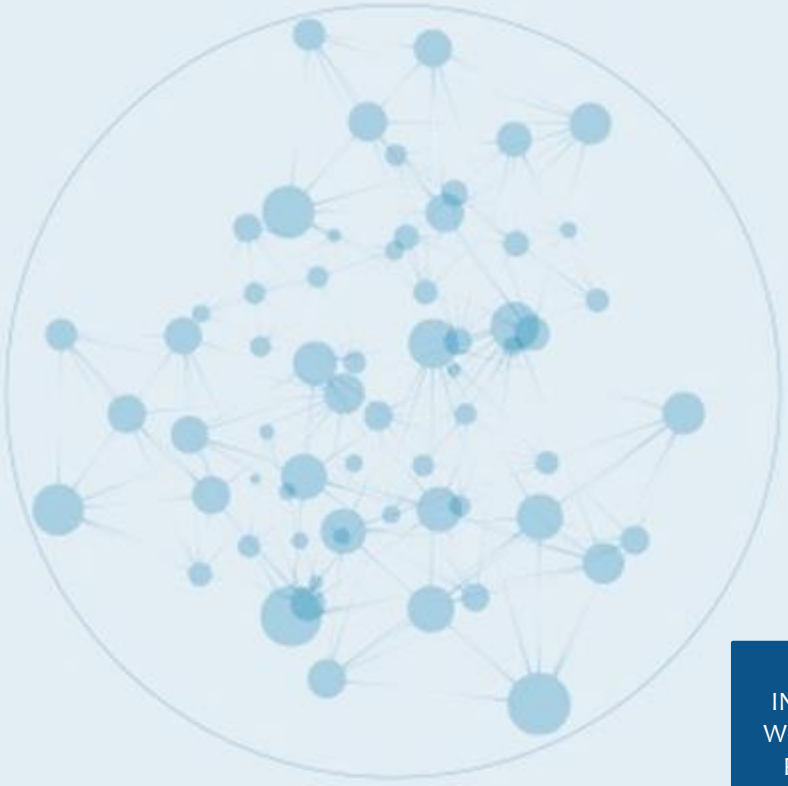
Inquiry: Design of a Sustainable Financial System

Global Infrastructure Basel

UNEP

SUSTAINABLE INFRASTRUCTURE AND FINANCE

How to Contribute to a Sustainable Future



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The UNEP Inquiry

The Inquiry into the Design of a Sustainable Financial System has been initiated by the United Nations Environment Programme to advance policy options to improve the financial system's effectiveness in mobilizing capital towards a green and inclusive economy—in other words, sustainable development. Established in January 2014, it published its final report, The Financial System We Need, in October 2015 and is currently focused on actions to take forward its findings.

More information on the Inquiry is at: *www.unep.org/inquiry* and *www.unepinquiry.org* or from: Ms. Mahenau Agha, Director of Outreach *mahenau.agha@unep.org*.

Global Infrastructure Basel Foundation

Global Infrastructure Basel Foundation (GIB) is a Swiss foundation based in Basel working to promote sustainable and resilient infrastructure through sustainable infrastructure design and financing on a global scale. Active since 2008, GIB works with multiple stakeholders ranging from city representatives to project developers and infrastructure financiers, with a focus on emerging and developing countries. GIB envisions a world where sustainable and resilient infrastructure is the norm rather than the exception.

About this report

The working paper gives an overview about the significance of infrastructure, infrastructure financing and the benefits of sustainable and resilient infrastructure. It also aims to present policy options to improve the effectiveness in financing sustainable and resilient infrastructure. The working paper is intended to stimulate discussion around sustainable and resilient infrastructure development and how the improved attractiveness can help to mobilize further financiers.

The views expressed in this paper represent those of the authors and do not necessarily represent those of the host institutions or funders.

Comments are welcome and should be sent to *nick.robins@unep.org*.

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Executive Summary

Infrastructure such as roads, bridges, tunnels, water supply, sewers, electrical grids and telecommunications is often referred to as the backbone of the global economy and plays a fundamental role in societies by enhancing the quality of life and increasing productivity. In addition to its effects on society and the economy, infrastructure can have significant impacts on the environment, depending on the choice of infrastructure.

In the aftermath of the recent financial crisis, public funds, which traditionally financed infrastructure, have shrunk dramatically. The current figures suggest an infrastructure investment gap of about US$2.5-3.5 trillion per year over the next 15 years (McKinsey, 2016). Therefore, private funds are urgently needed to step in and compensate for the decreasing contribution of governments in order to avoid the unintended negative consequences of an infrastructure deficit. However, to overcome the investment gap, current private sector infrastructure investments will have to double in volume.

The low interest rate environment and the steadily increasing level of assets under management are meaningful signs that ample funds are available in the global capital markets. Furthermore, due to concerns over the growing correlation between stocks and bonds, investors are looking to diversify their portfolios beyond the two major asset classes and are increasingly turning to infrastructure investments. Institutional investors in particular, with their immense assets under management, are increasingly turning to the "alternative investment" asset class, where infrastructure is often included. Nevertheless, engagement by institutional investors in infrastructure investments remains modest and insufficient to bridge the investment gap. Scaling up the portfolio allocation faces three barriers: technical constraints, investment barriers and legal requirements that hinder eager investors. In order to overcome the current situation, an enabling policy environment and a suitable approach to infrastructure investments are urgently required.

Both the long lifespan of infrastructure, often across several decades, and the fact that approximately 75% of the infrastructure that will be in place in 2050 does not exist today, represent a huge opportunity. Getting such a scale of infrastructure development right will be critical to whether or not the world locks into a high- or low-carbon growth path. Therefore, if the world wants to meet the Sustainable Development Goals (SDGs), adequate infrastructure development is part of the answer.

Focusing on sustainable and resilient infrastructure, complemented with innovative investment solutions and adequate political support provides the most promising avenue to attract the required financiers to bridge the investment gap and build the indispensable infrastructure while respecting the planetary boundaries. Sustainable and resilient infrastructure – defined as infrastructure that integrates environmental, social and governance (ESG) aspects into a project's planning, building and operating phases while ensuring resilience in the face of climate change or shocks – is capable of making the difference: it improves the attractiveness of infrastructure investments by mitigating risks, creating tangible benefits and opportunities as well as reducing emissions and climate risks.

To foster the development of sustainable and resilient infrastructure, a clear standard to help integrating sustainability and resilience criteria in infrastructure projects is crucial. Such a standard for sustainable and resilient infrastructure projects would lead to benefits for both projects developers and financiers, while also helping public sector institutions to bridge the infrastructure gap and tackle challenges such as improving resource efficiency, advancing sustainability and improving society's resilience against stresses.

Furthermore, a standardized approach to assessing infrastructure sustainability and resilience would help to address the current infrastructure investment barriers. A comprehensive standard founded in best practice would create a homogenous basis that is needed to establish innovative investment solutions to channel institutional investors towards sustainable and resilient infrastructure. It would also allow project comparability and improve efficiency. The establishment of investment vehicles such as sustainable and resilient infrastructure as a best-in-class approach within the infrastructure asset class, and the emergence of sustainable and resilient infrastructure as its own hybrid asset class would be valuable ways to simplify investments and help investors to perceive its benefits.

In order to further promote asset allocation into the new investment vehicles, policymakers and governments also have to step in – globally – to improve the attractiveness of long-term investments by providing specific conditions for sustainable and resilient infrastructure investments. Legal requirements in the form of quantitative portfolio restrictions for pension funds should be eased to give space for more infrastructure investments. Furthermore, the use of public finance instruments should be employed adequately to tap into important multiplier effects and improve project pipelines.

Taking advantage of the tangible benefits of sustainable and resilient infrastructure is indispensable to accelerating the flow of private capital into infrastructure and to meet the United Nations SDGs.

1 Introduction

1.1 Defining Infrastructure

Infrastructure such as roads, bridges, tunnels, water supply, sewers, electrical grids and telecommunications provide essential services and functions to society, the economy and the environment. Infrastructure can be seen as "the sum of all physical assets, equipment and facilities" (Jochimesen, 1966) or "the basic facilities, services, and installations needed for the functioning of a community or society" (American Heritage Dictionary). In economic terms however, infrastructure can be seen as structures that allow or simplify the production and exchange of goods and services, in other words as the basic requirement for a proper functioning economy. Therefore, infrastructure is often referred to as the backbone of the global economy.

1.2 The Importance of Infrastructure

Infrastructure plays a fundamental function in the development of societies. Since it connects capital and workers more efficiently, it increases total factor Productivity, and therefore enhances economic growth while providing jobs and reducing the levels of inequality. These effects can occur directly via capital accumulation or indirectly via total factor productivity gains. Therefore, infrastructure increases the **productivity** of the factors of production and enhances the **quality of life.** Furthermore, infrastructure has both positive and negative **impacts on the environment** while also being **vulnerable to shocks and stresses**.

1.2.1 Productivity

The availability of infrastructure contributes to **economic growth by influencing the marginal productivity** of private capital and public investments. As highlighted by Standard & Poor's (2015), an increase in infrastructure spending of 1% of real gross domestic product (GDP) can have a multiplier effect of between 1% and 2.5% for G20 countries over a three-year period; the economic benefits are even greater in emerging countries such as China, India and Brazil. The OECD (2007) and the World Bank (1993) argue that the economic growth can result from a number of different drivers, such as:

- Infrastructure services such as transport, water and electricity are intermediate goods for production. Any improvements in the availability of infrastructure services leads to a reduction of costs and hence to a rise in profitability, permitting higher output, income and/or employment levels.
- The availability of infrastructure services also increases the productivity of other factors of production. For example, by permitting the transition from manual to electrical machinery, reducing workers' non-productive time, or reducing wasteful consumption of natural resources.
- The availability of infrastructure in a given location may attract further private investments or companies and thereby reduce further costs, especially transaction costs, at that site. The advantage of urbanization, or "economies of agglomeration" also improves competitiveness.

1.2.2 Quality of Life

In addition to economic growth, physical and economic accessibility to infrastructure **contribute to higher quality of life and reduce the level of inequality and poverty**. For example:

- The consumption of infrastructure services, such as clean water and sanitation, are essential for human health and the creation of economic welfare.
- Infrastructure services such as energy, transportation, schools or telecommunications provide increased job availability, improved education and the possibility to have access to goods and services.
- Improved accessibility and thus a reduced cost for infrastructure services to households can have beneficial effects such as increasing a household's real income and consumption, raising labour productivity and also freeing up time for individuals.

1.2.3 Impacts on the Environment

Depending on the choice of infrastructure and how it is planned, constructed, operated and maintained, infrastructure can **have positive or negative impacts on our environment**, in addition to its effects on society and the economy. Due to its long lifespan, infrastructure results in lasting impacts during operation and beyond. For example, infrastructure such as waste recycling facilities or sewage treatment plants has positive impacts due to its vital contribution to waste and pollution reduction. However, infrastructure also often leads to devastating impacts on our environment, for example:

- Inadequate infrastructure may cause **sustainability issues**: destruction and degradation of natural habitats, loss of biodiversity, poaching, illegal mining, wildfires and land speculations (Laurance *et al.*, 2015), as well as threatened health and safety of both employees and affected society.
- Infrastructure can **increase pollution** such as noise, air, soil and water pollution. For example, emissions from coal-fired power plants in China were responsible for a quarter of a million premature deaths in 2011 due to air pollution, and are damaging the health of hundreds of thousands.
- Infrastructure related to the exploitation of natural resources, such as hydroelectric dams, mines and oil platforms cause **major disruptions to ecosystems**, causing intensive local environmental impacts. Furthermore, such invasive infrastructure projects provide major impetus for additional infrastructure developments (such as additional roads and power line networks), which have often worse environmental impacts than the original project.
- As a consequence, projects that do not consider their environmental impact produce **massive unintended costs and drawbacks** for both project operators and society. Furthermore, such projects will have negative consequences over the entire life span and may hamper the achievement of the two-degree target.

1.2.4 Resilience

Infrastructure is equally **vulnerable to a range of shocks and stresses**, including natural hazards (such as earthquakes, storms and sea level rise) and man-made changes like economic transformation and rapid urbanization. Such shocks and stresses have the potential to weaken infrastructure and possibly threaten its very functioning and critical service provision. This, in turn, is likely to cancel previous socio-economic development gains. The resilience of infrastructure, an often underestimated factor, is key for its ability to adapt to changing conditions and withstand shocks and stresses while still providing essential services and functions to society, the economy and the environment. Infrastructure in urban areas, with greater concentrations of people and assets, is particularly vulnerable to an increasingly complex range of shocks

and stresses, which jeopardize human well-being, cause major physical damage and have deep and lasting impacts on human development.

Case study: The Grand Inga Dam

The US$80 billion Grand Inga Dam will be the world's largest and most expensive hydropower scheme and is expected to open between 2020 and 2025. Situated on the Congo River in the Democratic Republic of Congo, the project exemplifies numerous positive and negative effects conventional infrastructure can have. The capacity of the Grand Inga Dam could be up to 40 gigawatts, enough to produce more than a third of the total electricity currently produced in Africa. It could therefore provide Africa with energy and may help foster its industrial and manufacturing industry. The project has the potential to generate both direct and indirect economic growth, numerous jobs and increase access to electricity while reducing inequality.

However, a number of concerns such as social and environmental impacts arise in relation to the project. Brunn (2011), for example, questions whether the local population will be integrated in the project development phase and whether the produced electricity will be considered for the local population or only for big cities. Further adverse environmental effects are also possible. Given that the Congo River feeds deep oceanic currents in the Atlantic Ocean, any flow disruption is likely to have dramatic consequences on the regional – and potentially even global – hydrological and climatic cycles. If such environmental aspects are not adequately considered in the infrastructure project, it could cause major environmental issues that may also lead to economic drawbacks for both the owners of the dam and the surrounding businesses. For example, agriculture would undergo significant changes due to the upstream infiltration of salt water. At the same time, substantial sediment loads may represent a major threat during the operational phase of the dams. Such large dams can also cause major disruptions in the biological characteristics of free-flowing rivers: major impacts on migratory fish, spawning habitats, aquatic biodiversity, fisheries and riverine communities are also possible.

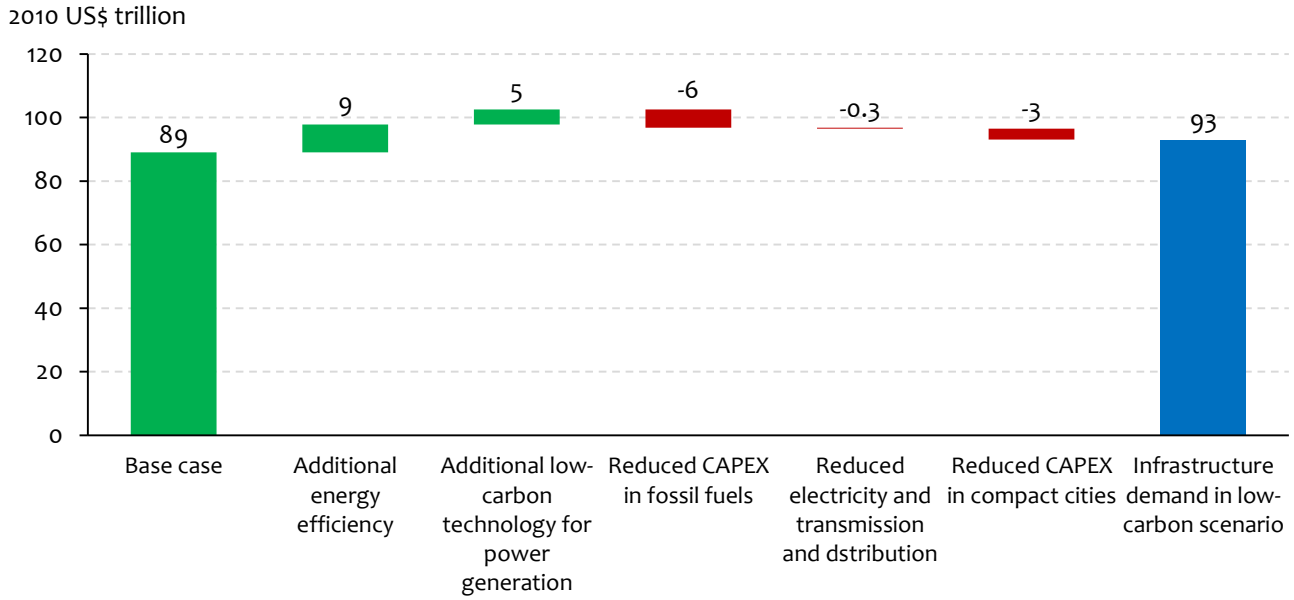
2 Infrastructure Investment

2.1 The Need

Increased urbanization, population growth and economic growth are the main drivers for the rising infrastructure needs. Estimates of infrastructure investment needs vary widely depending on methodologies and assumptions. McKinsey Global Institute (2013) estimates that global investment needs will be US$57 trillion, or more than 2.5% of the global GDP till 2030, while the World Economic Forum (WEF) estimates the needs to US$5 trillion per year, equivalent to US$75 trillion till 2030. The New Climate Economy (NCE) estimates the need to approximately **US$89 trillion** for the same period (NCE, 2014). Differences in the estimates are largely due to differences in definitions.

No matter which estimation is accurate, the **infrastructure demand is enormous and is even greater in the light of a low-carbon scenario**. This investment is needed for clean energy infrastructure, low-carbon transport, energy efficiency and forestry to limit the global average temperature increase to 2°C above pre-industrial levels (World Economic Forum, 2013). The WEF estimates additional incremental investment needs of at least US$0.7 trillion per year, while the NCE estimates additional US$0.27 trillion per year (see Figure 1).

Figure 1: Global Demand for Infrastructure Services, 2015-30



Source: NCE, 2014

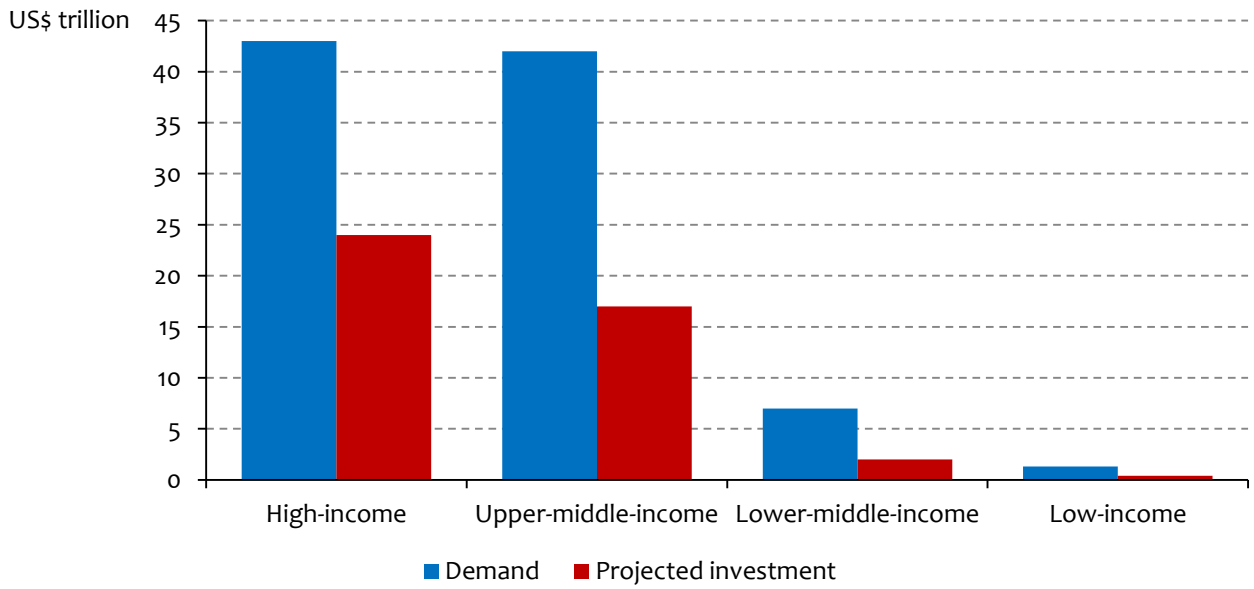
The low-carbon scenario sees investments in energy efficiency and low-carbon power generation. These investments could be partially offset by savings in other components, for example reduced capital expenditure (CAPEX) in fossil fuels. The results above do not reflect operating expenditure (OPEX). The NCE (2014) estimates further savings on OPEX in the low-carbon scenario of approximately US$5.1 trillion over the period 2015-2030**. Improved project selection and productivity** can, according to McKinsey (2013) further **reduce the overall infrastructure investment need**.

Regional Estimates

All countries have to spend huge amounts in the coming years to fulfil their infrastructure needs. The required increase in infrastructure investments may be higher in emerging markets, but, to meet the demands of continued growth, developed countries also have to invest large amounts to finance additional low-carbon and energy-efficient projects, thereby complying with international requirements such as the Paris Agreement. Additionally, they have to revive, maintain and overhaul their outdated infrastructure.

Developing countries, on the other hand, need to invest high amounts to meet the demands of urbanization, economic growth, development and better global integration and connectivity (Ehlers, 2014). With an estimated increase in the global population of 2 billion between 2010 and 2030, most of which will occur mainly in the developing world and in urban settlements, further specific infrastructure investments have never been so important. Even though the amounts in lower-middle-income and low-income countries are only a fraction of the global total, they represent a big amount in relation to the corresponding regional GDP.

Figure 2: Infrastructure Demand by Type of Country, 2015-30



Source: McKinsey & Company, 2016

2.2 Declining Infrastructure Spending and Rising Government Deficits

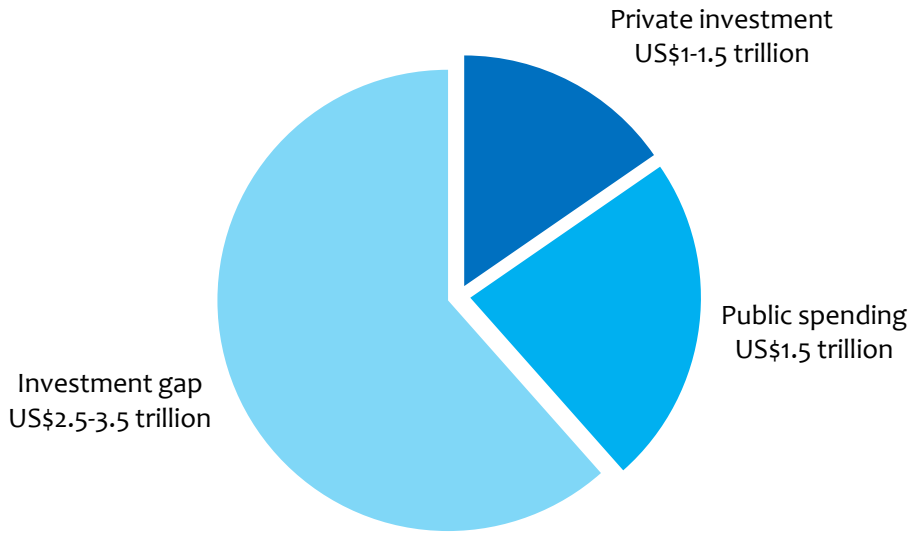
Governments have historically funded most of the infrastructure development. However, public infrastructure investment has declined over the past decades and represents currently globally about 3% of global GDP (Standard & Poor's, 2014). In OECD countries, public infrastructure investment represented more than 4% of GDP in the 1980s but has declined to about 3% in 2005 (Della Croce and Yermo, 2013). A similar development can be observed in Europe, where public infrastructure investment has declined from about 5% in the 1970s to about 2.5% in the 2000s (Inderst, 2013). In the US, government spending in infrastructure has fallen to 1.7% of GDP. Government spending to infrastructure is on average higher in emerging countries: China spends around 8.5% of GDP on infrastructure and India 4.7% (Standard & Poor's, 2015).

Given rising budgetary deficits and significant levels of debt, governments' ability to finance infrastructure is decreasing (Z/Yen Group Limited and WWF, 2015). Therefore, many governments are forced to cut their spending and re-prioritize their investments. Moreover, infrastructure competes with other socioeconomic priorities such as education or health for limited public resources (Maier and Jordan-Tank, 2014). As a consequence, public financing alone can no longer meet the entire infrastructure needs.

2.3 The Financing Gap

According to McKinsey (2016), **the global infrastructure investment gap** – the difference between current demand for infrastructure and projected spending – **amounts to US$39-51 trillion over the next 15 years**, based on a US$93 trillion infrastructure investment demand (NCE, 2014). The current infrastructure investment gap is equivalent to **US$2.5-3.5 trillion a year**. The wide range is mainly due to the uncertainties over China's spending on infrastructure, which is, as a share of GDP, the highest in the world. As Figure 3 represents, the current infrastructure spending of US$2.5-3 trillion a year is only about half the amount needed to meet the estimated US$6 trillion annual infrastructure demand (McKinsey, 2016). Given governments' decreasing ability to finance infrastructure, private investments play a fundamental role in helping to overcome the infrastructure investment gap. However, private spending in infrastructure has to at least double to overcome the investment gap.

Figure 3: Estimated Infrastructure Investment Volume per Year

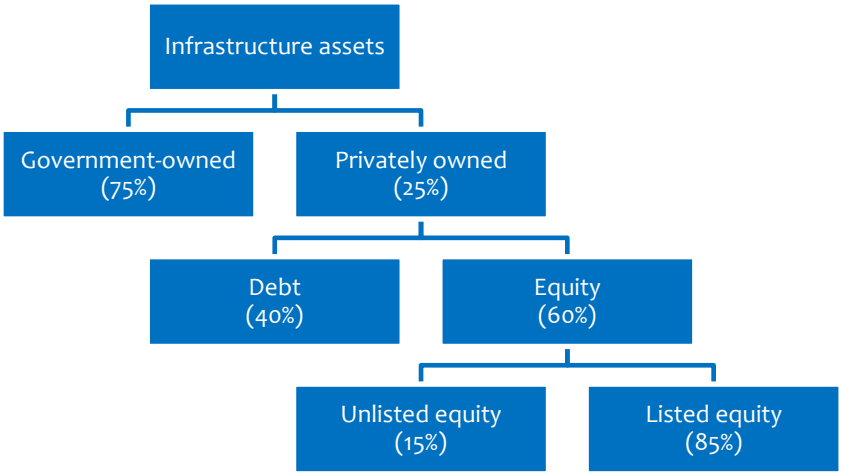


Source: Preqin, McKinsey, OECD, own estimations

3 Financing Infrastructure

Breaking down the investable infrastructure universe brings to the fore that the majority of all infrastructure assets are still held by governments. However, estimations of the value of the world's existing infrastructure vary widely – similar to the variations regarding the investments needs – between US$20 trillion and US$50 trillion. Referring to RARE (2013), **25% of the total infrastructure assets are privately owned**. Whereby, most of the privately owned infrastructure assets are held in equity. However, the numbers may be misleading because a large part of the listed equity universe contains listed infrastructure companies. Investments in listed infrastructure companies signify not automatically capital for infrastructure projects.

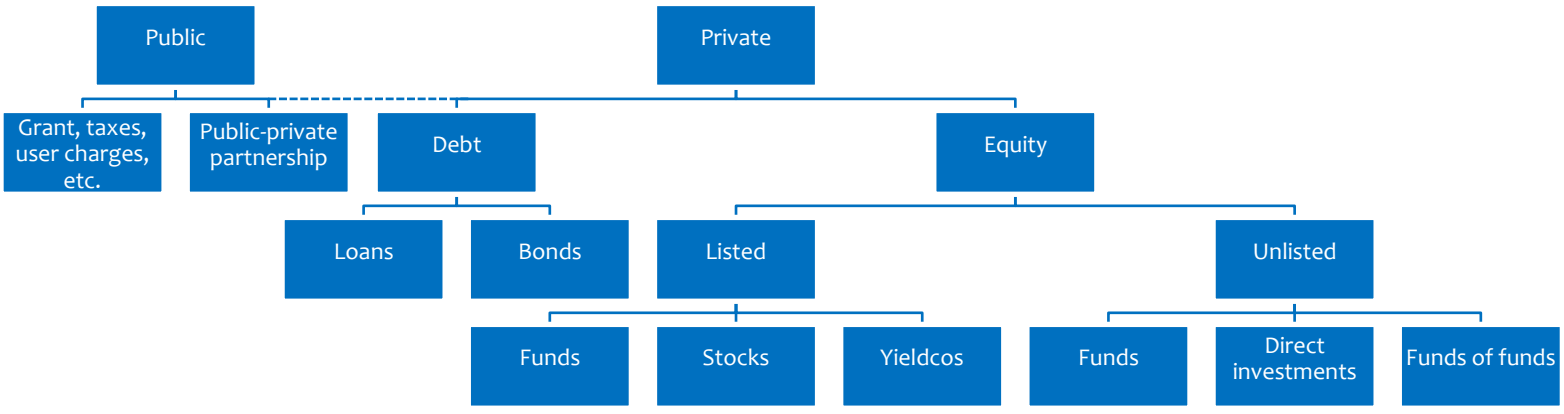
Figure 4: Breakdown of global infrastructure assets



Source: RARE, 2013

As visualized, infrastructure can be financed through different channels, actors, financial structures and instruments. Figure 5 represents the major categories and instruments for infrastructure financing. The list does not provide a comprehensive listing of all available instruments, but rather provides an overview of the wide range of existing instruments.

Figure 5: Instruments for infrastructure financing



3.1 Government Financing

For Adam Smith (1776), that the state had the duty to construct and maintain the main infrastructure that would benefit the entire society. Highways, telecommunications, power, railroads, hospitals, prisons and schools are common examples of utilities that were funded by governments.

Even if public finance instruments are, as this paper has already discussed, limited in number and in funds, governments are still the major financiers of infrastructure, representing an investment volume of approximately US$1.5 trillion a year (McKinsey, 2016). However, investment by the public sector fell as a share of total investment in the 1990s, since many countries were bound by fiscal constraints and debt servicing requirements.

3.1.1 Public Finance Instruments

Governments can draw on different instruments and tools to improve infrastructure development and mobilize further funds – private and public. They can also step in to pave the way for private sector investments in infrastructure. Therefore, governments play a major role in:

- Ensuring effective and efficient use of public budgets;
- Designing procurement processes;
- Designing public investments to attract private capital;
- Setting up financial risk-mitigation instruments such as loan guarantees, insurance options, and credit enhancement tools; and
- Creating an enabling environment for long-term investments.

No matter which instrument the public authorities use, it is crucial that neither the projects' effectiveness nor its efficiency suffers from the public intervention.

The following list provides an overview of the major categories of financial instruments available to governments that are relevant to infrastructure: land sales; land or infrastructure asset leaseholds; taxes; land value capture mechanisms; user charges and fees; grants and subsidies; building rights and planning permits; loan guarantees, insurance options, and credit enhancement tools (Z/Yen Group Limited and WWF, 2015).

Public finance instruments may have different impacts depending on the high diversity of governmental structures, for example legal frameworks and local contexts. With reference to Z/Yen Group Limited and WWF (2015), governments should incorporate and consider local circumstances in their decisions and complement their financial approaches with further policy and administrative instruments. Furthermore, **the public-procurement process can be crucial to guide and lead infrastructure development** towards the desired direction.

WEF (2013) and IDFC (2012) argued that even small amounts of well-designed and targeted public investments could have a significant **leverage function** to attract private spending. Some estimates consider that public finance has the potential to mobilize five times or more its contribution from private investors. On the other hand, state-owned companies have led to different problems, particularly in developing countries, where they have discouraged private investment in infrastructure. According to UN-Habitat (2001), problems primarily include underpricing, low productivity, poor service delivery, long queues, lack of access to basic services and lack of transparency due to political interference.

3.1.2 Public-Private Partnerships

Governments are increasingly turning to public-private partnerships (PPPs) to attract private investments and their expertise. The World Bank Group (2014) defines a PPP as "a long-term contract between a private party and a government entity for providing a public asset or service, in which the private party bears significant risk and management responsibility, and remuneration is linked to performance." PPPs have considerable potential to provide significant financing and tackle the investment gap, and also offer other benefits to infrastructure projects. However, the public sector is not fully convinced about the utility of PPPs as an alternative procurement method given the unknown maturity of PPP management.

Still, PPPs investments only play a small role, estimated to US$40 billion in the InfraPPP World database (InfraPPP World, 2015). The Asia-Pacific region was the main area with 46% of the planned PPP investments. The UK, Italy and Germany represent the biggest PPP market volume.

PPPs can be key to ensuring the necessary financing of an infrastructure project by including one or more private parties in public infrastructure projects and enabling governments to tap into design and engineering expertise, helping them improve the management of construction timelines, reduce costs and improve service delivery. A McKinsey working paper (Beckers *et al.*, 2013) illustrates that if an infrastructure project was evaluated, planned and executed more carefully, one-third of the current costs could be saved. However, even if PPPs promise many advantages, a significant amount of PPP projects still fail. An accurate long-term contract including procurement policies, concrete timelines, and a defined distribution of risks has to be at the core of every successful PPP project.

3.2 Private Sector in Infrastructure Financing

Various financing instruments are available to ensure the optimal structuring of infrastructure financing. The instrument, the form and the extent to which it is used depend on different factors: the size of the project, the amount of the cash flow, the preferences and requirements of the sponsor, the risk/return expectations and the political and economic conditions in the host country (Weber, 2010). The main differentiation is made between equity and debt. Within the instruments, debt is the most important source of finance. It generally accounts for between 70% and 90% of project financing (McKinsey, 2016; Weber, 2010; IJGlobal, 2016b). This mix allows infrastructure to get funded with lower-cost debt capital while avoiding overleveraging (McKinsey, 2016). Given the need for both debt and equity, approaches to enhance private sector infrastructure financing should address both kinds of instruments.

Difficulties can be observed to match debt and equity to the needs throughout a project's life cycle and its related risks. Debt financing, for example, is sometimes difficult to obtain until the project generates revenue. As a consequence, developer equity remains often the only private financing option available in the early phases of a project.

3.2.1 Debt Finance

Debt financing instruments can be divided into loans, bonds and debt funds. Bonds and loans in particular are less risky than equity and more profitable than sovereign bonds. They generally form part of the "structured debt" asset class. An OECD survey (2014a) of 104 pension funds and public pension reserve funds revealed that US$9.7 billion or 0.4% of total assets were invested in infrastructure debt in 2013.

3.2.1.1 Loans

A **bank loan** is a debt provided by one or more entities to another entity in exchange for a future repayment of the principal amount with interest. To have access to loans, the creditworthiness of a project developer is crucial. Therefore, a clear project and feasibility assessment is needed in addition to a sound balance sheet and credit history. A bank's **in-house expertise** may help the involved stakeholders through a rigorous due diligence process to assess the related risks and returns of a project. Access to debt provided by a multilateral development bank (MDB) often helps find additional sources due to the MDB's reputation and in-house monitoring capabilities.

Loans require a stable and functioning financial market, otherwise they may be both expensive and difficult to access. The post-crisis **constraints** on bank debt levels have negatively affected the infrastructure debt capital market.

The majority of project financing debt has been funded by banks, which face restricted regulations following the financial crisis. As a consequence, European banks – accounting for the largest loan share of the global market in the past – have significantly scaled back their loans or even withdrawn from the market due to liquidity issues. In fact, infrastructure project finance loan volumes reached a historic low in OECD countries in 2012, influencing the overall project finance amount, which also decreased significantly in 2012 (Della Croce et Yermo, 2013). According to IJGlobal (2016a), project finance recovered after 2012, and bank loans still represent with 60% the highest share of global volume.

Due to the current low interest rates, volatile equities and depressed fixed income yields, investors start investing in infrastructure debt. As consequence, non-traditional lenders are more and more attracted to the stable revenue stream and long-term liability of infrastructure debt investments.

The post-crisis have negatively affected the infrastructure debt capital market, however, according to an OECD working paper (Della Croce and Yermo, 2013), a huge volume of loans is predicted to flow in the market in the coming year, which requires an efficient capital market and favourable frameworks to finance new infrastructure projects for infrastructure.

3.2.1.2 Bonds

Project bonds are debt investment instruments through which investors provide money to a specific infrastructure project for a defined period at a variable or fixed interest rate. Project bonds are more risky because the risk of loss to credit holders is higher for a specific project than for a diversified portfolio of different projects.

Project bonds often represent an alternative and additional debt funding instrument for projects that have already been financed through bank loans or when the bank loans from the initial phase are being refinanced. This is why project bonds are most often used during the operational phase of a project, where the construction risk has ended and the asset begins to generate positive cash flows. They offer an interesting opportunity to invest in infrastructure projects through listed, tradable securities that can offer superior risk-adjusted returns and certain liquidity.

Due to the implementation of Basel III, such bonds require stricter monitoring and disclosures, and hence come with higher costs and capital requirements. As a consequence, bond financing of new projects has come to a halt and is rarely attractive to a broad investor base, except in the case of low-risk projects, for example involving bond insurance. However, such issuance has practically ceased, and the volumes of project bond issues have declined with the decrease of the monoline business model in the post-crisis

context (EPEC, 2010). The due diligence of such project bonds, to assess the risk of complex infrastructure projects, is very complicated. Therefore, **infrastructure project rating systems** are a prerequisite to reaching a broader base of project bond investors.

Pension funds and insurers plan to further expand their investments in bonds with poor credit ratings (triple-B or less) and take charge of higher (default) risks in order to replace their low interest sovereign bonds. In fact, the allocation of triple-B bonds of the largest European insurers increased from 9% in 2009 to 22% in 2014, while triple-A bonds decreased from 45% in 2009 to 23% in 2014 (Independent Credit View for SRF Eco, 2015). Such development could also mobilize investors into project bonds investments.

3.2.1.3 Green/climate bonds

Green/climate bonds are fixed-income securities issued to **raise finance for low-carbon, climate-resilient solutions, risk mitigation- or adaptation-related infrastructure projects**. A clear standard is needed to define what the label "green" covers – at the moment such a universally agreed definition does not exist. Efforts such as the Climate Bonds Standard (Climate Bonds Initiative) or the Green Bond Principles (Capital Markets Association) are under way to create standards specifically for green bonds. The financial mechanics of green/climate bonds are not different from those of project bonds or other debt instruments. However, green bonds deserve to be mentioned separately due to their **growing prominence and their potential in financing clean energy and climate change initiatives**. Interesting leverage and linkages with different financial instruments make it possible to promote infrastructure and green bonds, for example by granting investors a tax reduction or even a tax exemption for the amounts invested in such bonds.

According to the Climate Bonds Initiative, US$41.8 billion of green bonds were issued in 2015, representing the biggest year ever for green bonds. Like other bonds, governments, multinational banks or corporations can issue such green bonds. The largest green bonds were issued in 2015 by KfW (US$1.77 billion), the ING Bank (US$1.3 billion) and Électricité de France (US$1.25 billion). Europe remains the top market for green bonds issues in 2015 (US$18.4 billion issued), followed by the United States with US$10.5 billion issued (Climate Bonds Initiative, 2016). On average, bonds remain the dominant asset class in the portfolio allocations of pension funds (Della Croce et al., 2011), and hence possess a large potential to overcome the infrastructure investment gap. However, bonds for institutional investors are still lacking in order to fully access the infrastructure market.

3.2.2 Equity Finance

Equity typically constitutes between 10% and 30% of a project capitalization. However, due to the predictable decrease in debt level and during periods of financial stress such as the credit crisis, creditors may request a higher level of equity. Therefore, infrastructure may be more dependent in the future on the equity capital market, and hence on investors who will shoulder the higher amount of risk that comes with equity investments.

In, equity financing, capital is raised by selling companies' stock or infrastructure asset ownership to investors. In return for the investment ownership, the shareholders receive interests in the company related with the infrastructure asset. Equity investments can be done directly in specific infrastructure projects, special purpose vehicles or joint ventures, or indirectly via construction companies, equity infrastructure funds or funds of funds. Some shares are traded publicly and are to a certain degree subject to the Exchange Supervisory Authority (listed equities), while others are not traded on the stock exchange (unlisted equities).

Equity is a financing instrument often used for the construction phase, mainly because during this phase, highly specialized expertise and monitoring are crucial and only a few investors – that mainly invest in equity – possess sufficient expertise. Construction companies, for example, have enough expertise and often issue equity. This bears the risk of overcharging construction costs; fixed price construction contracts may act as a remedy in such cases.

No adequate quantitative data on the different equity instruments is available due to the lack of data and transparency, particularly for unlisted and direct investments vehicles.

3.2.2.1 Listed infrastructure

Listed infrastructure investment instruments such as listed funds are turned into individual shares or take the form of investment funds or index certificates at a stock exchange (Weber, 2010). The investments can be done for individual infrastructure assets or companies, for example utilities, transportation, heavy construction and communication entities.

Investments in **listed funds** tend to be more liquid and diversified compared to unlisted alternatives. So do many thematic equity funds – covering a huge bandwidth including clean tech, renewable energy and water – that conduct investments into one or several specific types of infrastructure. Several initiatives such as the UN-backed Principles for Responsible Investment (PRI) act as guiding principles for fund managers regarding the sustainability approach of equity funds, and try to encourage investors to take into account ESG factors in their investment assessments.

A major problem with listed infrastructure is that the definition of infrastructure is very broad. Furthermore, investing in listed infrastructure means investing at the company level and not at the project level. Indeed, amounts invested in listed infrastructure companies, which constitute about 5% to 6% of global stock markets, do not help to overcome the investment gap.

Listed infrastructure funds remain a relatively niche segment within the infrastructure fundraising universe (Preqin, 2015) with just 19% of active Limited Partners (LPs) that hold a preference for investing in listed vehicles. In 2013, ten listed infrastructure funds were launched, the largest number in a single year since 2007. According to Preqin, 44 listed infrastructure funds existed in 2014. Nevertheless, listed instruments offer investors easy access to the market for investors with small amounts, due to the greater liquidity and transparency of the secondary market. Furthermore, they have lower management fees than private or direct equity investments. However, the drawback is their high level of volatility, their higher correlation with other asset classes and the potentially missing exposure to infrastructure project financing.

Yieldcos are another form of listed equity vehicle, where special power projects with multi-year power purchase agreements are placed into a new subsidiary, which is listed on the stock exchange through an IPO. They are especially applicable to the spin-off of power plants projects. The market of yieldcos is still relatively young but growing: much of the future growth will probably be linked to trends in the renewable energy market. The vehicle is however only applied in the energy sector to provide finance for power plants and may therefore only offer limited potential to overcome the financing gap.

3.2.2.2 Direct infrastructure investments

These investments are made directly in unlisted infrastructure projects and require significant internal resources and capital to invest. They are therefore not an option for the majority of institutional

investors. According to Clark (2011), approximately 20 direct institutional investors exist on the direct infrastructure investment market.

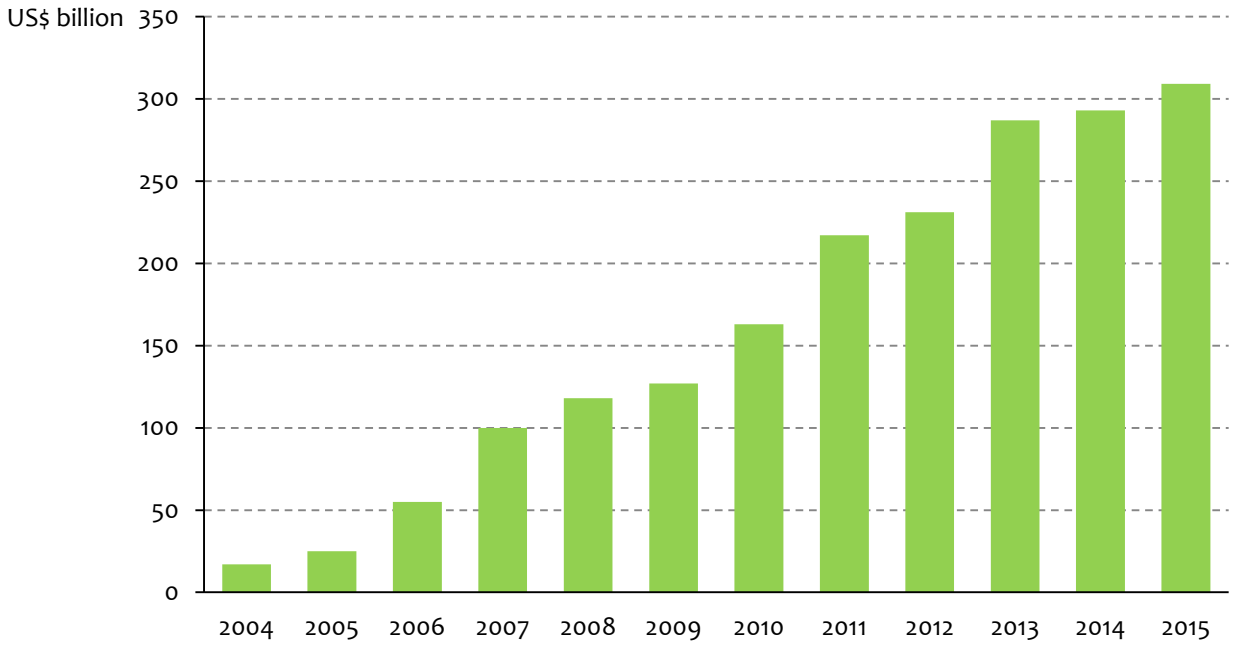
Direct infrastructure investments will become increasingly popular in order to gain closer control over the assets as well to avoid paying expensive fund manager fees. However, as the nature of direct investments is complex, they have to become more readily understood by institutional investors.

3.2.2.3 Unlisted infrastructure

Unlisted infrastructure assets are not listed on the stock exchange – and are therefore less exposed to restrictive regulatory frameworks – which is why unlisted instruments offer more potential for further innovative investment vehicles or the implementation of new, attractive regulatory frameworks.

Figure 6 illustrates the huge increase of new assets flowing into unlisted infrastructure funds in recent years. According to Preqin (2016), global infrastructure assets under management in unlisted funds are at a record high of US$309 billion at end of 2015.

Figure 6: Unlisted infrastructure assets under management



Source: Preqin, 2016

However, institutional investors have raised concerns on conflicts of interest and management fees. The conflicts of interest arise due to the perceived short-term opportunistic approach of fund managers, compared with institutional investors' long-term perspectives. Therefore, open-end funds or funds with lengths greater than 15 years seem to be more appropriate to match the long-term liabilities of institutional investors and the interests of the general partner of the funds (often investment banks or investment management firms). Open-ended funds, with their ongoing investment periods, provide immediate exposure to income-generating assets and greater ability to grow and diversify the fund over time without the rush to deploy capital. They are currently only a niche in the market, but are growing as part of the infrastructure fundraising market: with five open-ended funds launched in 2014, a record high of 46 open-ended infrastructure funds are active (Preqin, 2015).

The other often mentioned investor issue is the management fees. Infrastructure assets have a very diverse range of risk/return profiles from which the management fees are normally deducted. As this diversity is not yet fully reflected in the fees, investors are still often charged too high fees. For example, a fund investing in infrastructure assets in an emerging market, which carries greater risk, requires appropriate management of resources and will, as consequence, charge higher fees compared to a fund investing in assets in developed countries.

The aggregate target capital of unlisted infrastructure funds was at US$120 billion in 2014, with 179 unlisted funds according to Preqin. Despite the impressive increase in unlisted infrastructure assets, they currently represent only a fractional amount of the total assets managed by institutional investors. Infrastructure funds that were closed in 2014 raised an average of US$1 billion. This reflects the concentration of capital among a few large players in the unlisted fund market. However, due to the opaque nature of unlisted funds, it is difficult to estimate the exact numbers. Nevertheless, unlisted equity remains, with its huge increase in assets over the last five years, a valuable way to mobilize further investors.

3.3 Restraining Asset Allocation

3.3.1 Ample Funds

The global economy has abundant stocks of financial assets. In fact, according to McKinsey (2015a), "the pool of capital available is deep. Across infrastructure funds, institutional investors, public treasuries, development banks, commercial banks, corporations, and even retail investors, we estimate that more than US$5 trillion a year is available for infrastructure investment." Furthermore, the global assets under management (AUM) are estimated to increase over the next years. Today's AUM are estimated at US$63.9 trillion, and are predicted to exceed US$100 trillion by 2020 (PwC, 2014).

As a reaction to the stagnation in the economic cycle, national banks set **low interest rates**, thereby increased liquidity. A low interest rate indicates an expansionary monetary policy – a classic approach to cheapen loans and stimulate the business cycle. Due to the current low interest rate environment, the ample funds of institutional investors are looking for alternative investment possibilities in long-term illiquid assets with predictable rates of return and low volatility such as infrastructure assets. Furthermore, the fluctuations in equity markets and the closer alignment since 2007 of the two major asset classes, stocks and bonds – making them lose the solid hedge between one another – are driving long-term investors such as pension funds and insurers to look at other assets such as infrastructure as a part of their portfolio diversification strategies.

3.3.2 Attractive Investment Characteristics

As several studies show, infrastructure offers attractive benefits to investors, including the possibility to own real assets with high barriers to entry as well as stable long-term cash flow that are resilient to variations in the economic cycle, potentially offer protection against inflation and possess a relatively low correlation to other asset classes. Therefore, infrastructure is offering an interesting investment and diversification possibility to investors.

However, current private sector asset allocations in infrastructure were of US$1 trillion to US$1.5 trillion a year, representing only a small amount compared with the US$2.5 trillion to US$3.5 trillion investment gap. Technical constraints, investment barriers and legal requirements are the key reasons that hamper further infrastructure investments. Therefore, to mobilize private sector finance and gain access to the

ample liquidity available in the world market for infrastructure projects, it is crucial to unlock barriers and make infrastructure investments more attractive for investors.

3.3.3 Investment Barriers

3.3.3.1 Lack of Transparent and Bankable Project Pipeline

As Betrand Badré, World Bank Group Chief Financial Officer said, "the challenges are as much on the side of projects as on supply of capital. **There are simply not enough viable projects out there**" (Financial Times, 2015b). This barrier to making infrastructure investment more attractive is mainly based on three related issues (McKinsey, 2016). First, governments often fail to develop and communicate long-term infrastructure plans. For example, only half of the G20 countries publish infrastructure pipelines (B20, 2015), leading to a poor estimation of infrastructure needs. This makes it difficult for investors to justify investing in in-house infrastructure expertise or local staff and partnerships. Lastly, infrastructure projects are often not bankable, without sufficient collateral, future cash flow and a high probability of success.

3.3.3.2 Unfavourable and Uncertain Regulations

The international community intended to stabilize the financial sector by **introducing financial regulations on capital requirements** such as the Basel III and Solvency II regulations, which limit the availability of debt and equity for infrastructure. Under the third Basel accord, financial institutions have to build up additional equity to meet requirements, instead of spending or lending more for potential infrastructure projects. The regulatory framework implies that financially stricken banks have to limit long-term and illiquid structured finance and may either reduce or close their infrastructure financing business in order to strengthen their balance sheets. Therefore, credit and liquidity costs will increase, affecting in particular long-term bank debt such as project finance loans, and limit their availability. With the Solvency II Directive, equities will need to be backed by reserves of 30% to 40%, while European sovereign debt is deemed risk-free (OECD, 2011). European investors may be forced to move from equities to bonds due to this rule. Investments in structured credit such as infrastructure, which incurs higher capital charges, could be affected. Both the Volcker Rule and the Alternative Investment Fund Managers (AIFM) Directive might have further negative consequences on infrastructure funds and fundraising.

3.3.3.3 Pension Investment Restrictions

Pension funds still allocate relatively few financial resources to infrastructure investments, and yet need more long-term assets. But due to their high-risk aversion and quantitative **portfolio restrictions**, the infrastructure allocation of pension funds may remain small because infrastructure investments are **faced with uncertain risk/return profiles** as opposed to other assets such as fixed income and cash investments, which play the largest part of large pension funds' asset allocations. Nevertheless, given the huge assets under management (about US$60 trillion, of which US$30 trillion in North America's pension funds), even slightly higher allocations could create a considerable impact.

3.3.3.4 Shortage of Data on Performance of Infrastructure Projects

Private investors seek to optimize their risk-adjusted return by selecting assets that fit best their existing investment portfolios. **Clear risk and performance profiles** for asset classes with similarities to

infrastructure, such as bonds – long-term investments with mostly fixed returns and relatively low risks – exist to guide and help investors. For infrastructure investments such profiles do not exist.

3.3.3.5 Political Risks

Due to the close link and sensitivity of infrastructure assets to regulations, **political risks** play a very important role. They can stem from many sources and are normally outside the influence of private investors. Changes in regulations and laws relating to an infrastructure project can have adverse effects. Another risk, closely related to the political and regulatory risks, is the **non-transparent** disclosure risk. Due to the extremely complex structure and delivery process of infrastructure projects as well as the interaction between all the stakeholders, projects are exposed and highly sensitive to corruption and mismanagement.

3.3.4 Positive Signs of Private Sector Acceleration

The investment market provides clear signs that investors are intending to place more funds into infrastructure assets:

- The number of investors making infrastructure investment has increased in recent: Preqin's Infrastructure Online service features profiles of over 2,400 institutional investors that invested in infrastructure at the beginning of 2015. In 2010, it listed just over 800 investors.
- The investment sector has witnessed growing interest in sustainability products: the volume of asset managed in compliance with the PRI increased from US$4 trillion in 2006 to US$59 trillion in 2015, mirroring the booming demand for responsible investments.
- The majority (62%) of investors have invested below their target allocations for infrastructure. As a consequence, they will look to invest more capital in the coming years in order to move towards their long-term investment targets.
- 67% of the investors are planning to increase their spending in infrastructure investment over the long term.
- 57% of the unlisted infrastructure funds that closed in 2014 were either on or above their initial fundraising target. 39% beat their fundraising target by 20% or more, which is a significant amount and reflects investors' interest in investing in unlisted infrastructure funds.
- The high level of dry powder – capital reserves kept on hand to purchase further assets – amounted to US$105 billion for unlisted infrastructure funds.
- 25% of the investors surveyed by Preqin plan to invest over US$400 million each over the next year in infrastructure, and 90% plan to invest at least US$50 million.
- 49% of the investors survey by Preqin suggest that one of the key issues in the 2015 infrastructure market is the number of viable investment opportunities.

Infrastructure investments have to further evolve in order to mobilize the available capital on the market and keep growing. Pension funds in particular possess not only huge and increasing amounts of funds, but they also have long-term liabilities and an increasing sensitivity to responsible investments. However, pension fund investments are subject to strict regulations that prescribe the maximum share they are able to invest in an asset class.

4 Sustainable and Resilient Infrastructure

The value of world's existing infrastructure is, depending on the assumptions and methodologies, between US$20 and US$50 trillion. The US$93 trillion demand for new infrastructure in the next 15 years (see Section 2) therefore exceeds the value of the existing infrastructure: we will therefore literally build our world (McKinsey, 2016). Depending on the choice of infrastructure and how it is planned, constructed, operated and maintained, infrastructure can have lasting positive or negative impacts on environment, society and the economy.

Therefore, building the thousands of fossil-fuel power stations currently planned across the world will have negative impacts and consequences over the next 30-50 years at the very least, not to mention the locked in capital, which is committed to a service that goes against the achievement of the two-degree target. The only way forward is to implement sustainability and resilience criteria into infrastructure development and, therefore, to **maximize the positive effects on productivity and quality of life while minimizing the negative impacts on the environment**. Furthermore, an improved project selection has the potential to reduce the overall infrastructure investment need.

4.1 Defining Sustainable and Resilient Infrastructure

Sustainable and resilient infrastructure integrates ESG aspects into a project's planning, building and operating phases while ensuring resilience in the face of climate change or other shocks such as rapid migration, natural disasters or economic downturns. Service needs will be met in a manner that minimizes or reverses environmental damage, improves social equality and does not waste resources.

Sustainable and resilient infrastructure is therefore not only a key component of a functioning economy: it also forms the basis of good livelihoods for billions of people, and can significantly contribute to achieving sustainability and addressing the global climate challenge. Indeed, the United Nations include the potential of infrastructure in their proposal for the SDGs by directly mentioning sustainable and resilient infrastructure in two of the 17 SDGs. This underlines once more the potential power of infrastructure to drive sustainable development.

4.2 Indirect Benefits

According to the World Bank Group (2012), introducing sustainability into infrastructure projects is indispensable for a country to stay competitive: "Infrastructure can be a vector of change in addressing some of the most systemic development challenges of today's world: social stability, rapid urbanization, climate change adaptation and mitigation and natural disasters. Without an infrastructure that supports green and inclusive growth, countries will not only find it harder to meet unmet basic needs, they will struggle to improve competitiveness."

Sustainable and resilient infrastructure systems have the potential to create a wide range of indirect benefits (UN-Habitat, 2012):

- **Reduce consumption of resources:** by improving the resource efficiency of infrastructure systems or providing new forms of infrastructure that allow users to live more resource-efficient lifestyles (for example a public tram or bicycle lane where there were only roads for private vehicles before), the environmental impact associated with extracting and processing resources, and disposing of wastes can be reduced. New technologies like LED lights and high performance solar photovoltaic panels allow for significant resource and cost savings to utilities, and can help protect service users from price increases.

- **Reduce environmental impact:** by avoiding or reducing pollution and emissions into the air, water and soil, using sustainably managed renewable resources and reusing wastes, infrastructure systems can help reduce negative impacts on ecosystems and affected communities.
- **Increase service value:** by considering additional benefits that an infrastructure project could provide over and above its main intended purpose, multiple benefits can be derived through a single investment (for example a power plant can sell waste heat to nearby industries, or a natural storm water channel can double up as a recreational space).
- **Advance social inclusiveness:** by including a wide range of affected communities (particularly disadvantaged or marginalized communities) in decision-making pertaining to infrastructure projects, a greater sense of social cohesion can be fostered.
- **Promote transparency and accountability**: by promoting transparency in the development or operation of infrastructure projects, project owners may allow collaborators and external interlocutors to better understand the operations, their challenges and their impacts, which contributes to a higher motivation of the collaborators on the one hand and a better acceptance by the external interlocutors on the other.
- **Strengthen human and labour rights and improve working conditions**: by strengthening human and labour rights and improving working conditions, workers, supply chain workers and migrant workers will contribute to better occupational health and safety and thus increase the motivation and quality delivery, which in turn reduces absenteeism and increases worker retention.

Furthermore, sustainable and resilient infrastructure often creates benefits that accrue to other sectors or are reflected in other parts of a government budget. As the Cities Climate Finance Leadership Alliance (CCFLA) (2015) explains, "A city could use its transportation budget to finance a local cycling scheme, but accrue savings in its healthcare budget as citizens exercise more and breathe cleaner air." For example, the city of Copenhagen plans to build a network of cycle superhighways that is expected to reduce CO_2 emissions by 7,000 tons per year, generate savings in health costs of US$45 million a year and reduce congestion, at a cost of only US$60-151 million.

4.3 Direct Benefits of Sustainability

4.3.1 Business Stability and Risk Mitigation

Sustainability and resilience play a dominant role in infrastructure assets, compared to other types of assets, mainly due to the relatively capital-intensive and long-term nature of infrastructure. More changes are likely to occur the longer the lifespan of a project. Therefore, the more capital-intensive an investment becomes, and the longer the investment cycle lasts, the more important hedging against political, environmental and social risks becomes (Wiener, 2014).

Therefore, adopting sustainability and resilience ensures greater **business stability**. It seeks *per se* to **mitigate risks** by taking into account and dealing with the sources of environmental, social and corporate governance uncertainty.

With its long-term approach, sustainable and resilient infrastructure can be seen as a **proactive management tool**. Such an approach can reduce a wide range of risks, for example non-compliance with laws and regulations, and hence future litigation. In the context of climate change, new taxes or

governmental directives and regulations charging the ones responsible for negative externalities and emissions, are likely to be introduced. A wider implementation of eco-taxes, such as carbon regulation, could drastically reduce benefits from conventional infrastructure projects. Once further subsidies are removed, such as those for fossil fuels, conventional infrastructure, which strongly depends on these, is likely to incur heavy losses. Nonetheless, when incorporating sustainability and resilience criteria, infrastructure projects tend to minimize their negative externalities and will therefore show little exposure to such governmental action. In fact, as they become more competitive, they are likely to benefit from future carbon-reducing legislation.

4.3.2 Cost Reduction

Another benefit derived from a sustainable and resilient approach is the **lower energy and repair costs**. Sustainable and resilient infrastructure, for example, seeks not only to reduce emissions and their carbon footprint but also to improve energy efficiency, leading to lower energy consumption and hence lower and more stable energy costs. A resilient approach to infrastructure construction will result in fewer repairs, regardless of whether the result arises from its use or from external reasons such as natural disasters. Therefore, lower running costs caused by a sustainable and resilient approach will directly lead to higher returns.

4.3.3 Inflation Hedge

Most long-term investors are looking for **real returns** rather than nominal returns. Inflation can be seen as a major concern for long-term investors as it accounts for the difference between real and nominal returns. Infrastructure investments may provide a desirable safety net against inflation, in particular when they seek the acceptance of civil society. Indeed, since sustainable and resilient infrastructure significantly contributes to societal development, the sometimes necessary decision to adjust prices to inflation is more likely to be accepted by the end user. Often, the locals, who represent also the clients, have indeed a word to say at the board of the infrastructure developer. This added value can positively affect clients' reactions regarding changes in tariffs and therefore lead to a better mitigation of inflation risk. However, this implies giving up the short-term focus in investments.

4.3.4 Transparency

Lack of transparency, corruption and mismanagement can threaten the success of infrastructure projects. On the one hand, infrastructure projects often have an extremely complex structure and delivery process. On the other hand, they imply interaction between large arrays of stakeholders. Annamalai *et al.* (2012) showed that a deficiency in transparency is prone to negatively affect results; since transparency and fairness are among the pillars of sustainability, incorporating sustainability criteria can significantly reduce these adverse effects. However, if transparent business is likely to bring benefits, their extent is difficult to assess. Several organizations have tried to develop measurements tools – among them are global leaders in the war on corruption such as Transparency International.

4.3.5 Reputation Issues

Improved **investor reputation** constitutes a further advantage flowing from an implementation of sustainability. Investors increasingly recognize their responsibility and also the reputational benefits of sustainable investment. The pressure of their clients and the positive effects on PR are the main drivers of this development.

4.3.6 Capital Flows

An **increasing demand** for responsible investments mobilizes new sources of finance from private investors. As more clients wish their money to be invested in a responsible manner, it is in the fund's fiduciary interest to invest in compliance with sustainability criteria. The investment sector has witnessed a growing interest in sustainable products. As mentioned in Section 3.3.4, the volume of assets managed in compliance with the Principles for Responsible Investment increased from US$4 trillion in 2006 to US$59 trillion in 2015, mirroring the booming demand for responsible investments.

4.3.7 Productivity

Finally, **enhanced productivity** for the firm results from improved governance. As workers and managers are involved in the decision-making progress, the working conditions can better match the employees' skills and produce higher levels of output. Incorporating their needs or demands might indeed generate positive outcomes for both employer and employee. Swanberg *et al.* (2008) finds a positive correlation between flexible working hours and the productivity of workers.

4.4 Introducing Sustainability into the Infrastructure Sector

Successfully implementing sustainability and resilience requires a greater understanding of what it means in the context of infrastructure with its different sectors and within its different economic, social, and environmental contexts. This is why institutions including the UN, the OECD, the World Bank, EDHEC-Risk Institute and McKinsey are calling for a standardized approach to sustainability and resilience in order to improve the quality of projects and investments. In the Addis Ababa Action Agenda of the Third Financing for Development Conference, the UN clearly stresses the importance of establishing such a standard: "We call on standard-setting bodies to identify adjustments that could encourage long-term investments within a framework of prudent risk-taking and robust risk control."

4.4.1 Standardization

Since the earliest definition of sustainability in the Brundtland Report of 1987, many discussions, definitions and frameworks for sustainability have been introduced. Perhaps up to 500 different sustainability standards and certificates exist nowadays. Companies adopt standards to demonstrate the performance of their organizations or products in the field of sustainability, to comply with minimum requirements or to demonstrate competitive advantage.

An accurate implementation of sustainability and resilience elements is fundamental to reach their described benefits. Therefore, a clear, globally used, standardized approach **determining the meaning of sustainability and resilience in the field of infrastructure** and its areas of implementation is essential.

The standardization sets a minimum requirement to distinguish sustainable and resilient infrastructure from conventional infrastructure. It is crucial to take a long-term perspective, including the different stages of the project cycle, and to be defined as a clear, holistic, global and cross-sectoral approach for sustainable and resilient infrastructure projects in order to measure their economic, social and ecological impacts.

Such a standardized approach would improve the quality of projects because:

- It sets a clear, unambiguous definition of the term "sustainability and resilience" in relation to infrastructure projects and defines connected criteria.

- Clear criteria would improve the homogeneity of sustainable and resilient infrastructure projects, making them comparable and allowing projects to be bundled to create innovative financial instruments. The homogeneity and comparability also helps to backtrack and benchmark the performance of sustainable and resilient infrastructure.
- A common understanding between project developers, financiers and civil society on what determines sustainable and resilient infrastructure would facilitate the identification of such projects as responsible and sustainable investment opportunities.
- Such approached can be used by 1) project developers to integrate sustainability and resilience aspects into their infrastructure projects properly, 2) infrastructure financiers to identify sustainable and resilient infrastructure investment opportunities, which mitigate risks and reduce costs as well as create tangible benefits, and 3) public sector institutions to inform procurement processes and project requirements, and improve project selection by allowing comparison and thus support a more efficient use of limited public resources (SuRe® Overview, 2016).

Furthermore, a standardized approach for sustainable and resilient infrastructure has to integrate the entire value chain and life cycle of an infrastructure project and should also be connected to Measurement, Reporting and Verification (MRV) systems.

Several standards for responsible investments already exist, such as the International Finance Corporation (IFC) Performance Standard, Equator Principles or the Principles for Responsible Investment). On a project basis, Global Infrastructure Basel Foundation (GIB) and Natixis, a French investment bank, offer the Sustainable and Resilient Standard (SuRe® Standard), a global voluntary standard that helps to integrate state-of-the-art sustainability and resilience aspects into infrastructure development and upgrade. It consists of 76 criteria divided into 14 themes spanning ESG aspects and relies on the independent verification and certification of infrastructure projects. The SuRe® Standard engages important players from the infrastructure and construction industry, financial services, the public sector as well as civil society and academia, with a multi-stakeholder process driving its development.

4.4.2 Capacity Building

A holistic standard, regardless of its quality, is not enough to improve how sustainability, resilience and proper project design are implemented in a project. Capacity building is a crucial supplement to ensure all involved stakeholders understand the standard and its assessment. It should be addressed to public sector institutions and the private sector (for example project developers or infrastructure financiers).

However, capacity building should not just be a set of pre-packaged interventions to gain a common understanding of a finding. A key element in effective capacity building and know-how transfer is the development of a project developer's own skills over time, based on their own experiences, and the strengthening of self-adaptive capabilities, which enables actors to adapt to changing environments on an ongoing basis (Eade, 1997). Capacity building regarding sustainable and resilient infrastructure issues should aim to develop the abilities and skills of all involved stakeholders in order to improve their understanding of sustainability. In addition, capacity building should foster awareness of crucial principles and qualities desirable in sustainable and resilient infrastructure projects. Potential providers of such capacity buildings include MDBs, providers of infrastructure standards, NGOs and the public sector.

5 Mobilizing Investors for Sustainable and Resilient Infrastructure

Innovative financial mechanisms, which integrate the strength of sustainable and resilient infrastructure, are urgently required to further open the portfolio allocation to infrastructure, attract institutional investors and achieve the goal of overcoming the investment gap. This paper takes a closer look at two investment approaches with tremendous potential to attract private investors: **sustainable and resilient infrastructure as best-in-class** and **sustainable and resilient infrastructure as a new asset class**.

5.1 Sustainable and Resilient Infrastructure as Best-In-Class Approach

According to the Preqin report (2015), 39% of investors have carved out separate infrastructure allocations, the rest of the investors having infrastructure allocated as part of their private equity or real assets allocation or categorized into other allocations. Setting infrastructure as a commonly accepted asset class should give an increasing number and range of investors the opportunity to participate in this market and also increase the liquidity of infrastructure. Although some trades for conventional infrastructure investments via unlisted funds exist, reaching more than US$40 billion in 2014 (B20, 2015), the marketplace for infrastructure still remains very limited but has enormous potential for further improvements towards more liquidity.

As the marketplace is underdeveloped, procedures are not standardized and strictly regulated and a vast number of intermediaries are involved in the process (International Development Finance Club, 2014). This makes infrastructure transactions and investments inconsistent, disorganized and hence highly inefficient and costly for interested investors.

Sustainable and resilient infrastructure as best-in-class approach should give investors within the infrastructure asset class a preferred selection that outperforms conventional infrastructure due to the great benefits of the sustainability and resilience approach. To establish sustainable and resilient infrastructure as the best-in-class approach, it is crucial that sustainable and resilient infrastructure can be distinguished from conventional infrastructure, highlighting the need for a standardized sustainability and resilience approach for infrastructure projects.

The risks and returns for infrastructure are higher than for bonds, but lower than for equity. These unique characteristics have to be transparently monitored and reported to the market participants so that investors can incorporate the asset class into their investment portfolio. Once investors and the regulatory authorities recognize the distinct financial features of infrastructure and its best-in-class approach, they will be increasingly recognizing infrastructure as a distinct asset class, on the same level as bonds, equity, cash or precious metals (Wiener, 2014).

Infrastructure as an asset class with sustainable and resilient infrastructure as best-in-class approach has four main benefits:

- It gives a broader range of private sector investors the opportunity to participate in an attractive market that is not yet transparent and fully accessible, while avoiding direct project finance and fulfilling regulations at reduced transactions costs.
- It paves the way for further innovative financial vehicles/instruments like sustainable and resilient infrastructure funds or indexes, bundling homogenous (due to the standardized approach) projects.
- The establishment of a secondary market should make infrastructure investments more liquid.

- It lowers transaction costs and smoothen cash flows for investors, placement agents and project originators.

The major obstacles to such a distinction are the heterogeneity of projects and the lack of available performance data. Sustainable and resilient infrastructure is still too heterogeneous regarding contractual structures, unstandardized project design and environmental requirements for instance. This makes it difficult to assess and especially compare sustainable and resilient infrastructure projects. Harmonization of the project preparation, the sustainability and resilience approach and the project evaluation remains crucial, and therefore an implementation of a holistic standardized framework promises large payoffs for all involved stakeholders.

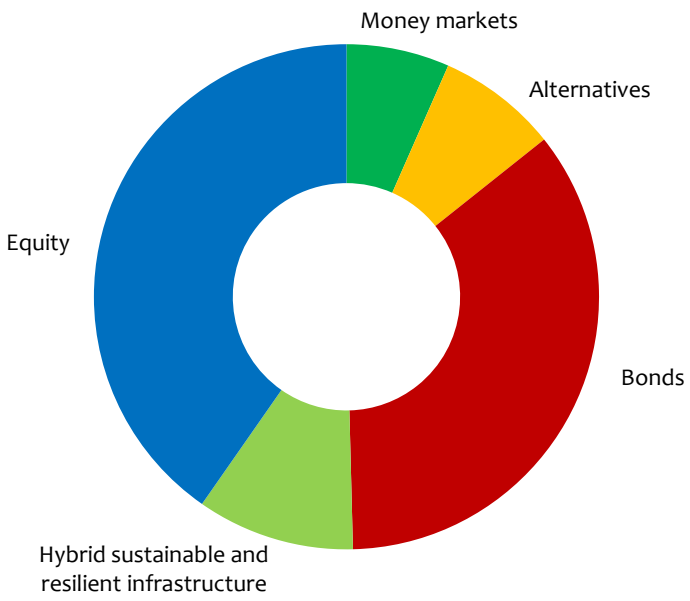
Supplementing the targeted standardization with international policy initiatives will help to establish a clear regulatory definition for sustainable and resilient infrastructure (and also PPPs), and thus lead to higher data transparency. This step is essential to achieve a sound assessment of sustainable and resilient infrastructure, having the possibility to benchmark the infrastructure asset class vis-à-vis other asset classes, and will help investors to make clear financial investment decisions based on commonly acknowledged financial indicators.

5.2 Sustainable and Resilient Infrastructure as an Asset Class

Many investment-related benefits from a sustainable and resilient approach to infrastructure will only be revealed on a long-term horizon. Hence it is crucial that the full lifecycle – a lifetime of 20 to 30 years is common for infrastructure projects – is integrated into an investor's evaluation of the project performance, also regarding its risk-mitigating effect of the triple bottom line approach. Furthermore, the long-term perspective of full lifecycle integration into infrastructure investment considerations overcomes the conflict of interest in unlisted equity investment between fund managers' short-term 'opportunistic' approach and institutional investors' long-term liabilities.

The dissociation of infrastructure debt and equity management in the institutional investor's portfolio shows the technical constraints within conventional infrastructure investment. Infrastructure debt often belongs to the "structured debt" asset class, while infrastructure equity constitutes a small share of "alternative investments". Such a separation can be explained by the discrepancy of time horizons for debt holders and equity providers during harsh financial times: debt holders want to secure the returns and the equity providers aiming to maximize the cash flows. These two objectives are often conflicting, and therefore hamper the mutual management of infrastructure debt and equity. As a result, infrastructure allocation remains divided and forgoes the benefits of a common management. According to Larry Fink, CEO of BlackRock, "we need to juggle out infrastructure from that crazy box called 'alternative investments' and establish it as a new asset class, somewhere between debt and equity" (September 2013).

Figure 7: Visualization of sustainable and resilient infrastructure as a hybrid asset class (numbers are assumption, based on the asset allocation by institutional funds)



Source: Swiss Fund Data

The emergence of sustainable and resilient Infrastructure as an asset class, associating infrastructure equity and debt – whether bonds or loans – in the same pocket of investment, would synchronize the conventionally opposite interests of equity and debt providers by merging their incomes over the entire lifespan of an infrastructure, securing sustainable cash flows with a risk/return profile between debt and equity. Conventionally, holding equity and debt within a single project is considered a financial aberration because debt holders only look at the firm's default rate and endeavour to keep the business afloat, while equity providers seek to maximize the cash flows, even if the firm has to shut down. Nonetheless, looking at the long-term cash flows can help reconcile the interests of infrastructure debt and equity held in the same project by merging the revenues. Indeed, if debt investors as well as equity investors adopt the same investment horizon, covering the entire lifespan of the infrastructure, then the cash flow maximization and the default rate minimization will be aligned. This requires the long-term involvement of institutional investors. However, such engagement does not necessarily need to be a burden since the overall maximization of profit and returns should be greater than the sum of their short-term maximization. In fact, many would agree that a clear and long-term vision enhances the efficiency of resource allocation and the effectiveness of any business operation.

Additionally to the benefits originating from a sustainable and resilient approach, sustainable and resilient infrastructure as an asset class possesses a low or a non-correlation with other bonds and equity, market performance and business cycles. Since infrastructure cash flows are generated by tariffs from end-users or public funding such as service agreements or taxes, the revenues from bonds or equity do not affect them. Given that infrastructure has fixed interest rates, it is neither affected by bonds nor equity market performance. Since infrastructure represents the backbone of the economy, it will continue to be used even during downturns. Indeed, infrastructure expenditures are likely to be the last that firms will cut. Within the current investment environment (uncertain prospects, low sovereign bond rates and the increasing correlation between bonds and stocks), most investors look for low or non-correlating assets.

However, such long-term liability can only be reliable if based on the required standardized approach. Indeed, such a procedure provides a homogenous foundation and therefore boosts the bankability of infrastructure projects, gaining large approval from institutional investors. Building upon this trust, sustainable and resilient infrastructure should soon become a standardized financial product. The last step, the securitization of sustainable and resilient infrastructure, should ensure the success of its market trade. Thanks to the comparability of infrastructure units, bundling some units with similar risk/return profiles should eventually guarantee the liquidity of this asset class. Backtracking and benchmarking should furthermore allow strategic asset allocators to generate predictable returns from this new source.

6 Policy Recommendations

To implement the advantages of sustainable and resilient infrastructure and to overcome the investment gap, a distinct policy framework is necessary to **make sustainable and resilient infrastructure investment more attractive, the norm rather than the exception.**

The featured policy recommendations can be divided between recommendations favouring infrastructure investments in general and those that directly improve sustainable and resilient infrastructure investments. Any improved policies for conventional infrastructure will automatically improve the attractiveness of sustainable and resilient infrastructure investments. Furthermore, policy recommendations can aim directly at improving the financing mechanism of sustainable and resilient infrastructure (for example a tax reduction for green bonds) but also indirectly via enhanced conditions for sustainable and resilient solutions (such as tax penalization for non-sustainable energy use). Both will increase the demand for new, sustainable and resilient projects and the profitability of sustainable and resilient infrastructure investments.

6.1 Policy Recommendations for Conventional Infrastructure Investments

6.1.1 Ease Portfolio Restrictions

Legal requirements in the form of quantitative portfolio restrictions limit the share of total assets that institutional investors can allocate to alternative investments, including infrastructure. 14 OECD countries have quantitative limitations on shares: in Switzerland for example, the "Verordnung über die berufliche Alters-, Hinterlassenen- und Invalidenvorsorge" (BVV2) caps alternative investments to 15% of domestic pension funds' assets. As infrastructure makes up most of the alternative investment share, efforts are needed to convince institutional investors to **use the available alternative investment ratio** with infrastructure investments. Other countries like Norway, the sovereign wealth fund (the largest in the world with US$849.6 billion in assets at the end of 2013) is not allowed to invest in unlisted infrastructure. In this context, the inclusion of unlisted infrastructure investments has to be aimed at allowing pensions funds to invest in infrastructure assets. On a longer-term perspective, an **extension of the alternative investment share** (e.g. 20% instead of 15%) or an additional inclusion of **infrastructure as separate asset class** should be sought to increase the asset allocation to infrastructure.

6.1.2 Implement Transparent and Bankable Pipelines

A pipeline of bankable infrastructure projects would meet the requirements of large investors and allow them to invest a greater share of their funds in infrastructure. A problem that countries face is the lack of clarity over long-term investment. Clear governmental commitments that highlight the outcomes and outline priorities, including an evaluation of needs and the introduction of **binding long-term infrastructure extension plans**, are necessary to stabilize project pipelines beyond political cycles. Different positive examples already exist, where countries commit towards infrastructure extension plans, such as Mexico, South Africa, China or India. Moreover, the Green Infrastructure Investment Coalition, aiming to identify infrastructure pipelines and connect them with investors, is a very promising initiative in this regard.

Project efficiency and effectiveness are critical in all project phases to improve project performance and thereby raise finance for infrastructure. But due to the extremely complex structure and delivery process of infrastructure, projects are exposed to corruption and inefficient management. Greater **transparency and the implementation of sustainability criteria in public procurement frameworks,** as well as a fight

against corruption, however, may prevent these issues from happening. Furthermore, a clear contract with private counterparties can reduce opportunistic behaviour and improve project performance.

6.1.3 Favourable Regulatory and Tax Policy

Due to the complex and strict capital requirements of Basel III and Solvency II, banks and insurance companies can only provide limited capital for long-term assets such as infrastructure. The Basel Committee on Banking Supervision (BCBS) and its sub-groups responsible for the development of the Basel III framework, as well as the European Commission (proposing the Solvency II framework) should **recognize the unique risk profile of infrastructure** as an asset class. Key in this endeavour is the collection of relevant performance data. The risk profile of infrastructure investments is currently overestimated. While demonstrating that the risk profile of infrastructure is better than conventionally assumed, it can be compared to other asset classes, which face similar restrictive policy regulations.

Foreign investors may be reluctant since equity restrictions sometimes do not allow a majority control of the project. Instead of excluding foreign participation in infrastructure projects through binding private ownership restrictions, **governments should encourage investors to involve local suppliers** in the infrastructure project in order to generate added value for local communities.

The privileged situation of state-owned enterprises (SOEs) leads to market distortion and distracts private investments. Private investors cannot be competitive in infrastructure sectors where SOEs benefit from governmental aid and special treatment such as shorter approval periods. Laws and regulations are required by the regulators, or if necessary from the competition authority to improve competitive conditions. **SOEs should face the same duties as private infrastructure constructors** and thus follow common corporate governance principles, the same accounting and auditing standards and in the future also follow the standardized approach for sustainability.

6.1.4 Set in Place an Attractive PPP Framework

Public-private-partnerships are developing channels of investment that require clear rules and regulations to improve their attractiveness. In order to address the significant PPP failure rate, individual government regulations are needed that focus on establishing clear **frameworks for the structuring of PPPs**, thereby allowing investors to access a broader set of investment tools, improving the investment climate of a country, ensuring good governance of the PPP programme and highlighting governmental commitment to PPPs. Furthermore, PPP contracts between different parties should be based on the "value for money" approach, which leads to better power sharing and would avoid other PPP-related pitfalls.

6.2 Policy Recommendations for Specific Sustainable and Resilient Infrastructure Investments

6.2.1 International Approach

Coordinated action is needed to address global concerns such as sustainability issues. Therefore, policy recommendations have to promote and develop a consistent and international dialogue setting compulsory international frameworks for sustainability, otherwise infrastructure projects that damage the environment will always find land to build on. Furthermore, the public must be fully aware of the benefits of sustainable and resilient infrastructure – economic growth and sustainability are not mutually exclusive.

Legally binding environmental agreements like the Paris Agreement should be further elaborated so that governments all over the world commit to sustainability and increase their efforts towards sustainable development, for example by reducing their greenhouse gas emissions. Legislation making it **mandatory for institutional investors to measure and reduce the carbon footprint** of their investment portfolio is needed – France for example, recently passed such a law. Another step in the right direction can be seen in Sweden, where a legal mandate for pension funds has been introduced to respect specific ethical and ESG criteria in their investments.

International accounting and funding rules may also be inadvertently discouraging investors from investing in sustainable and resilient infrastructure projects. Asset owners and advisers often point to fiduciary duty – which ensures that those who manage other people's money act responsibly in the interests of savers (clients or beneficiaries), rather than serving their own interests (PRI) – as one of the reasons why sustainability is not implemented in their investment decisions. Therefore, long-term investment value drivers, including sustainability issues, should be part of the fiduciary duty. Furthermore, higher transparency regarding all aspects of sustainability integration and investment practice is desirable.

The B20 Infrastructure and Investment Taskforce has already taken up the idea and the need for sustainable and resilient infrastructure. However, to pave the way and push for the realization of sustainable and resilient infrastructure within the G20, B20 should introduce sustainable and resilient infrastructure as a top priority and carry out further work on solutions and policy recommendations. The Global Infrastructure Hub – established after a commitment to increase global investment in infrastructure by the G20 – should also integrate sustainable and resilient infrastructure in their work efforts. To do so, they should cooperate with international players within the sustainability sector in order to work on existing evidence, definitions and standardized approaches of sustainable and resilient infrastructure.

6.2.2 Monetization of Externalities

The monetization of positive and negative externalities to **combat the market distortion** is desirable, yet currently unrealistic. Using public finance instruments is a more favourable way to foster sustainable and resilient infrastructure, for example by **reforming fossil fuel subsidies**. G20 leaders promised in 2009 to phase out fossil fuel subsidies and make the use of fossil fuels more expensive. However, little action has followed and the governments across the OECD countries are estimated to spend US$160-200 billion per year to support fossil fuel consumption and production (OECD, 2015). At the global level, subsidies for the production and use of fossil fuels were estimated at US$775 billion in 2012, as opposed to US$101 billion in 2013 for renewable energy (Bast, 2014). Furthermore, the current price for a barrel of oil is currently around US$40, close to a six-year low. Once such subsidies are removed and the oil price increases, conventional infrastructure, which is strongly dependent on fossil fuels, is likely to incur losses that turn investors and project developers towards more eco-friendly solutions.

6.2.3 Call for Standardization

It is important to create or advance **international energy efficiency and emissions standards**, for example for global transportation systems or electricity generation. The Renewables Directive (2009/28/EC) is a European Union directive that forms a general framework requiring that 20 per cent of the energy consumption within the European Union comes from renewable sources. The Member States, however, are responsible for the design of the realization. Achieving such objectives requires significant

investments in restructuring energy supply or improvements in energy efficiency. The realization should include **different policies fostering renewable energy** such as government investment in research and development, tax reforms, guaranteed purchase, long-term feed-in tariffs or legal requirements. All of these incentives should create a higher demand for sustainable and resilient infrastructure projects – improving the project pipeline – and also leading to higher project profitability.

As high regulatory risks are an often mentioned investment barrier, governments should step in: no matter what mix of incentives a government applies, it is crucial that the framework gives more stability instead of higher uncertainty. Indeed, the longer and more stable a regulatory period of an incentive, the more risk that can be mitigated. For example, the German government declared a 9.05% return on equity (ROE) (Bundesnetzagentur, 2011) for new or expansion investment projects in the renewable energy sector. However, the value is only valid for a regulatory period of five years, which creates medium-term risks for the investor. Furthermore, **enhanced standard form contracts** help improve the stability and mitigate regulatory risks by setting clear purposes and distributing the risk between the private and the public party. For example, improved liability regulations of offshore wind power can mitigate the regulatory risk of the involved private party.

Green or specific infrastructure bonds have shown in the recent years an impressive increase. Governments should nevertheless further **promote green or specific infrastructure bonds** with incentive schemes: granting investors with tax reductions or even a tax exemption for the amounts invested in such bonds would be a way to make such bonds more attractive. However, the biggest issue of green bonds is the absence of a common standard or criteria that set the minimum requirements of the activities that can be funded. Furthermore, the issuers often raise the money first and determine what specific projects will be funded later, which leads to mismanagement and misalignment. Bonds can be an important component to overcome the investment gap, however, basic standards and frameworks need to be set in place, excluding "dirty" energy (fossil fuels but also destructive dam projects or harmful biomass or forestry projects). Additionally, greenhouse gas emissions and social and environmental criteria should be taken into account. To improve transparency, bonds should be independently assessed and report transparently and publicly on eligible investments. Furthermore, green bond issuers should be obliged to finance the projects for which the bond has been publicized, which is not yet the case in most countries. Legal frameworks on the basis of a standardized approach of sustainability is thus needed to improve the quality and the impact of green bonds.

6.3 Policy Recommendations for Improved Project Harmonization

We acknowledge the tremendous infrastructure gap and therefore recommend, along other infrastructure investors, namely institutional investors, that the **infrastructure sector be harmonized so as to attract further funds and improve project comparability**. For the success of this harmonization, it is crucial that standards for infrastructure project evaluation are created. While the idea of project finance as the backbone for a new infrastructure asset class is well on its way, the standardization of documentation and disclosure requirements, which is currently under discussion, needs to be complemented with additional sustainability criteria.

Several sustainability standards for infrastructure debt and equity (namely project finance) will probably emerge, but we recommend that only standards developed under the **ISEAL methodology** – a non-governmental organization whose mission is to strengthen sustainability standards systems for the benefit of people and the environment – should be applied. The independent Sure® Standard, for example, provides a generic and transparent measurement of the relevant resilience and sustainability

criteria. These are of particular importance for investors, because infrastructure projects are by nature asset heavy and long term.

The "future proofing", standardization and bundling of such projects with the help of an independent and credible sustainability and resilience standard provides the **groundwork for the creation of a sustainable and resilient infrastructure asset class**, which is particularly attractive to institutional investments with long-term liabilities, such as pension funds, insurances or family offices. The sustainable and resilient infrastructure asset class also speaks to the needs of impact investors.

Creating trust in equity as well as debt investment in sustainable and resilient infrastructure for this broad variety of potential funders will allow for a significant contribution of applied sustainability criteria in bridging the global infrastructure investment gap. Certified, high-quality infrastructure projects represent large-scale investment opportunities with attractive returns, while helping to achieve the Sustainable Development Goals.

7 Conclusion

The main economic challenge today is to put financial liquidity to productive use in order to ensure economic growth and enhance the quality of life without negative impacts on the environment. Sustainable and resilient infrastructure, with its direct and indirect benefits is a key factor of such an economy. However, the full potential of sustainable and resilient infrastructure is neither exploited nor accessible yet. To overcome this situation, action is required on several fronts, addressing both the supply and demand side of infrastructure. Indeed, the lack of a pipeline of bankable projects seems to be a major hurdle for investors. The unstable policy environment also restricts the supply of further lucrative investment opportunities. In contrast, sufficient funds and interest in portfolio diversification exist. However, institutional investors still rather shy away from investing in infrastructure. A clear risk/return profile, high uncertainty, the lack of investment instruments and the restricted frameworks still stem further asset allocation in infrastructure.

Hence action is urgently required: several international organizations call for a standardized approach for sustainable and resilient infrastructure. Such approach would build trust and also pave the way for a simplified implementation, ensure comparability and allow the establishment of an investment profile for sustainable and resilient infrastructure. Furthermore, innovative financial instruments are required to make the added value of sustainability and resilience accessible for investors. Indeed, both the sustainable and resilient infrastructure as best-in-class approach and the sustainable and resilient infrastructure as separate asset class provide valuable ways to attract and mobilize institutional investors.

To increase the attractiveness of sustainable and resilient infrastructure investments, favourable legal binding frameworks are also needed as they would increase the positive impacts sustainable and resilient infrastructure has within the economy, the society and the environment. Once an appropriate investment environment for sustainable and resilient infrastructure has been established, institutional investors will look for investment possibilities in the sustainable and resilient infrastructure asset class to diversify and complement their portfolios.

Overcoming the infrastructure investment gap with sustainable and resilient infrastructure would have multiple benefits and represents a very good solution to meet the needs of the current generation without compromising the possibilities of future generations.

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