity set of companies that are owners or operators of infrastructure assets, selected from MSCI ACWI, the parent index, which covers mid and large cap securities across 23 Developed Markets and 26 Emerging Markets, for five infrastructure sectors: <ul style="list-style-type: none">• Telecommunications (1/3rd weight)• Utilities (1/3rd weight)• Energy, Transport, Social (1/3rd weight)
Unlisted infrastructure equities	EDHECINFRA INFRA 300 Equity Index	Unlisted infrastructure companies (often private equity funds) - a sample of 300 companies representing 6,000 firms in 22 countries across all infrastructure sectors.



Infrastructure debt performance

- This section analyses data on infrastructure debt performance that is drawn from Moody's 2021 report [Examining Infrastructure as an Asset Class](#) of the Data Alliance Project Finance Consortium of Moody's Analytics. The Data Alliance Project Finance Consortium is composed of leading project finance lenders and investors that provide historical portfolio and credit loss data to Moody's Analytics, for the purpose of creating an aggregate dataset. The dataset therefore contains information from more than 80 global institutions (including commercial banks, insurance companies, asset managers, and other institutional investors) that participate in the Consortium.
- For the purpose of this analysis, the Global Infrastructure Hub (GI Hub) was provided with confidential default and recovery information on a total of 9,332 project finance loans that originated from 1983 to 2019, representing 68% of all global project finance loans originated in that period. Of the total 9,332 project finance loans analysed, 7,670 were infrastructure loans and 1,662 were non-infrastructure loans. Within the infrastructure loans, 7,357 involved private sector participation, which is the sample used in our analysis of infrastructure debt performance. Although the infrastructure loans sample includes construction, operations, and refinancing loans, construction loans account for 70% of all the loans in the sample.
- The sample distribution used in this report is presented by income group, region, sector, and contract. These distributions are compared to non-infrastructure loans. The income groups used are based on the World Bank Group's FY2019–2020 classification of countries as high-income, middle-income, or low-income on the basis of 2019 per capita income levels. This report analyses cumulative default rate curves, expected losses, and recovery rates for the period 1983–2019. Cumulative default rate curves were considered over a period of 20 years, and the horizontal axis in all the charts presented corresponds to the year of default since loan origination. The analysis considers the 20-year period because, although the average maturity of infrastructure debt may be shorter, there are sectors and regions with higher debt maturities. This period also allows the comparison with the cumulative default rates associated with Moody's debt credit ratings for investment and non-investment grade securities, which are shown in the background of the default curves. The Baa3 (BBB-) rating marks the frontier between investment and non-investment grade.
- Cumulative expected losses curves were considered over a period of 20 years, and the horizontal axis in all the charts presented corresponds to the year of default since loan origination. The comparison with the cumulative expected losses associated with Moody's debt credit ratings for investment and non-investment grade securities are shown in the background. The Baa3 (BBB-) rating marks the frontier between investment and non-investment grade.
- Recovery rate (RR) refers to the amount recovered when a loan defaults, expressed as a percentage of face value. RR is calculated as Amount recovered / Amount loaned.
- Expected Loss (EL) refers to the proportion of debt value expected to be lost from potential infrastructure debt defaults. EL is calculated as Probability of Default x Loss Given Default x Exposure at Default.
- The results presented in this section try to portray infrastructure debt performance accurately based on Moody's sample. However, the data provided reflect a sample that is not statistically representative of the infrastructure debt universe. Comparing this data with the data of IJ Global, which collects data on private infrastructure investments, reveals differences among the composition of sectors, regions, and income groups. The main differences are that the Moody's database overrepresents Western European projects and underrepresents Asian projects. It also underrepresents middle- and low-income countries' projects. Although it is not possible to make inferences from the analysis, considering the lack of data regarding debt performance, it can help to shed light on this topic.

ESG factors in infrastructure

1. Corporate ESG scores presented in this section are sourced from Refinitiv. They measure a company's relative performance on ESG attributes, commitment and effectiveness across Environmental (E), Social (S) and Governance (G) pillars. Based on publicly-reported data, scores focus on a company's operations and policies rather than its products and services, and generally reflect their management approach and transparency of performance rather than direct performance. The dataset covers over 10,800 companies. This includes around 1,000 companies of the ~3,500 infrastructure private investors covered by IJ Global, representing approximately 65% of the total transaction value.
2. ESG Asset scores presented in this section are sourced from GRESB's Infrastructure Asset Assessment. Data is self-reported and third-party validated by SRI. The Assessment is structured into two components: Management and Performance. The Management Component collects information at the organisational level and measures the entity's strategy and leadership management, policies and processes, risk management and stakeholder engagement approach. The analysis presented in Monitor 2021 focuses on the Performance component, which comprises of information collected at the asset level across 12 aspects: Implementation, Output & Impact, Health & Safety, Energy, Greenhouse Gas Emissions, Air Pollution, Water, Waste, Biodiversity & Habitat, Employees, Customers, and Certifications & Awards. It is important to note that these Performance indicators reflect the extent to which assets report on their most material ESG issues and have current and future targets set. In this way, scores reflect the transparency of reporting ESG data and not actual performance.
3. Financial performance data in this section are sourced from three indexes provided by EDHECInfra and MSCI:
 - EDHEC InfraGreen: the unlisted wind and solar infrastructure equities curve exhibits data from the EDHEC InfraGreen index, which tracks the performance of the returns of wind and solar power companies.
 - EDHEC infra300® index: the unlisted infrastructure equities curve exhibits data from the EDHEC infra300® index, which tracks the performance of the returns of a representative global sample of unlisted infrastructure equity investments worth approximately USD 250bn.
 - MSCI ACWI Infrastructure Capped Index: the listed infrastructure equities curve exhibits data from MSCI ACWI Infrastructure capped Index, which presents the performance of the returns of infrastructure companies from Developed Markets and Emerging Markets (DM) countries.
4. Climate footprint numbers are sourced from MSCI Index Metrics report August 2021.

Appendix 4: References

- Brown, M., Kim, Y., and Romani, M. (2015). Infrastructure finance in the developing world. Green infrastructure: definition and needs. The Global Green Growth Institute, Seoul, Korea & The Intergovernmental Group of Twenty Four on Monetary Affairs and Development, Washington.
- B20 China (2016). B20 Infrastructure Taskforce Policy Paper. Beijing.
- B20 Taskforce (2017). Investing in Resilient, Future-oriented Growth Boosting Infrastructure Investment and Balancing Financial Regulation.
- Deloitte. (2016). A Positive Horizon on the Road Ahead? European Infrastructure Investors Survey 2016.
- EDHECInfra (2021a). InfraMetrics ®, Market Indices, Infra300 ®. October 2021.
- EDHECInfra (2021b). Strategic Asset Allocation with Unlisted Infrastructure. February 2021.
- EDHECInfra & GI Hub (2019). Global Infrastructure Investor Survey. April 2019.
- European Investment Bank (2021). Default statistics: Private and sub-sovereign lending 2001-2019.
- G20 (2011). High Level Panel on Infrastructure. Recommendations to G20 – Final Report. October 2011.
- G20 (2018a). Roadmap to infrastructure as an asset class.
- G20 (2018b). G20 Principles for the Infrastructure Project Preparation Phase. Infrastructure Working Group. Buenos Aires. November 2018.
- Global Infrastructure Hub (GI Hub) (2019). Leading Practices in Governmental Processes Facilitating Infrastructure Project Preparation. Sydney, Australia.
- Global Infrastructure Hub (GI Hub). (2020). InfraCompass. Set your infrastructure policies in the right direction. Sydney, Australia.
- Global Infrastructure Hub (GI Hub). (2021). Transformative Outcomes Through Infrastructure, n.d., accessed 5 November 2021
- GRESB (2021) 2021 Infrastructure Assessment Results.
- IEA (2020). Energy Investing: Exploring Risk and Return in the Capital Markets, Joint Report by the International Energy Agency and the Centre for Climate Finance & Investment, Paris.
- IEA (2021). Net Zero by 2050, IEA, Paris.
- IMF (2020). Fiscal Monitor. Policies for the Recovery. October 2020, Washington.
- Moody's (2020). Default and recovery rates for project finance bank loans, 1983-2018: Sustainable project finance bank loans. August 2020.
- Moody's (2021). Examining Infrastructure as an Asset Class. Moody's Analytics. September 2021.
- MSCI (2021a). Factsheets for MSCI ACWI (USD), MSCI ACWI Infrastructure Capped Index (USD), MSCI World Infrastructure Capped Index (USD), MSCI Emerging Markets Infrastructure Capped Index (USD). September 2021.
- MSCI (2021b). MSCI IndexMetrics ®. Report for MSCI ACWI Infra and Core Infra and Infra Sector Capped Indexes. August 2021.
- Risk Control (2020). Infrastructure Debt Capital Charges for Insurers.
- World Bank (2020). Benchmarking Infrastructure Development 2020: Assessing Regulatory Quality to Prepare, Procure, and Manage PPPs and Traditional Public Investment in Infrastructure Projects.

Appendix 5: Acknowledgements

This report has been prepared by the GI Hub Economics and Data team. The core team includes Chief Content Office Henri Blas, Director of Economics Cinthya Pastor, Economist Manpreet Juneja, Economist Katrina Yu, Senior Economist Arjuna Mohottala and Data Architect Sivakumar Kugalur.

We thank Frédéric Blanc-Brude, Denis Crevier, Kevin Kelhoffer, Thomas Maier and Kyle Peters for their comments and feedback on the report.

We also thank Sara Ahmed, Camille Bautista, Stefania Ciruolo, Thomas Eriksson Louis Gauvreau, Towfiq Hoque, Seong Ho Hong, Jeffrey Kouton, John LaSalle, Faiz Marhami, Marcos Martinez, Shamas ur Rehman Toor, Fernanda Ruiz Nunez, Mike Salawou, Fabio Schweinoster, Ghufan Shafi, Mariana Silva, Ancor Suarez and Leyla Traore for their insights.



Copyright

Unless otherwise noted, copyright (and any other intellectual property rights, if any) in this publication is owned by the Global Infrastructure Hub.

© Global Infrastructure Hub Ltd, 2020ACN 602 505 064ABN 46 602 505 064

Online Resource ISBN: 978-0-6488571-2-9

Creative Commons Licence

This publication is provided for use under a Creative Commons Attribution 3.0 Australia Licence, except that no licence is provided for the GI Hub's logo and branding, photographs, other artistic works or third-party content (as marked). Apart from any use granted under the Creative Commons Attribution 3.0 Australia Licence or permitted under the Copyright Act 1968 (Cth), all other rights in the content are reserved. Requests and inquiries concerning reproduction and rights should be addressed to contact@gihub.org.

The Creative Commons Attribution 3.0 Australia Licence is a standard form licence agreement that allows you to copy, distribute, transmit and adapt this publication, provided that you attribute the work. A summary of the licence terms is available from <http://creativecommons.org/licenses/by/3.0/au/deed.en>. The full licence terms are available from <https://creativecommons.org/terms/>. The GI Hub requires that you attribute this publication (and any materials sourced from it) using the following wording: 'Source: Licensed from the Global Infrastructure Hub Ltd under a Creative Commons Attribution 3.0 Australia Licence. To the extent permitted by law, the GI Hub disclaims liability to any person or organisation in respect of anything done, or omitted to be done, in reliance upon information contained in this publication.'

Disclaimer

This report has been prepared by the Global Infrastructure Hub (GI Hub). The opinions, findings and recommendations contained are not necessarily the views of the G20 member countries, or of other countries associated with the G20 or the GI Hub. The material contained in this publication is made available on the understanding that the GI Hub is not providing professional advice, and that users exercise their own skill and care with respect to its use, and seek independent advice if necessary. The GI Hub makes no representations or warranties as to the contents or accuracy of the information contained in this publication. To the extent permitted by law, the GI Hub disclaims liability to any person or organisation in respect of anything done, or omitted to be done, in reliance upon information contained in this publication.





Contact Details

Cinthy Pastor

Director of Economics

cinthya.pastor@gihub.org

www.gihub.org

LinkedIn: Global Infrastructure Hub

Twitter: GI_hub



December 2021

A G20 Initiative