

A photograph of a wind farm with several large, white, three-bladed wind turbines. The turbines are arranged in a line, receding into the distance. The sky is a clear, pale blue. The foreground shows the metal lattice structure of the turbines' bases, which are situated on a body of water. The overall scene is captured during the day, with soft lighting.

Valuing Sustainability in Infrastructure Investments: Market Status, Barriers and Opportunities

A Landscape Analysis

Prepared by WWF Switzerland and Cadmus Group

March 2019

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Acknowledgements

WWF Switzerland would like to thank all the experts and stakeholders that contributed to this report through research interviews, workshop participation, and/or external review. We hope the experience has been useful and that the results of this research will support the growing field of ESG in infrastructure investment. We look forward to continued engagement and collaboration.

The views expressed in this document are those of WWF Switzerland and do not necessarily reflect those of the external participants.

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Foreword



As you hold this publication in your hands, you may ask yourself: Why is WWF involved in the topic of infrastructure finance? Could a topic be further removed from conservation than long-term investment in real assets? Yet, clearly, if we think about it, all infrastructure has some kind of footprint on our environment. Power plants, roads and dams, etc. can have impacts not only on beautiful and endangered species such as tigers and elephants, but also on the functioning of the very ecosystems on which the infrastructure project may depend. Thus, it is only prudent to take environmental factors into account when infrastructure projects are considered for investment. Yet, as we find out in this report, most infrastructure investors are only at the beginning of this learning journey, and have yet to make use of the specific tools that are being developed to support them.

The timing is good for this report. The call for increasing infrastructure investment can be found on many international policy agendas as new civil structures are considered a key prerequisite for reaching the Sustainable Development Goals (SDGs). For this, funds need to be mobilized; and with governments all around the globe

strapped for cash, it makes sense to turn to the private sector to help fill the annual infrastructure funding shortfall of \$350 bn, as estimated by the McKinsey Global Institute. This coincides with the current quest by institutional investors such as pension funds and insurers for stable opportunities that can match their long-term liabilities. According to a recent analysis by the Global Infrastructure Hub-EDHEC, 90 per cent of institutional investors intend to increase their asset allocation in the infrastructure sector.

It is therefore not surprising that, at the G20 summit in Argentina in November 2018, the “Roadmap to Infrastructure as an Asset Class” was being launched. The roadmap explicitly mentions environmental risks as a factor that needs to be considered in investment processes. Also, LTIIAⁱ acknowledges that down-side ESG (environmental, social, governance) events can trigger liabilities further down the road. Project delays caused by ESG negative events also pose a significant risk to an investment.

Institutional investors have come a long way on the integration of ESG criteria in equity and bond investments. As infrastructure is developing as a separate asset class, I encourage infrastructure investors to make ESG considerations a critical driver of this development and a key component of their investment processes. May this report be helpful in this effort.

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ⁱ LTIIA ESG Handbook: <http://www.ltiia.org/wp-content/uploads/2015/12/ESG-Handbook-Second-Edition-Excerpts.pdf>

Foreword

In 2018 two critical reports were published highlighting the dire state of our natural world. The Intergovernmental Panel on Climate Change Special Report on Global Warming of 1.5°C, and WWF’s Living Planet Report 2018 showed us that as a global community, we need to come together and rethink our relationship with the natural world and act quickly to ensure a planet where people and nature can both thrive. WWF’s Living Planet Report 2018 showed an astonishing decline in wildlife populations as measured by the Living Planet Index: a 60% reduction in just over 40 years. It is a grim reminder of the pressure we exert on our planet.

If we are to feed and power our growing population in a manner that does not undermine our own health and well-being, we need to do it differently. This rings particularly true when it comes to infrastructure. According to the G20 Global Infrastructure Outlook, \$94 trillion in infrastructure investments will be needed by 2040, with an additional \$3.5 trillion required to achieve the Sustainable Development Goals (SDGs) for electricity and water.ⁱⁱ

Taken together, this amount of infrastructure investment will put tremendous stress on our natural resources if not planned and implemented in a manner that considers potential impacts. At the same time, we need to better understand how investing in nature can help to make our infrastructure, our cities, and our food systems more resilient. If we are to meet the SDGs, we need to increase societal wellbeing while restoring planetary health.

This can be done through infrastructure projects that have sustainability principles at their core. Planners, developers, and investors must consider environmental, social, and governance matters at the very start of the investment process, so that capital is allocated to those investments that are designed to fulfill both environmental and societal demands.

WWF, together with its partners, is working to point capital flows toward smart infrastructure. With this



report we highlight the emerging field of investor tools for sustainable infrastructure. The tools examined in this study aim to make the sustainability impacts on and from infrastructure projects tangible. They thus enable investors to make informed decisions not only about potential negative impacts of the respective infrastructure asset, but also about financial risks and opportunities that may materialize. The report also shows that we are at the very beginning of this journey and need to quickly ramp up our understanding of how sustainability considerations influence the financial viability and general attractiveness of an infrastructure asset.

Clearly, the investment community represents only one piece of the puzzle. On the critical path to placing nearly \$100 trillion in infrastructure assets, we urgently need investors, governments, development finance institutions, NGOs, and project developers to work hand in hand to make infrastructure work for both people and planet.

Together we can ensure that our most valuable infrastructure asset – our Earth – can recover and be the home that we all desire.

Margaret L. Kuhlow
Finance Practice Leader
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ⁱⁱ Global Infrastructure Hub, A G20 Initiative. “Global Infrastructure Outlook: Infrastructure investment needs, 50 countries, 7 sectors to 2040.”

About this Report

Purpose

This report assesses the current landscape of environmental, social, and governance (ESG) integration in the infrastructure investment space. The assessment includes an overview of tools available to support investors and other actors in evaluating and quantifying ESG criteria and incorporating them into the infrastructure development and investment process. The report draws on insights gained from interviews, desk research, and a stakeholder workshop held in June 2018 to analyse current practices for integrating ESG criteria into investment decisions and to identify barriers to further integration of ESG in the infrastructure sector. Finally, the report identifies key opportunities to facilitate ESG integration among the infrastructure investment community, and to increase the adoption of the existing tools and standards.

The report focuses primarily on the needs of private investors, due to: 1) the growing role of private investors in infrastructure investment; 2) increased pressure on private investors to demonstrate sustainable or responsible investment practices in line with sustainability goals; and 3) the role of private investors as drivers of mainstreaming the inclusion of ESG considerations across all asset classes. In particular, the report focuses on private equity investors due to their unique opportunities to influence the sustainability of infrastructure through direct ownership and stewardship of assets. However, the report's findings on the availability of ESG tools and opportunities to incorporate ESG into different stages of infrastructure development may also be pertinent to other private and public sector investors, procuring entities, and infrastructure owners or operators.

Given the range of ESG frameworks for other investment classes yet lack of cohesive guidance on how these apply to infrastructure, this report intends to offer infrastructure investors an overview of the benefits of ESG integration, to describe current practices for integrating ESG into infrastructure investment decisions, and to identify

available tools and standards that support ESG integration. The report's secondary purpose is to provide ESG tool developers with an understanding of the investment community's remaining needs to enable further tool customization and to expand the market.

Methodology and Contents

To investigate the current practices for integrating ESG into infrastructure investment decisions, the research team conducted an in-depth review of existing infrastructure ESG tools, frameworks, and reports. Additionally, the research team conducted interviews with a variety of stakeholders operating in the infrastructure sector. In total, 15 stakeholders were interviewed, including 6 financiers, 3 infrastructure experts, and 6 ESG tool developers. The research team presented initial research findings at an expert workshop hosted in Zurich, Switzerland. Ten experts in the ESG or infrastructure investment space attended, including several interview participants. Input provided by these experts during the workshop is incorporated into the findings described in this report.

Desk research findings are cited directly throughout the document and interview and workshop findings are anonymized and aggregated across stakeholders to preserve participant confidentiality. This report summarizes key findings and results from research in the following sections:

- **Section 1: Introduction to Sustainable Infrastructure and ESG**, which introduces the concept of ESG in the context of growing private sector investment in infrastructure.
- **Section 2: ESG in Infrastructure Investment**, which provides an overview of private sector participation in infrastructure finance and how ESG considerations might impact investment decisions.
- **Section 3: Applications of ESG Analysis in Infrastructure Investment**, which examines the extent to which ESG is being incorporated into infrastructure valuation and evaluation.
- **Section 4: Frameworks and Tools for Infrastructure ESG Analysis**, which summarizes the current landscape of frameworks and tools available and used for ESG evaluation and valuation.
- **Section 5: Action Areas, Barriers and Recommendations to Further Utilisation of ESG Valuation Tools**, which highlights gaps in existing tools and key recommendations to increase adoption of available tools.
- **Section 6: Conclusion**, which summarizes next steps and key opportunities for market development.

These sections are supported by Appendix A, which summarizes commonly used ESG reporting frameworks, and Appendix B, which provides a brief description of each tool reviewed by the research team.

For further investigation and information, WWF has developed a suite of resources to further explore sustainable infrastructure investment. Companion documents include case studies, an in-depth analysis of sustainability standards available for infrastructure, and an upcoming guidance note on valuation, which details how ESG criteria can impact financial models.ⁱⁱⁱ

ⁱⁱⁱ These companion documents can be found at:

<http://www.panda.org/?275790/REPORT-A-Better-Road-to-Dawei>;
<https://www.worldwildlife.org/publications/review-of-screening-tools-final-report-sep-2017>;
<https://www.sustainablefinance.hsbc.com/-/media/gbm/reports/sustainable-financing/greening-the-belt-and-road-initiative.pdf>;
<https://www.worldwildlife.org/publications/state-of-the-practice-sustainability-standards-for-infrastructure-investors-full-report>

Key Findings

Achieving global development goals will require an increase in the scale and pace of infrastructure investment. Traditionally, infrastructure investment has been dominated by the public sector. However, **shifting market trends and growing demand for infrastructure across developed and emerging markets have resulted in increased private sector participation through both debt and, increasingly, direct equity investment to supplement public capital.** Equity investments have created pathways to directly influence infrastructure project development and outcomes (See Section 1).

Throughout the interviews and desk research conducted for the report, there was **consensus from investors, technical experts, and international agencies that ESG criteria can help manage risks and improve financial returns for infrastructure projects.** Several investors indicated that given a choice between similar assets, they would invest in the assets with higher ESG performance. This shared hypothesis is driven by a series of factors including: 1) reputational risks associated with operating outside of sustainable investment trends, 2) more holistic risk management and assessment practices within investments that consider potential ESG impacts to and impact from assets, and 3) an emergence of ESG policy and regulatory requirements (See Section 3).

In practice, investors' formal or informal use of ESG criteria in infrastructure investment decision-making varies widely across the industry. ESG investment analyses typically fall into one of two categories: 1) assessing the ESG performance of an asset (evaluation); and/or 2) quantifying the selected ESG criteria in a way that can be integrated into a financial model (valuation). ESG evaluation has been increasingly adopted by financial investors to guide engagement with asset managers, to enhance internal investment decision making processes, and to improve reporting on asset performance. Investors have less readily adopted ESG valuation due to several key challenges, including: the heterogeneity of the infrastructure landscape; the quality and availability of data; the ability to quantify and monetize ESG criteria; transparency in valuation methodologies across the industry; client confidence in ESG valuation; and the costs of ESG analysis (See Section 3).

In response to market trends, publicly available tools have been developed to support ESG analysis during all phases of project development (See Section 4). However, **while there has been growing recognition of the importance of ESG in infrastructure, adoption of third-party ESG tools by investors has been limited,** due in part to investor preference for internally developed methodologies for ESG analysis. Several barriers have limited market adoption of ESG tools among the investment community, including:

- **Data and information.** Many interview and workshop participants highlighted that one of the biggest challenges related to ESG integration into investment decisions is a lack of data and information required to perform analyses.
- **Outreach and education.** Interview and workshop participants from the investment community were often unaware of the range of ESG tools available and how these tools might be useful in the investment or due diligence process.
- **Industry coordination and market maturity.** As is the case of many nascent markets, there is a need for greater coordination to align standards and accelerate the adoption of ESG tools among the investor community.
- **Policy drivers and public-sector leadership.** While the private sector is increasingly aware of the financial risks posed by ESG-related factors, many of these are externalities that do not appear on company or project balance sheets.

The paper concludes with a set of recommendations to address these barriers (Section 5):

- Develop open data sets and research tying ESG criteria to financial outcomes;
- Tailor ESG tools for specific infrastructure sub-sectors;
- Increase market awareness of tools via competitions;
- Align existing evaluation and valuation tools;
- Tailor ESG tools to the needs of the investment community; and
- Implement policies requiring ESG disclosure.

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Section 1:

Introduction to ESG Integration in Infrastructure Investments

Over the past decade, the infrastructure sector—which includes energy, transportation, waste, water, telecommunications, and social infrastructure assets¹—has undergone a significant transformation. According to the G20’s Global Infrastructure Outlook, \$94 trillion will be needed for infrastructure investment by 2040, far outpacing current investment trends.² An additional \$3.5 trillion will be required to achieve the United Nation’s Sustainable Development Goals for electricity and water.³ As a result, governments are increasingly looking to private capital markets to fund infrastructure projects that have traditionally been under the purview of the public sector.

The push toward private sector investment in infrastructure was accelerated by the financial recession of 2008, which placed pressure on governments to reduce debt and drove investors to seek alternative long-term investments that would be more protected from rapid economic contractions. Financing mechanisms such as public-private partnerships (PPPs) have emerged as increasingly popular mechanisms to mitigate risk and encourage increased private sector participation in infrastructure investment.⁴ The effect of these forces has been striking, with \$1.7 trillion of private capital invested in infrastructure from 2010 to 2016.⁵

Private sector infrastructure investments have been led in large part by institutional investors, such as pension funds, sovereign wealth funds, and insurers, which look to infrastructure assets to meet their long-term investment and return criteria. As of September 2018, the top one hundred institutional investors in infrastructure held around \$439 billion in real infrastructure assets, representing a growth of around 20% from the previous year.⁶ Given the inelastic demand of infrastructure services and the emergence of PPPs as a financing mechanism, institutional investors are increasingly viewing

infrastructure investments as an opportunity to generate stable long-term returns that are relatively protected from economic shocks and cyclical risks.^{iv}

However, as a highly illiquid asset class typically held for periods of over ten years, infrastructure assets are especially vulnerable to long-term sustainability risks, such as climate impacts, shifts in environmental regulations, and changes to consumer health and safety regulations. Infrastructure investments are also vulnerable to externalities, such as carbon emissions or environmental degradation, which are borne by the public, but are often unaccounted for on project balance sheets. Though difficult to quantify, these risks can have material impacts on the financial performance of the asset over its life-cycle.⁷

For institutional investors, sustainability considerations are especially important. Given that institutional investors have highly diversified portfolios of long-term assets, financial performance is closely tied to the general health of the economy and global capital markets. As such, these portfolios are vulnerable to the externalities and other macroeconomic impacts generated by individual assets. The absence of certain sustainability risks in financial models or asset balance sheets means that investors may not be capturing the full range of risks, and in some cases benefits, across portfolios. Thus, as private investment in infrastructure has grown, so too has the demand for more comprehensive and streamlined ways to understand how externalities and other sustainability risks impact the performance of infrastructure investments.

^{iv} Demand elasticity is defined as the degree that demand for goods or services changes in response to changes in price or consumer income. By providing what are often considered essential services, infrastructure is generally demand inelastic, meaning that demand for infrastructure services is not significantly impacted by price changes (e.g. inflation) or reduction in consumer income (e.g. due to economic growth or contraction).

The emergence of widely adopted climate and sustainable development commitments have created additional pressure on investors to include sustainability considerations in investment decisions. International policy frameworks such as the Paris Climate Agreement, Task Force on Climate-related Financial Disclosures (TCFD), and the United Nations Sustainable Development Goals (SDGs),^v for instance, are being integrated into the policies and practices of governments and major development financial institutions (DFIs).⁸ The private sector has increasingly followed suit, as demonstrated by voluntary commitments to the Principles for Responsible Investment (PRI), the Global Investor Coalition on Climate Change, and other coalitions of institutional investors on SDG-related investments.^{vi} The integration of these policies has placed pressure on infrastructure owners and managers to track and improve asset sustainability. Furthermore, national and local-level government priorities related to sustainability—such as goals for clean energy, social and environmental resilience, and other societal benefits—are driving demand for infrastructure assets that will help reach these goals and maximize return for taxpayers, creating strong value for money.

Across sectors, environmental, social, and governance (ESG) criteria have emerged as ways to help investors understand and assess the sustainability of investments. ESG has been widely incorporated into the internal policies of major investors, driven in large part by client demand for responsible and sustainable investments. Yet there is also a growing understanding among the investment community that considerations for ESG criteria - such as carbon emissions, impacts on ecosystems and biodiversity, engagement with local communities, or reputation for ethical business practices - can help investors mitigate sustainability risk and lead to better financial outcomes.⁹

Specific ESG criteria are largely subjective, and often determined by investors based on unique investment philosophies, client preferences, and both internal and external sustainability policies. These ESG criteria can vary significantly based on the type of asset. For corporate and real estate investment, for instance, benchmarks and accounting standards for ESG integration are relatively

mature across the industry.^{vii} While infrastructure and real estate have similarities as both are real assets,^{viii} the unique physical and financial characteristics of infrastructure requires a nuanced understanding of how ESG factors impact financial performance. As a younger asset class, ESG in infrastructure investment is generally less understood than in real estate or corporate investments.

In recent years, a range of tools and standards have emerged to help infrastructure investors integrate ESG into their decision-making processes. These tools and standards help investors understand what ESG criteria are relevant to different types of infrastructure assets. They also help procuring entities and developers understand which ESG criteria should be measured and reported to attract investment from ESG-conscious investors. In some cases, tools may help quantify and assign monetary value to ESG metrics, allowing investors, developers, and procuring entities to incorporate ESG criteria in project financial models and balance sheets.

Yet despite the emergence of these tools and standards and the adoption of ESG broadly across the investor community, the extent to which ESG considerations are impacting infrastructure valuations and investment decisions remains unclear.

Ensuring that investor capital is allocated to infrastructure assets that yield the greatest sustainability value will require a refined understanding of how material ESG criteria should be incorporated into investment decision-making. To drive changes in decision-making, ESG criteria must be more readily incorporated into investor due diligence processes and financial analyses alongside—and equal to—other material factors. For this to occur, investors need support from robust methodologies that elevate infrastructure ESG valuation to an investment-grade standard. Improvements in the quality and availability of methodologies, tools, and frameworks for incorporating ESG benefits may accelerate the transition to investment in sustainable infrastructure.

v The Paris Climate Agreement is an accord within the United Nations Framework Convention on Climate Change. The agreement was reached by 195 countries in December 2015 and focuses on keeping global temperature rise below 2 degrees Celsius. For more information visit <https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement>

vi In an example of such a coalition, a series of European Institutional Investors developed a shared goals statement to align investments with international sustainability standards and practices. To view the statement visit <https://www.pggm.nl/wie-zijn-we/pers/Documents/Institutional-investment-into-the-Sustainable-Development-Goals-statement.pdf>

vii ESG benchmarks and accounting standards such as the Global ESG Benchmark for Real Assets (GRESB) and the Sustainability Accounting Standards Board (SASB), respectively, have been readily adopted by the real estate industry to understand the ESG risk. See Appendix A for a detailed list of ESG standards and frameworks.

viii Real assets are physical assets—such as real estate, infrastructure, commodities and natural resources—that have inherent value in their property or substance (as in the case of natural resources and agricultural commodities).

Section 2:

ESG in Infrastructure Investment

According to a 2016 McKinsey report, the world will need to invest \$3.3 trillion annually to keep up with projected infrastructure needs.¹⁰ At the time of that report, however, only \$2.5 trillion was being invested annually.¹¹ With public finances strained across the world, particularly in developing economies where the infrastructure need is greatest, the gap in infrastructure investment points to an urgent need to increase private sector participation in the market. Governments, development financial institutions, and other organizations are looking to strategies to unlock private sector investment to fill the infrastructure financing gap. At the same time, institutional investors are turning to infrastructure to meet their needs for long-term, stable returns. As further attention turns to private investment in infrastructure, a deeper understanding of how investments can be positively and negatively impacted by ESG criteria will be important for investors to understand the true value of infrastructure assets and for governments and other stakeholders to ensure that private capital flows toward more sustainable infrastructure projects.

This section provides an overview of the private sector's role in financing infrastructure projects and how ESG criteria can impact the financial viability of projects.

The Role of Private Capital in Infrastructure Finance

Private-sector investment in infrastructure includes direct investments in an infrastructure company or project (e.g. through a special purpose vehicle), and indirect investments, such as contributions to an infrastructure fund that channels funding to the infrastructure assets (see Table 1: Types of Private Sector Infrastructure Investment). Between 2006 and 2016, specialist infrastructure funds raised over \$200 billion accompanied by at least an equal amount of capital channelled to direct project investment from institutional investors such as pension funds, insurance companies, and sovereign wealth funds.¹²

Table 1: Types of Private Sector Infrastructure Investment

	Security/Investment Type ^{ix}	Direct	Indirect
Equity	Public	Listed infrastructure & utility stocks	Listed infrastructure equity funds; index funds; ETFs
	Private	Direct equity investment in infrastructure company/project	Unlisted infrastructure funds
Debt	Bonds	Corporate bonds of infrastructure companies; project bonds; PPP/PFI bonds; US municipal; Green bonds	Infrastructure bond funds
	Loans	Direct loans to companies/projects/asset backed financing	Infrastructure loan/debt funds

Source: European Investment Bank¹³

^{ix} In the context of equity investment, public and private refer to whether the equity shares are publicly traded, as in those listed on stock exchanges, or privately traded, as in the case of unlisted securities.

While unique ESG considerations exist for each of type of infrastructure investment, this paper is primarily concerned with direct equity investment in unlisted infrastructure projects.^x Direct equity investors, such as pension funds, insurers or infrastructure fund managers, typically assume greater influence over project development and operational management than debt investors or investors in infrastructure equity funds (indirect investment). As such, these investors have the potential for greater influence over the extent to which ESG considerations are integrated not only in the initial investment decision but also the ongoing management of the asset.

Private sector investment in infrastructure projects can be enabled by public private partnership (PPP) procurement methods. PPP projects are often financed using the project finance technique, which allows developers to finance a project off-balance sheet; this reduces the exposure of the developer and other equity investors, also known as project sponsors, to the project. This risk mitigation

mechanism typically involves the private partner (i.e. a developer) establishing a special purpose vehicle (SPV) that allows investors to contribute capital directly to the project, rather than to the company selected to construct and operate it. However, if a developer is unable to meet conditions for demonstrating the financial viability of a project it may not be able to access project financing. In such a case, a developer may finance the project at the corporate level and transfer it to the SPV as equity or guaranteed corporate loans.

Debt makes up the bulk of infrastructure finance, often accounting for between 70-80% of project costs. Debt finance typically consists of loans from commercial banks, development banks, and local actors, or bonds issued by the developer or procurement entity. In the case of emerging markets and developing economies (EMDEs), these projects may also receive subordinate debt or mezzanine capital from development financial institutions (DFIs) (see Box 1 for more information on infrastructure investment in EMDEs).

^x Unlisted infrastructure refers to infrastructure projects that are not traded as securities on public markets. In contrast, listed infrastructure typically refers to shares (stocks) of companies that own or operate infrastructure assets. Unlike investors in listed infrastructure assets, investors in unlisted infrastructure assets may assume roles in making decisions on the operational management of the asset.

Box 1: Infrastructure Investment in Emerging Markets and Developing Economies¹⁴

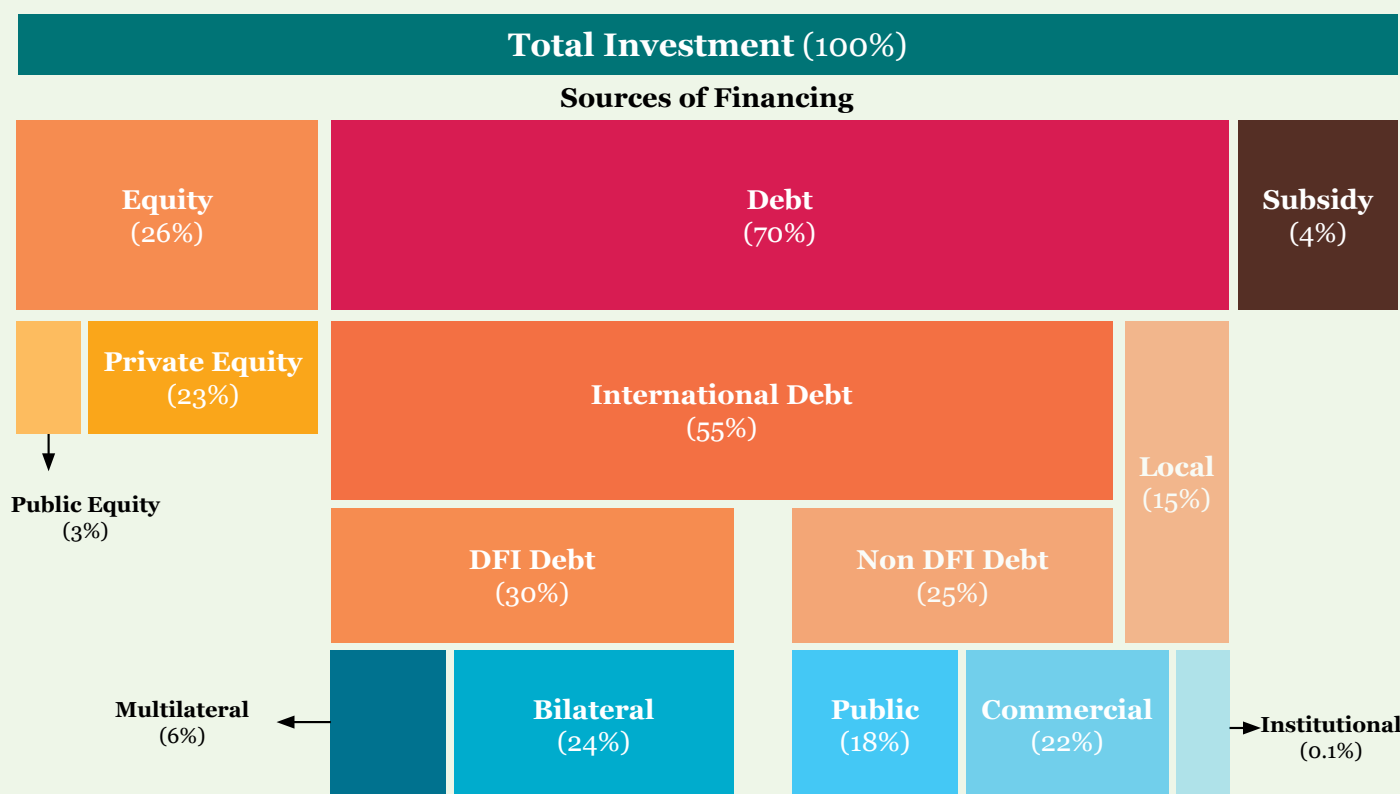
Institutional investors have become increasingly interested in the long-term, stable returns from infrastructure projects. These expectations can pose a challenge for attracting investment in emerging markets and developing economies (EMDE), which may be perceived as higher risk due to more nascent infrastructure market development or more volatile political environments. Despite this, EMDEs represent a significant opportunity for infrastructure investment as countries continue to rapidly develop, grow and meet the needs of their populations.

Source of Financing

In 2017, World Bank figures indicated that private investors, the focus of this report, participated in 304 infrastructure projects in the sectors of energy, transportation, information and communication technologies, and water infrastructure in EDMs, totalling US\$93.3 billion in investment. Of the projects for which investment information was available (168 out of 232, or 74 percent, totalling \$61.6 billion), approximately 25 percent came from public sources, 45 percent from private sources, and 30 percent from development finance institutions.

Types of Financing

Debt represented 70 percent of total financing. Over half of all debt was international, which the World Bank notes is preferred by EMDEs because foreign investment tends to charge lower interest rates than local, under-developed debt and capital markets. Development Financial Institutions (DFIs) provided nearly 30 percent of investments, representing 56 percent of international debt and 44 percent of the total debt raised. DFI support came in the form of bilateral and multilateral direct support, direct loans, syndication support, and guarantees. All regions have significantly increased financing from DFIs. The remaining investments came from private equity (23 percent) public equity (3 percent.)



Source: The World Bank, Private Participation in Infrastructure (PPI) Annual Report, 2017

Equity finance can account for between 20-30% of project costs and typically comes from the purchase of shares of the SPV (in the case of project finance) or of the company (in the case of corporate finance) developing the infrastructure project. Typically, the primary source of equity in an infrastructure project is the project developer. However, projects can be co-financed with additional equity contributions from third-party financial investors, such as infrastructure funds or institutional investors. Equity contributions are considered higher risk financing instruments, as equity payments are always made after debt is serviced.

Third-party equity investors typically prefer to avoid construction risk and enter infrastructure projects after project completion, when the asset is either being sold or

refinanced for operation (see Box 2 for information on the phases of infrastructure investment). However, for riskier investments, particularly in EMDEs, project developers may be hesitant to finance the project directly, leading to gaps in risk capital available to finance the project through construction. In this case, third-party equity investors are critical to filling the equity gap. Funding for third party equity financing in EMDEs may come from DFIs, such as large multilateral development banks (e.g. the Asian Development Bank, African Development Bank, or Inter-American Development Bank). In other cases, private equity firms and institutional investors, such as pension funds and insurers, may serve as sources of risk capital.

Box 2: Phases of Infrastructure Investment

This paper divides the investment decision-making process into three major phases. These phases will vary based on the type of procuring entity (e.g. public or private) and the infrastructure asset (e.g. transportation or energy). However, these phases are meant to be illustrative of a typical infrastructure development and investment process.

- 1. Development.** Procuring entities, such as governments, utilities, or telecom companies (telcos) will initiate infrastructure project development based on needs or goals unique to the specific party. In the case of utilities or telcos, projects may be initiated based on consumer demand, business growth strategies, or driven by changes to the regulatory environment. In the case of the public sector, infrastructure projects are initiated for purposes of economic growth or the need to improve old or failing public infrastructure. Procuring entities in the public sector prioritize new infrastructure projects based on perceived value for money, return on investment, and budgetary considerations. Based on these considerations, the procuring entity will also determine the approach for financing the infrastructure project through either direct public financing, bond issuance, or through a public private partnership (PPP). The procuring entity will then solicit bids from private developers (e.g. construction, engineering, architecture, or facilities management firms) through a competitive procurement process. Bids may be awarded based on project design, price and financial viability.
- 2. Construction.** Equity financing for new infrastructure projects (greenfield investment) typically comes from the balance sheet of the construction firm or developer selected through a public procurement process.¹⁵ External financial investors typically prefer equity investment in operational infrastructure assets (brownfield investments) due to the high risk associated with the construction phase.¹⁶ However, long-term financial investors, such as infrastructure funds and institutional investors (e.g. pension funds, insurance companies, large banks, or sovereign wealth funds), are increasingly funding greenfield projects. Investment earlier in the process offers investors an opportunity to capture risk premiums and have greater control over the design and performance of the asset.¹⁷ PPPs can incentivize private investment in greenfield projects by allocating risk appropriately and offering certain risk-sharing guarantees.
- 3. Operation.** After construction, additional equity investment may be raised to support operation and maintenance of the asset. These brownfield investments appeal to financial investors due to the lower risk and more predictable cash flows. As with greenfield projects, investors will conduct detailed due diligence and financial analysis to assess the asset's risk-return profile and make an investment decision.¹⁸

ESG Considerations in Project Analysis

Regardless of the geographic context or type of infrastructure asset, demonstrating the project's financial viability is critical to attracting the capital needed to finance infrastructure projects. Thus, all actors with a significant stake in the infrastructure project, including procuring entities, developers, and financial investors, are incentivized to conduct detailed analyses to understand the project's risks and commercial feasibility.

ESG-related considerations are incorporated into many of these analyses, such as economic, social, and environmental impact assessments, and community needs assessments. Often, these ESG-related analyses are conducted to mitigate the risk of projects being non-compliant with regulations and incurring associated penalties through fines and legal fees. Increasingly, this data is being used by investors to manage ESG risk, as by integrating the Equator Principles into internal environmental and social policies, or to meet certain voluntary commitments to social and environmental sustainability, as through the Principles for Responsible Investment (PRI) or the Sustainability Accounting Standards Board (SASB).^{xi}

In some cases, the ESG criteria analysed may be quantified and incorporated into financial analyses such as internal rate of return (IRR) or net present value (NPV) using discounted cash flow models. For instance, a wind powerplant that needs to be shut down annually due to bird migratory patterns experiences a predictable and quantifiable impact on cash flows that impact the return of the asset. The more qualitative aspects of ESG, such as wellbeing and social cohesion, may be monitored and considered by investors as they decide which projects to pursue, generally by using a checklist during the due diligence process.

Analyses for understanding ESG-related risks and benefits vary among actors and at different phases in the infrastructure process. However, the process of conducting these analyses often requires coordination and reporting between various actors. Figure 1 demonstrates an illustrative flow of ESG-related analyses and information between various actors at various stages of the infrastructure investment process.

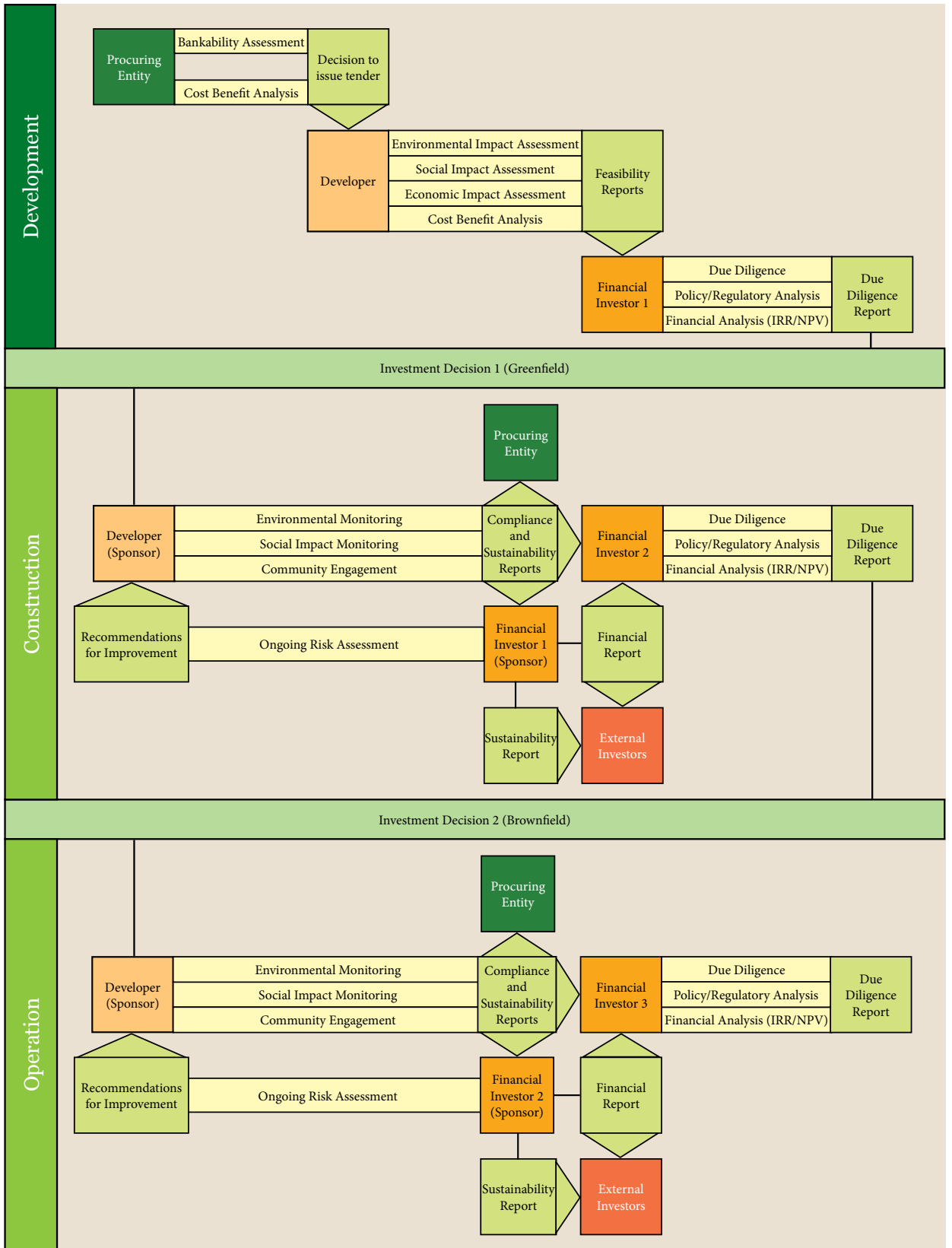
In the development phase, ESG analyses are used to guide project planning and design. ESG metrics may be incorporated into feasibility studies and cost benefit analyses (CBAs) of procuring entities in deciding whether to initiate a project. After a tender has been issued, developers conduct ESG analyses including social and environmental impact assessments, and financial feasibility assessments. Financial investors in greenfield assets evaluate ESG data available from project developers during due diligence, often via external technical advisors, and may incorporate material ESG criteria into IRR analyses and NPV calculations. Investors may support other ESG analyses during project planning and design. In practice, however, this is more common in EMDE contexts where investors are more likely to be involved early on to have greater oversight and management of risks during project development (see Box 5).

During the construction phase, developers monitor and report on ESG performance of the project. Greenfield equity investors collect and analyse available ESG data (often via external technical advisors). These analyses may be used to make ongoing recommendations for improvement to project developers to mitigate ESG risk, and are incorporated into sustainability reports, annual reports, and other reports for shareholders or clients (external investors). This information also helps to prepare the asset for sale or refinancing, which may occur after project construction with contributions of additional equity investors.

During the operation phase developers or other operators will continue to monitor and report on ESG performance. As with greenfield investors, brownfield investors evaluate available ESG data during due diligence and may incorporate material ESG metrics into IRR analyses and NPV calculations. Throughout the operation phase, financial investors collect and analyse ESG-related performance data to develop regular reports for the shareholders and external investors and to properly steward their investments.

^{xi} See Appendix A for a description of the Equator Principles, the Principles for Responsible Investment, and the Sustainability Accounting Standards, along with other ESG standards and reporting frameworks

Figure 1: ESG-related Analyses in an Illustrative Infrastructure Investment Process



Section 3:

Applications of ESG Analysis in Infrastructure Investment








Governments and financial investors are increasingly incorporating ESG metrics into investment analysis, the assessment of risk across portfolios, and portfolio impact assessments.¹⁹ During interviews, experts shared a variety of factors driving the increased adoption of ESG criteria, noted different methods for assessing ESG criteria in infrastructure investment, and provided their perspective on the level of influence of ESG criteria in investor decision-making. Primary drivers include:

- **Industry trends.** Interview participants shared that reputational risk is a primary motivator for the inclusion of ESG considerations in infrastructure investments. As the investment community is increasingly pushed toward responsible investment by both internal drivers and client preferences, others in the field want to remain competitive with industry leaders. The recent growth of investments in infrastructure has been paired with an increased effort to consistently apply ESG considerations from other portfolio investments (e.g. investments in publicly traded companies) to infrastructure assets.
- **Enhanced risk assessment processes.** During interviews, investors placed a high value on ESG analysis as a risk management tool. These risks could include worker safety, corporate corruption, and long-term risks associated with climate change. Risks associated with ESG factors, if not managed and mitigated, may ultimately impact the performance of an asset and the rate of return for investors. One investor noted that even robust due diligence processes may miss potential risks that are identified through ESG monitoring. Proper assessment and mitigation of ESG risk also helps investors create or maintain social license to operate, preventing delays in project development that may result from community pushback.

- **Policy and regulatory trends.** Regulations and legislation related to ESG criteria have increased adoption of ESG considerations in infrastructure investment. A 2017 report by Ernst & Young suggests that there are around 300 ESG-related regulations that affect the investment community, including institutional investors, such as pension funds.²⁰ Other initiatives such as those emerging from The Paris Climate Agreement have placed pressure on signatories to enforce policy and regulations that curb emissions, a movement that has broad implications on infrastructure, particularly in the energy and transportation sectors. These regulations and policy initiatives have put added pressure on the investment community to improve ESG reporting and have forced investors to consider long-term risks associated with future regulations or policies that might impact their infrastructure assets.

Whether and how ESG criteria are formally factored into infrastructure investment decision-making varies across the industry. Generally, ESG investment analysis strategies involve 1) assessing the ESG performance of an asset; and/or 2) quantifying the selected ESG criteria in a way that can be integrated into a financial model.²¹ For the purposes of this research, the analysis of ESG factors in investment decision-making is categorized into infrastructure evaluation or infrastructure valuation, as defined in Box 3: Categories of ESG Analysis in Infrastructure Investment.

Figure 2: ESG Risks and Benefits – Impacts on vs. Impacts from of a Hypothetical Road Project

	RISKS			BENEFITS		
	ENVIRONMENTAL	SOCIAL	GOVERNANCE	ENVIRONMENTAL	SOCIAL	GOVERNANCE
Impacts on	<p>Vulnerability of asset to extreme weather events.</p> 	<p>Land planned for development in proximity to important cultural sites.</p>	<p>Weak local enforcement of anti-corruption policies.</p> 	<p>Enabling policy to support or incentivize green infrastructure or renewables.</p> 	<p>Minority, women, or local labor hiring requirements.</p> 	<p>Regional government has purchasing requirements and advanced business licensure practices.</p> 
Impacts from	<p>Runoff polluting local water supply leads to environmental non-compliance penalties.</p> 	<p>Damage to or interference with important cultural sites causes community protests.</p> 	<p>Bribery allegations leads to legal action against construction contractor.</p>	<p>Preservation of or improvements to biodiversity in surrounding ecosystem drive "eco-tourism" that increases road use and toll revenue.</p>	<p>Increased levels of employment among local workforce leads to long-term economic growth.</p>	<p>Sustainable supply chain requirements impacts practices of local and regional businesses.</p>

Box 3: Categories of ESG Analysis in Infrastructure Investment

Evaluation: an assessment of quantitative and qualitative ESG criteria, which may be reported as a set of information, and which typically results in a score or rating. Evaluation can be useful during the due diligence process, for benchmarking investments or projects, as a tool for reporting and stewardship, and for considering how a project addresses various ESG criteria across a portfolio.^{xii}

Valuation: assigning a monetary value to an ESG risk or benefit, which is then incorporated into a financial model. For example, ESG valuation may involve incorporating ESG metrics into a cost-benefit analysis, net-present value, or discounted cash flow models.

This report also distinguishes between ESG criteria related to impacts on the asset versus impacts from the asset.²² ESG criteria with impacts on the asset include risks and benefits posed by the local or regional context in which the asset is being developed that either enable or inhibit the performance of the infrastructure asset. This may include the policy or regulatory context, social climate, or vulnerability to extreme weather events. Often, ESG considerations

such as local policy or regulatory environments are easier to assess in terms of impact on project financials, and therefore more likely to be considered in investment decision-making than other less tangible criteria. ESG criteria related to impacts from the asset include risks and benefits that the infrastructure asset generates on the external environment and community, which can in turn impact financial performance. This may include impacts from the asset on biodiversity, health, or macroeconomic indicators such as employment that can impact long term cash flows of the infrastructure asset. Typically, these ESG criteria are considered externalities and as such are less likely to be incorporated into project investment decisions or reflected in project financials. Figure 2 walks through a series of examples of ESG considerations for a hypothetical roadway project.

ESG valuation and evaluation methodologies can be employed differently across stakeholders. Public sector actors may be more likely to use valuation techniques to incorporate ESG criteria into financial analyses and investment prioritization due to their role as project initiators, arguably with greater concern for the positive and negative externalities resulting from a project (see case study in Box 4). In contrast, private sector investors may be less willing or able to incorporate ESG valuation into financial analyses, as they are typically concerned with

^{xii} ESG stewardship refers to investor engagement with companies or project in their portfolio to advise on corporate governance, environmental and social practices.

Box 4 Autocase Analysis of Atlanta's Hartsfield-Jackson Airport

The Valuation and Prioritization of Investments within Atlanta's Hartsfield Jackson Airport²³

ESG TOOL: Autocase Triple Bottom Line Cost Benefit Analysis

Over 101 million passengers travel through Atlanta's Hartsfield-Jackson Airport (ATL) every year, making it the world's busiest airport. ATL's Airport Administration is committed to serving passengers sustainably and has created a set of guiding principles which require an integrated approach to development that accounts for economic stability, social responsibility, and environmental sustainability. These principles have been incorporated into decision-making for prioritizing a range of investments, including the expansion of ATL's cargo building, the location of green infrastructure projects, and energy efficiency, air quality, and water efficiency measures across the site. To integrate the guiding principles into its economic analyses and compare the true value of design alternatives, the Airport Administration used Autocase's cloud-based, **triple-bottom line cost-benefit analysis** software tool.

For each investment, administrators worked with Autocase to conduct ESG valuation by measuring the monetary costs and benefits of relevant ESG criteria. For example, Autocase assessed the value of replacing an airport fire station to meet LEED standards by measuring the costs and benefits associated with **air pollution, carbon emissions, heat island effect, and worker health and absenteeism**. Using Autocase's triple bottom line cost benefit analysis, the Airport Administration was able to compare project design alternatives based on total project value inclusive of social and environmental impacts, and to select investments that optimized value for the surrounding area.

Across ATL, Airport Administrators are using Autocase to prioritize investments based on life-cycle cost analysis and total cost of ownership. In addition to the fire station project, the airport is working with Autocase to select green infrastructure locations and prioritize sustainable investments in their cargo building expansion. The expanded analysis aligns the airport's investments with its social and environmental goals, helps it exceed compliance expectations, and provides a basis for meaningful stakeholder engagement with the airport's surrounding communities.

returns of the asset within an expected investment horizon. An investor with a 5-year investment horizon, for instance, may be less likely to consider an ESG risk such as impact from climate change, which may result in longer-term impacts on an asset's financial performance.

Typically, investors evaluate ESG factors during the due diligence process as a part of assessing and mitigating risks.²⁴ The results of these ESG assessments often serve as "tie-breakers" between similar types of projects when an investment opportunity is presented to an investment committee for consideration or for "go/no go" decisions. More than one interviewee noted that given the choice between two assets with a similar return and different ESG characteristics, investors will prefer the investment with a higher ESG performance. However, these interviewees also noted that investors are unlikely to sacrifice higher returns in favour of ESG considerations.

To the extent that ESG criteria are incorporated into investor financial models for asset valuation, approaches to ESG integration remain largely determined by the internal strategies and goals of the investor. Private sector leaders in ESG valuation have developed internal ESG frameworks and methodologies and provide varying degrees of

transparency on the underlying ESG metrics, criteria, and methodologies used.

Understanding the approaches, challenges, and opportunities for infrastructure ESG evaluation and valuation is critical to assessing how current approaches could be scaled across the market. The following sections examine ESG evaluation and valuation in more detail.

ESG Evaluation

Infrastructure is a relatively new asset class for private investors, so specific frameworks for evaluating ESG criteria have not yet achieved industry-wide adoption or standardization. The infrastructure space has adopted strategies for ESG evaluation from more mature markets, such as real estate (e.g. green building) and corporate strategy (e.g. corporate social responsibility). However, the unique characteristics of infrastructure investment, which include long-term, illiquid, and heavily regulated assets, requires a tailored approach to evaluating ESG criteria. Though ESG evaluation in infrastructure is still an emerging practice, several international standards, rating systems, and guiding principles have emerged as industry-recognized ESG frameworks for investments across asset

classes, including infrastructure. Leading methodologies are summarized in Appendix A: ESG Standards and Reporting Frameworks.

Investors in the public and private sectors have increasingly adopted ESG evaluation standards, frameworks, and tools to achieve the following key benefits:

- **Engagement with asset managers.** Investors benefit from ESG evaluation frameworks because they provide a platform for engaging asset managers on sustainability concerns. Several investors described that evaluation frameworks create either a reporting process (e.g. Global Reporting Initiative, Integrated Reporting, ISO standards) and/or a measurable certification or score (e.g. Envision, GRESB) that can provide the basis for discussions with the asset manager to improve the asset's ESG management and performance (see case study in Box 5).
- **Guidelines for internal processes.** Several investors interviewed described using internally standardised frameworks to inform ESG monitoring practices. For example, investors may use frameworks or standards to inform internal evaluation methodologies for qualitative risk assessments that they apply to assets. Additionally, several investors described using evaluation frameworks or tools to inform internally-generated valuation processes. In these cases, investors curate a list of ESG criteria that they consider material and include them in financial models (see ESG Valuation).
- **Reporting on asset performance.** As in other sectors, infrastructure investors use established frameworks to monitor asset and portfolio performance. These frameworks create standardised methods for tracking sustainability, and a common format among investors for communicating successes and growth opportunities.

Box 5 Envision Rating of Peralta Wind Power Project

Evaluating Uruguay's Peralta Wind Power Project

ESG TOOL: Envision Rating System for Sustainable Infrastructure Version 2.0

The Peralta Wind Farm was developed by PAMLATIR S.A. to bring clean energy to approximately 74,000 Uruguayans and to increase the resiliency of Uruguay's energy supply, which is largely dependent on hydroelectric power. The project, which consists of 25 turbines, a High Tension Line and substation, cost approximately \$143.8 million. It was financed with 27 percent equity and 73 percent long-term loans from the Inter-American Development Bank (IDB) and the U.S. Exim Bank, respectively. **To determine the sustainability of the proposed project, the wind farm was evaluated using the Envision Rating System for Sustainable Infrastructure during its development.**

Envision includes five categories: quality of life; leadership; resource allocation; natural world; and climate and risk. A project is assessed based on its planned or actual performance in each category as either improved, enhanced, superior, conserving, restorative, or innovative relative to the baseline condition. Examples of ESG criteria evaluated by Envision for the Peralta Wind Farm project include:

- **Quality of Life:** clean energy production, job creation, plans for historical sites, assessment of impacts of health and quality of life on nearby residents;
- **Leadership:** fulfillment of Kyoto protocol, adherence to Environmental Management Plan, sustainable procurement, net-embodied energy and potable water consumption;
- **Natural World:** ecological value of land, environmental impacts; and
- **Climate and Risk:** GHG emissions and air pollution credits, inventory of GHG emissions, and assessment of climatic threats and long-term adaptability.

Envision's Rating System demonstrated how the wind farm could support Uruguay's and Peralta's sustainable development commitments, which include complying with Article 12 of the Kyoto Protocol's Clean Development Mechanisms. **Uruguay's commitment to wind energy was an ESG impact on the project – the country set a goal for 38% of its electricity to be supplied by wind projects.**²⁵ Notably, the project earned an Innovation credit for its use of a GHG inventory to manage and track the emissions of the project's suppliers.

The evaluation also identified areas where there were opportunities for improvement, which included the potential for additional reductions in embodied energy and potable water consumption and an increased attention to climate change resiliency. Overall, the evaluation of the project earned it a Gold Award from the Envision Rating System, clearly demonstrating its commitment to sustainability. The wind farm's construction was completed in Spring 2017.²⁶

ESG Valuation

While ESG valuation methodologies enable an understanding of the full economic impacts of an infrastructure asset and its externalities, private sector investors are primarily concerned with ESG impacts on the financial performance of the asset itself. As such, this report focuses on ESG valuation methodologies involving the monetization of ESG metrics that could impact operating costs, cash flows, or capital expenditures, and integration of these metrics into associated financial models, such as a discounted cash flow or cost benefit analysis.^{xiii} Discount rates may also be adjusted based on the outcomes of an ESG risk assessment of the asset. However, the process of adjusting discount rates based on ESG related risk is perceived to be somewhat arbitrary and difficult to justify to mainstream investors.²⁷

In ESG valuation, ESG metrics can be included in infrastructure asset financial analyses as either costs or benefits. Nearly all investors interviewed described greater success incorporating ESG costs or risks into asset valuation compared to ESG benefits. For example, one investor described that when acquiring an infrastructure asset, the company would typically factor the costs required to conduct workplace safety training, improve asset resiliency, increase cybersecurity, and other ESG-related costs into financial analyses. Potential benefits from these activities are more difficult to monetize or quantify in a financial model.

Despite the availability of several guidelines and frameworks for integrating ESG criteria into asset valuation across various asset types, practical approaches for implementing ESG valuation in the infrastructure space remain fragmented across the industry. While standardization of approaches may be helpful in some circumstances, research for this report indicated that investors will continue to implement tailored approaches to how they assess infrastructure investments. Rather than standardization, investors require a clear understanding of the materiality of ESG risks and benefits to implement ESG valuation. The ESG valuation tools assessed in this report may help address this market need. However, several common challenges to integrating ESG criteria into infrastructure valuation were expressed during expert interviews and supported in the literature.²⁸

xiii |The PRI has produced detailed guidance and case studies for public equities investors on ESG valuation in: A Practical Guide to ESG Integration For Equity Investing <https://www.unpri.org/listed-equity/a-practical-guide-to-esg-integration-for-equity-investing/10.article>

- **Heterogeneous infrastructure landscape.** Establishing a standardised ESG valuation approach across the infrastructure space is made difficult by the diversity in types of assets included within the infrastructure asset class, ranging across energy, transportation, information and communication technology, water, waste, and social infrastructure assets. Additionally, ESG considerations are project-specific and vary between greenfield and brownfield investments. Each infrastructure asset requires a tailored ESG approach, making it difficult for investors to compare across asset types when evaluating investment opportunities.
- **Data quality and availability.** To integrate ESG metrics into asset valuation, relevant data must be available for the specific asset or asset type. Developers, owners, or operators of the asset may not collect the relevant data, or the data may be of poor quality. If the data does exist, it may not be made available to external investors during their due diligence processes, and therefore would not be included in financial analyses.
- **Quantification/monetization of ESG criteria.** Monetizing the costs or benefits of ESG criteria requires detailed empirical research across a wide range of criteria, including dynamic and difficult-to-quantify metrics, such as social impact metrics.²⁹ These metrics could include improvements in wellbeing or the value of preserving historical landmarks. Existing sources of research or data demonstrating the monetary value of these metrics can be difficult or expensive to access. This challenge is exacerbated by the need for country- or region-specific ESG data to accurately integrate ESG criteria into the valuation of an infrastructure asset.³⁰ The challenge of finding appropriate data is particularly acute in the international development context, where existing data might be insufficient and resources for funding the necessary research is often limited.
- **Transparency.** While investors are increasingly incorporating ESG criteria into how they evaluate infrastructure investments, there is little transparency on how and whether the results of ESG evaluation are then integrated into their internal financial models used to value assets and determine investments. Several interviewees noted this is partially to preserve the competitive advantage of the first movers in ESG valuation. This lack of transparency both in methodologies and data used for ESG valuation prevents learning and growth opportunities associated with leveraging industry best practices in the infrastructure investment space.

- **Client confidence.** While clients have pushed investors toward more socially responsible investment, investment managers are still expected to prioritize satisfactory levels of financial returns. While a general industry trend has pointed to an increase in ESG consideration in the evaluation of investments, interview participants noted that clients are typically unlikely to sacrifice financial returns for norm-based sustainability considerations. Without convincing data on the materiality or monetary impacts of specific ESG criteria, particularly those difficult to quantify or predict, it is unlikely that clients would accept investors using ESG criteria in asset valuation that would influence how investors compare opportunities from a financial perspective.
- **Costs of ESG analysis.** The assessment process and data requirements for effective ESG valuation requires time and resources that impose significant costs on investors and procuring entities compared to traditional valuation techniques. Some organizations are well-positioned to make the time and financial investments to develop an ESG practice area; however, others lack the available resources to incorporate ESG valuation into regular infrastructure prioritization or investment decisions.

Although it is likely that mainstream investors will continue to maintain internally developed or proprietary methodologies for implementing ESG valuation, publicly available tools designed to quantify and monetize ESG benefits in financial analyses may provide added credibility to the practice and encourage increased adoption within investment decision-making processes. Currently, several tools have been developed to monetize ESG criteria and incorporate them into infrastructure asset valuation. Many of these tools have been used primarily by procuring entities and developers to assess business cases, perform cost benefit analyses or financial viability assessments (see case study in Box 6 below). An assessment of these tools and the challenges and opportunities for investors to use them for infrastructure asset valuation is provided in the following sections.

Financial Assessment of a Proposed Netherlands Wind Farm

ESG TOOL: Sustainable Asset Valuation (SAVi)

In late 2017, Rijkswaterstaat—the Netherlands’ Ministry of Infrastructure and Water Management—contacted the International Institute for Sustainable Development (IISD) to apply their Sustainable Asset Evaluation (SAVi) tool to a planned 9.5 GW offshore wind farm in the North Sea. Rijkswaterstaat **wanted to assess the financial attractiveness of the planned development** versus alternative energy generation options in light of positive and negative climate impacts and externalities.

To help perform this ESG valuation, the Ministry selected a range of metrics to include in the financial analyses. They picked two key sustainability risk metrics with impacts on the project: (1) the physical impacts from an increase in temperature of 1.5 degrees Celsius; and (2) the policy and economic risks of a EUR 16.27/MWh carbon tax levied by the European Union. The Ministry also identified key ESG metrics related to impacts from the project as relevant to Dutch taxpayers. These metrics included:

- A **valuation of emissions** and their **impacts on human health**;
- The project’s impact on **labor income**, including additional employment created, average income, and proportion of discretionary income utilized in the Netherlands;
- The **opportunity cost of land** based on the productivity of other uses precluded by power generation;
- **Lost fishing industry revenue** from offshore wind farm;
- **Revenue impacts on coastal real estate, tourism, and recreation**;
- Possibility of wind farm **limiting sand mining**; and
- **Development of a new seaweed farming industry** between the wind turbines.

IISD quantified each metric and included them in the analysis, along with traditional costs and benefits of the asset, to create a comprehensive cost benefit analysis using SAVi. The SAVi tool also integrated the ESG metrics into analysis of key financial performance indicators, including levelized cost of electricity, gross margin, Internal Rate of Return (IRR), debt service coverage ratio, loan life coverage ratio, and net present value (NPV). These calculations were used to assess the financial return of the wind farm compared to other forms of energy generation, including a coal-fired power plant. Using only conventional assumptions, the offshore wind asset had significantly lower financial performance than coal. However, when material climate risks are included (e.g. rising temperatures), coal was only slightly more competitive than wind. **When the material externalities are included (e.g. the health impacts of emissions), wind had no competition among generating sources—it was the clear winner.**

By quantifying the benefits of the Wind Farm, Rijkswaterstaat was able to gain a tangible understanding of the value of renewable energy. This supported their strategy and policy development of a national plan that will ultimately lead to additional procurement of wind projects.

Section 4:

Frameworks and Tools for Infrastructure ESG Analysis

Although the use of ESG metrics by investors in infrastructure asset valuation is nascent, several tools have been developed to support the incorporation of ESG metrics in infrastructure asset analysis. Many of these tools draw on established frameworks for sustainable business and investment practices established by internationally recognized standard setters such as the Sustainable Accounting Standards Board (SASB), the International Organization for Standardization (ISO), the International Framework for Integrated Reporting (IR), the Global Reporting Initiative (GRI), and the UN-supported Principles for Responsible Investing (PRI), among others (see Appendix A for a detailed list).

While many of these international frameworks provide guidance on relevant criteria to be considered in ESG analysis for infrastructure investment, at present no single, comprehensive set of criteria for ESG in infrastructure is universally recognized. ESG tools, therefore, support infrastructure investors, procuring entities, and developers by drawing on this range of frameworks and industry expertise to establish unique, measurable criteria deemed most relevant to asset sustainability or financial materiality. By using these tools, these actors can then analyse and benchmark ESG performance, as well as the impact of ESG criteria on financial returns.

Box 7 Definition of ESG Tool

ESG tool is defined broadly in this report as a software, web-based platform, or qualitative guidelines for analysing specified inputs (ESG data) to produce a practical output (rating, certification, or financial figure) that may be used to inform the decision-making of an infrastructure investor, developer, or procuring entity.

This report reviews ten commercially available tools with broad applicability across infrastructure sectors. Specialized tools for the evaluation and valuation of

green infrastructure^{xiv} and natural infrastructure^{xv} were not included in the analyses.^{xvi} Tools that analyse ESG criteria but do not have specific applicability to the infrastructure sector were also not included in the analysis. The reviewed tools can be categorized across several characteristics:

- **Evaluation vs. Valuation:** The tools are categorized by whether they are used for ESG evaluation or valuation (see Section 2 for further explanation).
- **Asset Type(s):** Some of the tools can be utilised for a wide-array of infrastructure assets including telecommunications, transportation, water, waste, and energy. Others were designed for specific asset types and have a more specialized set of ESG metrics.
- **Primary User Type(s):** The primary users of these tools fall into three categories: procuring entities (e.g. governments, utilities, or other organizations); developers (e.g. engineers, architects, facilitates managers, and construction firms); corporate and financial investors (e.g. fund managers, pension funds, insurance companies, institutional investors, and sovereign funds). Most tools have been designed for specific user types, but many are flexible and can be used to support a variety of user types.

xiv Green infrastructure is infrastructure that combines both engineered and natural solutions that mimic or restore natural process, such as an area's hydrology, to provide a variety of environmental and social benefits.

xv Natural infrastructure describes the nature-based solutions and ecosystem services provided by natural systems such as wetlands, forests and other natural infrastructure assets.

xvi The research identified approximately 8 tools used for the evaluation or valuation of green infrastructure (GI) and natural infrastructure. These tools are used primarily by researchers, governments, and project developers to determine the costs and benefits associated with green infrastructure, sometimes in comparison with traditional or grey infrastructure. While these types of infrastructure assets are out of scope for this project, it is worth noting that there is growing interest in the valuation of GI and natural infrastructure. InVEST from the Natural Capital Project, the Guide for Valuing Green Infrastructure and the Green Values Calculator from Center for Neighborhood Technology Chicago, i-Tree Eco from the USDA Forest Services, GreenSave Calculators from Green Roofs for Healthy Cities and the Athena Institute, Green Roof Energy Calculator from the Green Building Research Laboratory, Tree Benefit Calculator from Casey Trees and Davey Tree Expert Co, and Low Impact Development Rapid Assessment (LIDRA) by Drexel University.

Table 2: ESG Tool Characteristics

	Name	Types of Assets	Primary User Type(s)	Methodology	Output(s)
Evaluation Tools	GRESB Infrastructure Asset Assessment	Energy, Water, Waste, Transportation, Telecom, Data, Social, Real Estate	Financial Investors, Managers, Operators	<ul style="list-style-type: none"> User-provided data Point scoring system Validation Peer benchmarking 	Rating: Absolute score (out of 100), peer and overall rankings, Scorecard and Benchmark Report
	Envision	Energy, Water, Waste, Transportation, Landscape, Information	Procuring Entities, Developers	<ul style="list-style-type: none"> User-provided data Publicly available point scoring system 	Certification: Bronze, Silver, Gold, and Platinum levels
	SuRe	Energy, Water, Waste, Transport, Communication, Social, Food Systems, Mining	Procuring Entities, Developers, Financial Investors	<ul style="list-style-type: none"> User-provided data Publicly available achievement scoring system 	Certification: Bronze, Silver, and Gold levels
	RepRisk	34 sectors (including beyond infrastructure)	Companies, Investors, Governments, NGOs	<ul style="list-style-type: none"> Media scanning Private point scoring system and rating system 	Score or Rating: RepRisk Index score or RepRisk Rating (AAA-D)
	CEEQUAL	Infrastructure, civil engineering, public spaces, and landscaping	Governments, Developers/Designers	<ul style="list-style-type: none"> User-provided data External validation and scoring 	Score and Rating: Assessment score (percentage out of 100%) and award (excellent, very good, good, pass)
	ISCA Tools (Planning, Design & As-Built, and Operations) ^{xvii}	Energy, Water, Waste, Transportation, Information	Governments, Developers/Designers, Operators/Owners	<ul style="list-style-type: none"> User-provided data External validation and scoring 	Score and Rating: Assessment score (out of 100) and rating (Bronze, Silver, Gold, Platinum, and Diamond)
Valuation Tools	SAVi	Energy, Buildings, Roads, Water, Natural Capital (under development)	Procuring Entities, Financial Investors	<ul style="list-style-type: none"> System dynamics modeling Project finance modeling 	Financial Impact: Cost benefit analysis, gross margin, net present value, value for money, internal rate of return, credit ratio
	TREDIS	Transportation	Procuring Entities, Developers	<ul style="list-style-type: none"> Regional economic and transportation modeling Project finance modeling 	Financial Impact, Market Access: Cost benefit analysis, project finance analysis, economic development impact
	Autocase	Buildings and Project Sites	Procuring Entity, Developers	<ul style="list-style-type: none"> Economic analysis modeling 	Financial Impact: Cost benefit analysis, net present value
	Zofnass Economic Process Tool	Energy, Water, Waste, Transport, Landscape, Information	Procuring Entity, Developers	<ul style="list-style-type: none"> Economic analysis modeling (based on Envision framework) 	Financial Impact: Cost benefit analysis, net present value

^{xvii} This tool is only commercially available in Australia and New Zealand. An international tool is being piloted.

- **Methodology:** The methodology used to analyse ESG metrics depends on whether the tool is used for valuation or evaluation purposes. Evaluation tools generally use scoring techniques driven either by user-input data or market scanning. Valuation tools combine multiple modelling approaches—including systems, financial, and economic modelling—to monetize ESG impacts.
- **Output(s):** Each tool generates an output that can be used to measure or assess the ESG performance of an asset. Evaluation tools generate either a specific score, rating, or yield a certification based upon asset ESG performance. Valuation tools generate various economic and financial metrics—such as net present value—that help determine the value and viability of the asset.

Table 2 summarizes these tools by the characteristics described above. A short description of each tool is also available in Appendix B.^{xviii}

In addition to the frameworks and tools listed in Table 2, many investors and brokers have proprietary in-house methodologies for conducting due diligence, including assessing and pricing risk, as well as asset valuation. Proprietary tools may be based in part on the frameworks, standards and principles listed in Appendix A.

The scan of existing tools indicated that some tools are designed to apply across infrastructure asset types, while others are designed for specific infrastructure subsectors, such as transportation or energy. Despite some interviewees and workshop participants calling for standardization of ESG criteria across the infrastructure space, different metrics and inputs available or appropriate for different types of infrastructure assets makes standardization of tools across sectors difficult. However, interview findings also suggested that the ESG criteria used by existing tools and methodologies could be standardised across each *phase* of the infrastructure investment process to further market adoption of ESG criteria (see Box 2, Section 2).

Figure 3 illustrates when and how available ESG tools can be used by different types of users (procuring entities, developers, and financial investors) across the three phases of infrastructure investment. The types of ESG analyses and corresponding tools are delineated based on whether

they apply to ESG evaluation or ESG valuation. While these tools can support different types of ESG analyses (e.g. risk assessment, compliance, monitoring, etc.), successful implementation of each analysis may require users to complete additional processes beyond tool usage.

While the framework presented in Figure 3 shows the availability of tools at various stages of the infrastructure investment process, it does not suggest the extent to which these tools are currently used by the relevant user type (i.e. procuring entities, developers, financial investors). For instance, while the valuation tools assessed provide financial modelling capabilities, investors interviewed during this research highlighted that ESG valuation, if performed at all, was typically completed using internal methodologies. When asked, some investor interviewees were not aware of the external ESG valuation tools assessed during this research but expressed interest in understanding how they could be leveraged to support internal ESG analysis.^{xix} This discrepancy between interest and use could be alleviated with further education and outreach regarding the availability and credibility of existing tools and frameworks, or by open sourcing the methodologies employed.

In addition, greater alignment between evaluation and valuation tools may encourage increased tool adoption by standardising the data used for ESG analysis across each phase of the investment process. In an ideal scenario, ESG valuation tools used by financial investors in the operation phase (i.e. in assessing brownfield investment opportunities) would draw directly on the data monitored and reported using evaluation tools during the development and construction phases. This relationship is most closely represented by the alignment between the Envision evaluation tool and the Autocase valuation tool. Autocase was developed to apply economic valuation to criteria associated with Envision's rating system, allowing data monitored during the development, construction, and operation phases to be integrated into financial models. Other tools, such as SAVi, draw on a range of sector-specific frameworks that may present gaps in the availability of reported data for seamless integration into the valuation tool.

xviii For further detailed reading on available ESG tools, WWF's companion report focused on tools and framework for supporting the development of sustainable infrastructure can be found at: <https://www.worldwildlife.org/publications/review-of-screening-tools-final-report-sep-2017>

xix Despite evidence that current use of external tools is limited, a similar scan of ESG valuation tools by Morgan Stanley identified Autocase (previously Business Case Evaluator) and TRÉDIS as two promising valuation tools for financial investors, suggesting interest in the space for leveraging externally developed tools and methodologies.

Figure 3: ESG Tool Availability Across the Infrastructure Investment Process

		Development	Construction	Operation
PROCURING ENTITIES	Examples: • Public sector • Utilities • Telcos	Prioritizes and selects infrastructure projects		
	Type of ESG Analysis	<ul style="list-style-type: none"> • ESG risk assessment • ESG compliance • Financial modeling 		
	Tools	<ul style="list-style-type: none"> • Envision • SuRE • CEEQUAL • TREDIS • Autocase • SAVi 		
DEVELOPERS	Examples: • Construction • Engineering • Architecture • Facilities management	Submits bid for project development	Builds infrastructure asset	Oversees infrastructure maintenance and operations
	Type of ESG Analysis	<ul style="list-style-type: none"> • ESG compliance • ESG risk assessment • Financial modeling 	<ul style="list-style-type: none"> • ESG Monitoring • ESG Reporting 	<ul style="list-style-type: none"> • ESG Monitoring • ESG Reporting
	Tools	<ul style="list-style-type: none"> • Envision • SuRe • CEEQUAL • TREDIS • Autocase • SAVi 	<ul style="list-style-type: none"> • Envision • SuRe • GRESB Infra Asset 	<ul style="list-style-type: none"> • Envision • SuRe • GRESB Infra Asset
FINANCIAL INVESTORS	Examples: • Infrastructure fund • Pension fund • Insurance companies • Large banks • Sovereign funds	Greenfield equity investment <i>Note: Financial investor participation in the development phase is limited and concentrated primarily in EDME projects.</i>	Greenfield equity investment	Acquisition/Brownfield equity investment
	Type of ESG Analysis	<ul style="list-style-type: none"> • ESG risk assessment • ESG stewardship • Financial modelling 	<ul style="list-style-type: none"> • ESG risk assessment • ESG stewardship • Financial modelling 	<ul style="list-style-type: none"> • ESG risk assessment • ESG stewardship • Financial modelling
	Tools	<ul style="list-style-type: none"> • GRESB Infra Asset • RepRisk • TREDIS • Autocase • SAVi 	<ul style="list-style-type: none"> • GRESB Infra Asset • RepRisk • TREDIS • Autocase • SAVi 	<ul style="list-style-type: none"> • GRESB Infra Asset • RepRisk • TREDIS • Autocase • SAVi

 Evaluation Tools  Valuation Tools

Section 5:

Action Areas, Barriers and Recommendations to Further Utilisation of ESG Tools

Despite broad recognition of the importance of ESG criteria and interest in incorporating these factors into infrastructure investment decision-making, the implementation of these criteria in asset valuation remains in an early stage. Research conducted for this report identified several market barriers to ESG growth that could be addressed to scale the adoption of ESG tools and integrate ESG criteria in infrastructure asset valuation.

Interviewees representing tool developers and industry associations consistently cited a need for standardization in the way the market defines ESG and how investors integrate ESG into investment decisions. However, investor preference for proprietary frameworks and methodologies presents a significant barrier to standardization and suggests that strategies for encouraging investor use of existing third-party tools will be an important first step. In addition, while some participants noted that the market may benefit from a credible and unified standard setter, such as a major credit agency or SASB, others emphasized that standardization should occur organically as the market for ESG in infrastructure investment grows and matures. Given this dynamic, the barriers and opportunities described in this section are focused on pathways to improve and harmonize ESG tools to scale the market, which will thereby push the market toward maturity instead of prescribing a path to standardization.

The barriers and opportunities identified in this research can be broadly categorized under four action areas described further below:

- Action Area A: Data and information.** Many interview and workshop participants highlighted that one of the biggest challenges related to ESG integration in investment decisions was a lack of data and information required to perform analyses. The ESG tools assessed in this report require significant data and information at the project level to analyse ESG performance and quantify ESG-related risks and return. For valuation tools, additional research is required to demonstrate the monetary impact of specific ESG metrics for
 - integration into financial analyses. Specific data and information barriers include: financial performance data demonstrating correlation between ESG performance and financial performance; project/asset-level ESG data benchmarked by infrastructure sub-sector; and credible research providing the basis for monetizing ESG metrics in financial models.
- Action Area B: Outreach and education.** Interview and workshop participants from the investment community were often unaware of the range of ESG tools available and how these tools might be useful in the investment or due diligence process. Improved outreach and education is needed to address the gap in investor awareness of existing ESG tools and their benefits.
- Action Area C: Industry coordination and market maturity.** As a relatively nascent market, many barriers identified during this research related to the need for greater coordination to align standards and accelerate the adoption of ESG tools among the investor community. Specific barriers related to industry coordination and policy include: the absence of an ESG standard setter; the alignment between ESG valuation tools and ESG evaluation tools to streamline data reporting and analysis; and the alignment of ESG tools with investor due diligence needs.
- Action Area D: Policy drivers and public-sector leadership.** While the private sector is increasingly aware of the financial risks posed by ESG-related factors, many of these factors are externalities that do not appear as costs on the project balance sheet. Private investors will not be incentivized to internalize ESG risks unless they demonstrate a clear impact on financial returns. The public sector can therefore play an important role in ensuring that these costs are fully accounted for through policy and regulation. Policies may serve to encourage investors to seek tools and resources to help them measure and report ESG criteria relevant to their investments.

Examples of policies mandating ESG disclosure exist, but workshop participants noted a need for greater implementation of policy mechanisms to drive sustainable infrastructure investment.

The following subsections detail the specific barriers identified within each category, as well as potential pathways to address them as identified through desk research, interviews, and the expert workshop. These opportunities include a qualitative assessment of feasibility, timeframe, and suggested implementation actors.

Action Area A: Data and Information

Barrier	Recommendation	Feasibility	Time-frame	Implementing Actor
1. Evidence-based demonstration of link between ESG rating and asset performance.	Analyse the correlation of infrastructure financial investment performance and ESG performance.	High	Medium-term	Non-profits; ESG tool developers; GRESB, LTIIA, EDHEC (<i>in development</i>)
2. Comparisons or benchmarks of assets within infrastructure sub-sectors.	ESG tools tailored to infrastructure sub-sectors	Medium	Medium-term	ESG tool developers
3. Accessibility of credible research to demonstrate monetary value of ESG-related externalities	Open databases of peer reviewed research tying ESG metrics to economic outcomes or financial performance	Medium	Long-term	Universities; Non-profits; Public sector

Barrier 1: Demonstration of link between ESG rating and asset performance.

Many of the investors interviewed subscribe to the hypothesis that strong ESG performance leads to improved long-term infrastructure returns. However, there is limited empirical evidence to support this hypothesis, apart from the lessons of neighbouring sectors such as real estate. As a result, many investors incorporate ESG or ESG-related criteria into investment decisions or financial models only to the extent that clear and measurable impact on the financial performance is anticipated, or to the extent that they are legally required to do so (i.e. by regulation or fiduciary duty). Absence of data to demonstrate a correlation between asset financial performance and ESG performance may discourage investors from seeking analyses to understand how less tangible factors, such as both the negative and positive externalities generated by the asset, may impact long-term financial performance. Without this data, investors will be less motivated to base investment decisions on adherence to ESG standards and less likely to seek methodologies for integrating ESG criteria into asset valuation.

Recommendation 1: Analyse the correlation of infrastructure investment performance and ESG performance.

Establishing correlations between infrastructure financial and ESG performance would be a strong motivator for the investor community to adopt ESG standards and seek opportunities to leverage existing ESG tools. At the time of this report, at least one research project is being conducted by GRESB, LTIIA, and EDHEC Infrastructure Institute to investigate this correlation. This study will combine GRESB's ESG benchmarking tool data with EDHEC's financial performance data to determine if ESG integration can improve the explanatory power of risk-adjusted return financial performance models. The results of the report are expected to be released in the first half of 2019.³¹

The results of this study could have a significant impact on the ability to demonstrate correlation between the financial performance of an infrastructure asset and its ESG performance, and will serve as an important starting point for future research. However, additional research will be required to grow the acceptance and willingness of the investment community to adopt ESG evaluation and valuation tools. Additional research incorporating sub-sector-level benchmarking could be conducted to determine how ESG performance impacts financial performance differently between different asset types (see Barrier 2).

Barrier 2: The ability to compare or benchmark assets within infrastructure sub-sectors and geographies.

While many current tools attempt to apply broad criteria across infrastructure asset types, investors noted that the heterogeneity of the infrastructure sector requires a more nuanced approach. Assets within the energy, telecommunications, transportation, water and waste management sectors will have unique ESG considerations that should be considered and weighted accordingly.^{xx} Carbon emissions, for instance, will apply differently to the energy sector compared to the transportation sector. Creating benchmarked ESG scores across the infrastructure space may result in investors favouring certain asset types that perform well from an ESG standpoint, such as renewable energy, and deter investment in other areas where private capital is needed, such as roads and bridges. Similarly, the same type of asset in a different geography or socio-economic context may experience different ESG risks and benefits which should be weighted accordingly.

Recommendation 2: Tailor ESG evaluation tools to infrastructure sub-sectors and geographies.

Understanding ESG performance between assets within various infrastructure subsectors and geographies will provide investors a clearer understanding of how investments under consideration compare to benchmarks. In addition, having benchmarks within infrastructure subsectors and geographies will provide a more nuanced understanding of how ESG scores or ratings influence financial performance across different asset types.

Evaluation tools should be similarly tailored to determine unique sets of criteria for assets within infrastructure subsectors and geographies. For example, the Infrastructure Sustainability Scorecards developed by the Infrastructure Sustainability Council of Australia (ISCA) are tailored to the local nuances of Australia and New Zealand. Alternatively, criteria within current frameworks may be weighted based on asset type to provide a more accurate understanding of how infrastructure assets compare across the space. Creating more tailored approaches to ESG evaluation in the infrastructure space may also allow greater integration with valuation tools, many of which have already adopted sub-sector-specific approaches. TREDIS, for example, focuses on the transportation sector, and SAVi has developed various unique modules for assets including energy, roads, and water.

^{xx} While not considered tools by this report's definition, SASB has developed guidance notes for valuing different infrastructure assets. Available here: https://www.sasb.org/wp-content/uploads/2016/03/SASB-Infrastructure_All_Standards.pdf

Barrier 3: Accessibility of credible research to demonstrate the monetary value of ESG-related externalities

Industry utilisation of ESG criteria in financial analyses could be accelerated with greater availability of quality data for the quantification and monetization of ESG criteria. Tool developers noted that the ability to value the monetary impact of ESG metrics currently depends on credible, peer reviewed research that may be difficult to access, expensive, or may not exist. The cost of accessing academic studies and research can impose upfront cost burdens and inefficiencies on the use of ESG valuation tools. Furthermore, these studies typically need to be locally or regionally focused to provide an accurate reflection of costs or returns associated with ESG related externalities. The need for local or regional data may be particularly challenging in the EMDE context where public research grants and reputable research institutions may be scarcer.

Similarly, investors noted that monetizing the costs and benefits of ESG criteria would require access to data from similar investments that might serve as a benchmark. However, as the incorporation of ESG criteria into infrastructure valuation is still at an early stage, this data is limited and may be difficult to access outside of one's organization.

Recommendation 3: Create an open database of ESG financial data and valuation research.

A public library of ESG financial data and ESG-related studies and research would support both investors and tool developers in monetizing ESG metrics and encourage their integration into valuation methodologies by providing credible research to back analyses. This data library might also include case studies and best practices by leading investors to lower barriers associated with learning about ESG valuation approaches and encourage other investors to employ similar practices. An open database of ESG data could further support the field by establishing long-term data points and trends of infrastructure ESG performance and investment returns. To be most impactful, this data and research library would need to span multiple infrastructure sectors and geographies.

In addition, publicly funded research should be encouraged to demonstrate the monetary value of both negative and positive externalities. Significant progress has been made in the field of valuing emissions through the social cost of carbon.^{xxi}

^{xxi} The social cost of carbon is a measure of the impacts of carbon emissions, often quantified as a monetary value per ton of carbon dioxide.

However, additional research for externalities such as impacts on biodiversity, social cohesion, health and wellbeing can improve the abilities of ESG tools and tool developers to quantify not just the risks and costs associated with specific

ESG criteria, but also the benefits as positive impacts on cash flows. These research initiatives should be supported and funded as living research projects, recognizing the changing dynamics of the field.

Action Area B: Outreach and Education

Barrier	Recommendation	Feasibility	Time-frame	Implementing Actor
4. Investor awareness of ESG tools	Competitions and awards to drive awareness of leading ESG tools	High	Short-term	Multilateral development banks; Non-profits

Barrier 4: Investor awareness of ESG tools

Research conducted for this report indicated that there is limited awareness among the investment community about existing ESG tools and how they might benefit infrastructure investors. As many investors have developed their own internal ESG criteria and proprietary tools, investors engaged throughout the research process were generally unaware or had a limited awareness of the breadth of tools available to support ESG analysis during the due diligence process. In some cases, participants noted that the variety of tools and standards for ESG or sustainable investment made the space difficult to navigate and difficult for investors to identify the most useful tools for their purposes.

Some of these investors noted that proprietary methodologies for analysing ESG offered them a competitive advantage against others in the space. However, others noted that if more investors were aware of how ESG tools overlapped with existing due diligence practices they might be more open to adopting them, as many aspects of due diligence are already outsourced to external advisors or technical experts. For investors that do not see their ESG practice as a primary competitive advantage, increased awareness of how third party ESG tools can support or improve existing due diligence processes could drive adoption.

Participants noted that efforts to increase investor awareness of the availability of ESG tools and how they align with investor needs can play an important role in growing the market. Education and outreach might be led by tool developers and take the form of simple online videos demonstrating ESG integration in the investment field, or through business models designed to increase industry awareness. Envision, for instance, offers training to certify individuals as Envision specialists within different organizations; in this way tools themselves can

serve as education vehicles. GRESB also hosts webinars and an annual training for the industry.

However, as many existing ESG tool developers in the infrastructure space have limited capacity and resources for broad marketing activities, alternative third-party-sponsored programs to raise awareness present a significant opportunity. The Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), for instance, is supporting an initiative to develop an online platform and repository to assist the public with understanding and navigating currently available ESG tools.^{xxii} Though such examples exist, increased third-party support for promoting investor familiarity and technical capacity around existing tools can help expand the practice of ESG integration.

Recommendation 4: Competitions and awards to drive awareness of leading ESG tools.

Award programs recognizing integration of ESG into infrastructure projects may be an effective mechanism for growing awareness of ESG tools by providing heightened exposure of existing tools in the market and encouraging uptake on a voluntary basis. This has been demonstrated by the GRESB Sector Leader program, and the Inter-American Development Bank (IDB) Infrastructure 360° awards, which leveraged the Envision tool to award infrastructure projects in IDB member countries based on project sustainability. Multilateral development banks and public agencies may be well positioned to sponsor these types of award programs based on infrastructure development goals and available funding. Other actors such as non-profits, impact investors, or other leaders in responsible investment should explore opportunities to sponsor or collaborate around similar award programs.

^{xxii} The Emerging Market Sustainability Dialogues (EMSD) is working to set up an online platform to map the existing infrastructure sustainability tools and explain their main characteristics, application and target audience. The platform is aimed at bringing clarity around existing tools to the infrastructure sustainability arena, and to make these tools more accessible to potential users.

Action Area C: Industry Coordination and Market Maturity

Barrier	Recommendation	Feasibility	Time-frame	Implementing Actor
5. Alignment between ESG evaluation and valuation tools	Align data and information inputs of valuation tools and evaluation tools	Medium	Short-term	ESG tool developers
6. Alignment of ESG tools with investor due diligence and stewardship	Customizable ESG tools tailored for the investor community	Medium	Medium-term	ESG tool developers

Barrier 5: Alignment between ESG evaluation and valuation tools

As described in this report, ESG evaluation and valuation tools differ as evaluation tools provide guidance on the types of ESG-related data that should be collected and reported, whereas valuation tools assign monetary values to ESG-related data and incorporate them into financial analyses. This flow of information presents an opportunity for valuation tools to utilize the data collected for evaluation as direct inputs, adding efficiency and reducing analytical burden. Among the evaluation and valuation tools assessed in this research, only Envision and Autocase demonstrated direct alignment between ESG criteria evaluated and the ESG criteria used as inputs in the associated valuation methodology. This implies an opportunity for improved coordination between evaluation and valuation tool developers to create greater value for potential users.

Recommendation 5: Valuation tool developers can streamline data collection and analysis by aligning data needs with the ESG criteria analysed using evaluation tools.

Using Envision and Autocase as a model, there is a significant opportunity to improve alignment between evaluation and valuation tools to ensure that ESG information collected and reported can be easily integrated into ESG valuation analyses. Aligning data requirements of ESG valuation tools with the data collected for ESG evaluation tools can serve to improve efficiencies by streamlining the data collection process. Furthermore, alignment between evaluation and valuation tools can help move the market toward standardization and provide consistency of ESG data for each actor across the infrastructure investment process.

As many valuation tools are developed for specific infrastructure sub-sectors, the alignment between evaluation tools and valuation methodologies may be further supported by creating tailored evaluation tools for specific asset types, as suggested in Recommendation 2.

Barrier 6: Alignment of ESG tools with investor due diligence and stewardship

Many of the infrastructure ESG valuation tools reviewed were developed primarily for project designers, developers, or public sector procuring entities. For example, TREDIS, Autocase, SAVi and Envision define either governments or project designers as their primary users, while only GRESB and RepRisk are oriented primarily toward investors. While some tools can serve multiple users, investors often have unique needs or internal requirements for conducting financial analysis of potential investments that are not being met by existing tools. Addressing these needs requires tool developers to understand the unique needs of investors and tailor tools for how investors could use them in the investment decision-making process. One workshop participant noted that investors would be more likely to pay for services that enable them to create efficiencies in their due diligence processes, such as a tool that attaches an ESG “gold standard” to an infrastructure investment and enables investors to cross certain items of their due diligence checklist.

Given the challenge of developing a standardized approach for comparing infrastructure investments across sectors and asset types, research suggests that investors will prefer customized approaches to ESG valuation on an asset-by-asset basis. In addition, due diligence and stewardship requirements of investors vary across the industry. For these reasons, ESG tools should be customizable to meet investor needs for specific investments and to align with existing due diligence processes.

Recommendation 6: Design customizable ESG tools for the investor community.

Workshop participants suggested that a customizable, cloud-based ESG valuation tool might be able to meet investor needs while also nudging the market toward greater harmonization. Such a tool would address internal coordination issues (such as different stakeholders needing to provide data at different stages of a project’s development), data availability issues (e.g. by tying into existing data sources), and standardization needs

by tying to an established standard for conducting scenario-based ESG valuation. This tool should be a customizable template to meet the specific needs of investors, such as by enabling investors to input ESG and financial data to produce a comprehensive ESG report. This tool could leverage existing

ESG standards such as SuRe and Envision, but also involve a specialist in ESG valuation, such as IISD. Existing tools, such as MyClimate, may serve as a model in terms of how this tool might function.

Action Area D: Policy Drivers and Public-Sector Leadership

Barrier	Recommendation	Feasibility	Time-frame	Implementing Actor
7. Limited policies and regulations to drive and enforce the use of ESG standards among investment community	Implement policies to enforce accountability for externalities produced by investments.	Medium	Long-term	Public sector

Barrier 7: Limited policies and regulations to drive and enforce the use of ESG standards among investment community

As aforementioned, many ESG-related risks (and benefits) are externalities which are not reflected on company or project balance sheets. Negative externalities are borne by the public with little accountability placed on the asset manager or owners. As such, participants in interviews and the expert workshop noted that there is a need for greater consideration of the role of policy and regulation as a driver for adoption of ESG integration in the infrastructure investment space. As policy mechanisms drive sustainable investment, investors may seek tools and resources to help measure and report ESG criteria to remain compliant.

Recommendation 7: Implement policies for ESG disclosure requirements.

The public sector can play an important role in correcting externalities through policies to encourage sustainable investment practices. While mitigating social, environmental, and macroeconomic risks, these policies may also indirectly encourage investors to adopt ESG tools as resources to facilitate compliance with legislation such as ESG disclosure requirements.

A recent example of the connection between policy and infrastructure is the French government’s mandate that requires companies to disclose policies and procedures for addressing the social and environmental impact of their activities, as well as carbon emissions over the company’s entire value chain.³² Similarly, the European Commission has proposed legislation mandating that institutional investors

disclose the policies and procedures for integrating ESG risks into investment decision-making processes.³³ At the local government level, the state of California’s legislature passed Assembly Bill 2800, which funded a Climate Safe Infrastructure Working Group to explore the use of sustainable infrastructure standards and tools to incorporate climate risks and impacts into the state’s infrastructure project development cycle.³⁴ Additional policy mechanisms, such as carbon or pollution taxes, have been implemented to varying degrees as corrective measures to internalize the costs of ESG-related externalities.

These initiatives can be used as models for leveraging policy as drivers for ESG integration, but further work should be done to integrate ESG criteria into how banking regulatory committees oversee the industry.

Table 3 Summary of Barriers and Recommendations in ESG Tools

Barrier	Recommendation	Feasibility	Time-frame	Implementing Actor
Action Area A: Data and information				
1. Demonstration of link between ESG rating and asset performance	Analyse the correlation of infrastructure financial investment performance and ESG performance	High	Medium-term	Non-profits; ESG tool developers; GRESB, LTIIA, EDHEC (<i>in development</i>)
2. The ability to compare or benchmark assets within infrastructure sub-sectors and geographies	ESG tools tailored to infrastructure sub-sectors	High	Medium-term	ESG tool developers
3. Accessibility of credible research to demonstrate monetary value of ESG-related externalities	Open databases of peer reviewed research tying ESG metrics to economic outcomes or financial performance	Medium	Long-term	Universities; Non-profits; Public sector
Action Area B: Outreach and education				
4. Investor awareness of ESG tools	Competitions and awards to drive awareness of leading ESG tools	High	Short-term	Multilateral development banks; Non-profits
Action Area C: Industry coordination and market maturity				
5. Alignment between ESG evaluation and valuation tools	Align data and information inputs of valuation tools and evaluation tools	Medium	Short-term	ESG tool developers
6. Alignment of ESG tools with investor due diligence and stewardship	Customizable ESG tools tailored for the investor community	Medium	Medium-term	ESG tool developers
Action Area D: Policy drivers and public-sector leadership				
7. Limited policies and regulations to drive and enforce the use of ESG standards among investment community	Implement policies to enforce accountability for externalities produced by investments	Medium	Long-term	Public sector

Section 6:

Conclusion

The integration of ESG metrics in infrastructure valuation has experienced limited adoption among the investment community to date. However, the growing emphasis on ESG evaluation across the infrastructure space suggests that investors will increasingly face pressure to refine their understanding of ESG and how it impacts investment performance. ESG tools like those assessed in this report can play an important role in how the infrastructure investment industry evolves.

Many investors and public-sector agencies are already using tools such as GRESB and Envision to monitor and improve asset ESG performance. Many more have begun using evaluation tools or ESG frameworks to develop internal valuation methodologies. Concurrently, tool developers, are improving methodologies and working to customize their approaches to meet user needs. The result of these collective efforts is a market with many commercially-available models for incorporating ESG criteria into infrastructure asset valuation and stakeholder interest in improving and expanding current approaches.

Still, a broad reliance on proprietary ESG methodologies among the investor community implies that the market has significant room to grow. Fragmentation in how ESG is analysed in the infrastructure space and a lack of a unified ESG standard setter have been cited as key barriers to ESG integration in investment decisions. However, standardization should be driven by market forces rather than a selected standard setter. Efforts to drive integration of ESG into investment decisions should therefore be geared toward promoting competition among tool developers to continuously refine ESG methodologies through an understanding of customer needs and improvement in the ability to understand risk and predict the financial performance of infrastructure assets.

As private sector investment in infrastructure rises, new methods of understanding long term risk and asset sustainability can simultaneously improve financial returns for investors and help countries progress toward sustainable development goals. By offering third party assessments and streamlined processes for ESG analysis, ESG tools such as those investigated in this report can help ensure that this growing pool of private capital is allocated toward sustainable infrastructure projects.

This research has identified several needs for accelerating adoption and growing the market for ESG tools. These market needs include:

- Greater availability and accessibility of relevant ESG information and data;
- Increased outreach and education on the existence and benefits of ESG tools;
- Improved industry coordination to increase adoption and grow the market; and
- Additional policies and regulations to address externalities and encourage sustainable investment.

The ability to address these market needs will require coordination, education, and capacity building among several key actors including investors, government officials, multilateral development institutions, and non-profits. To support this effort, the WWF has developed a suite of resources exploring ESG and sustainable infrastructure investment. In addition to this report, these resources include an in-depth analysis of sustainability standards available for infrastructure and an upcoming guidance note on valuation, which will detail how a range of ESG criteria can impact financial models. Additional research to understand the benefits and opportunities of ESG integration in infrastructure investment will play a critical role in accelerating private sector investment in sustainable infrastructure.

Appendix A:

Standards and Reporting Frameworks

Name	Type	Asset Type	Description
<u>Principles for Responsible Investment (PRI)</u>	Investment Framework	ESG in Infrastructure and other asset classes	This framework consists of six voluntary and aspirational principles that help guide sustainable investment practices. The framework furthers incorporation of ESG criteria into decision making by providing asset owners, investment managers, and service providers a menu of possible actions. Signatories—who pay a fee—are required to report on their responsible policies and processes annually.
<u>International Integrated Reporting Framework (IR)</u>	Reporting Framework	Listed Equity	Framework for annual corporate reporting that integrates a range of factors that impact an organization’s ability to create value over time. The framework requires companies to describe how they transform a variety of “capitals,” including financial, manufactured, intellectual, human, social and relationship, and natural) into long-term value creation.
<u>Global Reporting Initiative (GRI)</u>	Reporting Framework	Corporations	Widely-adopted framework for annual corporate sustainability reporting that focuses on critical sustainability issues such as climate change, human rights, governance, and social well-being.
<u>Sustainability Accounting Standards Board (SASB)</u>	Accounting Standard	Listed Equity	Accounting standard designed to enhance high-quality disclosure of material sustainability information that meets investor needs. The standards apply to 79 industries in 11 sectors. Resources available include engagement guides, ESG integration insights, a climate risk bulletin, and a Materiality Map.
<u>Equator Principles</u>	Risk Management Framework	Infrastructure (EMDEs)	Adapted from the IFC Performance Standards, this framework of ten principles is applied by financial institutions to projects in developing countries. These principles help investors determine, assess, and manage social and environmental risks in large infrastructure projects.
<u>ISO 14007</u>	Reporting Standard	Any Organization	Provides guidance to organizations on how to determine and communicate the environmental costs and benefits associated with the aspects of their organizations that relate to natural resources and ecosystem services.
<u>ISO 14008</u>	Reporting Standard	Any Organization	Provides organizations with a common framework for monetary valuation of environmental impacts and natural resources. This standard will increase transparency in monetary valuation and provide a common framework and language for the valuation process (to be released in late 2018).
<u>UNEP FI Responsible Property Investment</u>	Investment Framework	Real Estate	Responsible Property Investment (RPI) is a framework for integrating environmental, social, and governance factors into investors real estate decisions.
<u>IFC Performance Standards on Environmental and Social Sustainability</u>	Investment Framework	Infrastructure	Eight performance standards that a client of IFC must meet throughout the life of an investment with IFC. The standards cover a range of environmental, social, and governance criteria. Additionally, many private investors, multilaterals, and institutional investors require that their clients/assets are analyzed through this framework (or a very similar framework).

Appendix B:

Tool Descriptions

Sustainable Asset Valuation tool (SAVi) developed by International Institute for Sustainable Development (IISD)

SAVi is used by governments, investors and citizen stakeholders to better understand the value of ESEG^{xxiii} externalities associated with infrastructure projects. It can also be used to support the business case for sustainable infrastructure. SAVi can be used in a variety of infrastructure sectors including water, roads, energy, and buildings. It uses a system dynamics methodology which layers ESEG impacts with traditional cost-benefit analysis. It can also help identify and monetize potential risks such as regulatory, market, technology, and social risks.³⁵

GRESB Infrastructure Asset Assessment framework developed by GRESB

The GRESB Infrastructure Asset Assessment framework is used by infrastructure asset investors, managers and asset allocators to score and benchmark infrastructure assets. It can be used for a variety of sectors including energy (generation, distribution, and transmission), data infrastructure (telecommunications, data centres), transportation, waste, water and social infrastructure. Investments are grouped by asset type and assessed across approximately 40 different indicators. Inputs are based around seven core areas aspects including management, policy and disclosure, risks and opportunities, monitoring and EMS, stakeholder engagement, performance indicators, and certifications and awards. The process includes validation, scoring and peer benchmarking (against other similar assets using the framework). Maintaining a GRESB portfolio allows investors to compare the environmental ESG performance of their assets with a sector and peer group benchmark. In addition to the Infrastructure Asset tool, GRESB also provides a benchmarking framework for Infrastructure Funds and a Resilience Module.³⁶

^{xxiii} SAVi explicitly uses the term “ESEG” to reference environmental, social, economic and governance metrics, as well as explicitly mentions climate risks and opportunities.

TREDIS Suite developed by TREDIS

TREDIS is a suite of tools used primarily by government planners in the U.S., Canada, and Australia to conduct financial analysis on transportation projects. These tools use various environmental (e.g. energy use, emissions) and economic (e.g. supply chain reliability) inputs to conduct benefit cost analysis, economic impact analysis, and financial impact analysis. This tool evaluates the mix of different vehicle types as well as can address public transportation.³⁷

Autocase developed by Impact Infrastructure

The Autocase tool is used by project planners, designers & architects, and asset owners to analyse and develop a business case around ESG metrics used in different types of sustainable infrastructure assets. They have two products, which analyse “horizontal” infrastructure (e.g. stormwater)³⁸ and “vertical” (e.g. buildings)³⁹ assets. This tool is primarily used in North America and covers a wide variety of inputs across ESG including air pollution, and carbon emissions as well as more economic metrics like productivity and absenteeism of building occupants. Each metric is assigned a monetary value based on third-party empirically researched data and is used in a triple-bottom-line cost benefit analysis (CBA).⁴⁰

Envision developed by Institute for Sustainable Infrastructure

Envision is a framework used by designers, architects, engineers, local governments and utilities as a decision support tool. The tool can be used across several sectors including energy, water, waste, transportation, landscape and information technology and looks at the complete life-cycle of the project including design, construction, and operation. The framework includes 60 ESEG metrics across five categories: Quality of Life, Leadership, Resource Allocation, Natural World, and Climate and Risk.⁴¹ While the framework is primarily for self-assessment, third party verification to receive Envision certification is also available. It was developed

jointly by the Institute for Sustainable Infrastructure (ISI) and Zofnass Program for Sustainable Infrastructure at Harvard University.

Zofnass Economic Process Tool developed by Zofnass Program at Harvard University

The Zofnass Economic Process Tool is based off the Envision Rating System. It is an online tool for analysing “sustainable externalities” in infrastructure. The tool can be used across several infrastructure sectors including communication, energy, food, landscape, transportation, waste and water. The tool uses ESG metrics across five categories: quality of life, leadership, resource allocation, natural world, climate and risk. For each metric the tool calculates and estimated value of externalities in terms of costs and benefits. In addition, the tool creates a list of Envision credits the project may be eligible for. The tool also provides references for all metrics, which are assigned monetary values by the software.⁴²

SuRE: The Standard for Sustainable and Resilient Infrastructure developed by the Global Infrastructure Basel

SuRE is a global voluntary standard for sustainable and resilient infrastructure that includes 61 ESG criteria across 14 different themes. It was developed as a standard for project developers, financiers and local decision-makers to help leverage public and private investments and maximize benefits. Projects receive independent assessments, and can receive a Bronze, Silver or Gold certification if select criteria to reduce ESG risks are successfully completed. This tool builds upon the UN Framework Convention on Climate Change (UNFCCC), the Sendai Framework for Disaster Risk Reduction, the International Labour Organisation’s (ILO) Core Conventions, the Convention on Biological Biodiversity (CBD), Sustainable Development Goals and capitals of Sustainable Development.⁴³

RepRisk developed by ECOFACT

RepRisk is a global market research and intelligence provider specializing in ESG risk analysis. The database and evaluation methodology were originally developed by ECOFACT, an environmental and social risk consultancy based in Zurich. RepRisk has since become an independent company offering a range of due diligence products for a variety of stakeholders, including banks, insurance providers, asset managers, asset owners, and corporations. The core product is an online searchable database of ESG

risk exposure for companies, projects, and sectors. Using a proprietary IT tool, RepRisk screens over 80,000 sources daily to identify ESG risks. The company then filters and analyses the results to quantify risk in the form of the RepRisk Index and the RepRisk Rating (ranging from AAA to D). The analysis is driven by 28 core ESG issues in the environmental, social, and governance topic areas, along with variable ESG “hot topics” that are more specific and thematic.⁴⁴

CEEQUAL delivered by BRE

CEEQUAL is an international evidence-based ESG assessment rating and awards system for a range of infrastructure, civil engineering, landscaping, and public works projects. The rating scheme was first established in 2003 as a company with an association of shareholders, including civil engineering firms, and was then acquired in 2015 by BRE. CEEQUAL validates user-provided self-assessments and evidence with rigorous external verification to arrive at a percentage assessment score and award (excellent, very good, good, or pass) to all evaluated projects. CEEQUAL is used by governments, private sector developers, project designers, and project contractors to measure and improve ESG outcomes. BRE is currently in the process of aligning its proprietary tool, BREEAM, with CEEQUAL to create an aligned industry-standard tool in late 2018.⁴⁵

Infrastructure Sustainability Scorecards developed by ISCA

The International Sustainable Council of Australia (ISCA) Infrastructure Sustainability Scorecards evaluate ESG criteria for the planning, design, construction, and operation of infrastructure assets. The scorecards are currently targeted for use in Australia and New Zealand. Tools for use outside of the region are in development.

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