

INCORPORATING SUSTAINABILITY INTO INFRASTRUCTURE

How climate and nature-related factors are applied
in the investment process



ABOUT THIS REPORT

OBJECTIVE AND SCOPE

This report covers current industry trends and practices in infrastructure investing as they relate to environmental, social, and governance (ESG) factors, with a particular focus on climate- and nature-related considerations. The report examines ways in which ESG factors are integrated into investment decision-making processes and the methods used to assess ESG concerns. Case studies are used to showcase examples of best practices. Materials for the report were collated by Oliver Wyman and WWF. Primary research included a survey, direct interviews with leading investment organizations, and a review of existing ESG research literature.

Contemporary ESG literature typically considers two elements of ESG management: the way in which ESG factors are integrated into decision-making and the sustainability practices adopted by organizations. This report focuses on the first element, particularly the decision-making process to deploy capital. Investors have long looked at governance as a key decision-making criteria, and hence is not focused on within this report.

STRUCTURE AND RESEARCH

To examine the current practices of infrastructure investors around ESG integration in investment decisions, a survey was commissioned with responses from more than 30 global infrastructure investors, just over half of them with more than US\$10 billion in assets under management. In addition, we interviewed a number of investors and institutions. An in-depth review of existing literature was performed to validate and supplement our primary research.

The report captures key findings from the primary and secondary research in three sections: overall progress integrating ESG factors into investment decisions to date, current approaches to ESG factor integration and case studies showcasing investment organizations' best practices for ESG factor integration.

The report aims to increase readers' awareness and knowledge of ways in which climate- and nature-related ESG factors can be integrated into infrastructure investment decision-making. Ultimately, this is to promote the increased adoption of such practices in the investment industry.

EXECUTIVE SUMMARY

Various stakeholders have taken a wide range of policy actions to encourage the integration of ESG factors into investment decisions, including infrastructure investments. Research conducted for this report indicates progress in integrating climate- and nature-related ESG factors into decision-making processes, as all survey respondents indicated that they use ESG scoring frameworks of some kind. Motivations to include such frameworks have usually been driven by society- and market-led considerations, with the top three motivations for ESG integration being financial returns, ESG risk management and brand reputation (for more details, please refer to Section 2).

The integration of ESG factors into investment decision-making most commonly consists of a qualitative evaluation within the structured due-diligence process, followed by ongoing ESG performance monitoring at the post-investment stage. Some investors are still filtering or screening assets that are unattractive for ESG reasons, however funds are increasingly using a more nuanced approach. For instance, some investors are considering investments into assets currently perceived as less “sustainable,” to support those assets’ transition onto a more sustainable footing from an ESG perspective. Investors are planning to adopt quantified ESG metrics into their valuation modelling assessments (refer to Section 2).

The ESG factors most commonly reflected in investment decision-making were greenhouse gas (GHG) emissions and energy and resource efficiency. Within infrastructure investment sectors, the ESG factors most often considered included GHG emissions in utilities, transport and thermal energy generation, and physical climate in telecommunication, utilities and transport (refer to Section 3).

Two distinct approaches can be seen: 1) smaller or indirect investment funds relying more on external frameworks and tools; and 2) infrastructure specialists and multilateral development banks using a combination of internal proprietary tools as well as external frameworks and tools. The scale and focus of the second approach generally lead to an increased capacity and appetite to use proprietary tools to identify an asset’s current and future ESG footprint (refer to Section 3).

ESG motivations associated with corporate responsibility and those associated with financial returns are converging, as ESG factors are increasingly considered as driving risk-adjusted returns. Investors are recognising the potential to enhance value by making unsustainable assets sustainable, thus benefiting from a yield shift and higher returns in the process (refer to Section 3).

Case studies from leading investors clearly illustrate the benefits of considering ESG factors in the investment process. Prominent examples referenced in the report include:

- **European Investment Bank (EIB):** The integration of GHG emissions and air pollution considerations into lending activity.
- **Allianz Global Investors:** Physical climate and biodiversity considerations in the Thames Tideway Tunnel project.
- **A leading infrastructure fund:** ESG approach and organizational practices for enablement.

(Refer to Section 4)

For the future, emerging best practices include a focus on acquiring better-quality data to integrate ESG considerations into qualitative decision models and enhancing the number of climate- and nature-related ESG factors integrated into investment decisions (refer to Section 5).

1. INTRODUCTION

Collective progress by governments and industry bodies towards sustainability have taken various forms, including the Paris Climate Agreement, the UN Convention on Biological Diversity, and the 2030 Agenda of the United Nations Sustainable Development Goals (UN SDGs). These agreements have motivated more than 70 countries¹ to pledge to deliver national climate policies consistent with the aim of net zero emissions by 2050. The private sector has also sought to further its own commitment to ESG standards through actions such as the Financial Stability Board (FSB) Task Force on Climate-related Financial Disclosures (TCFD) and the United Nations Principles of Responsible Investment (UN PRI). Building and operating of infrastructure is responsible for more than 60 percent of global greenhouse gas emissions², as well as being a core driver of biodiversity loss. That means efforts to put infrastructure investment on a more sustainable path are key to meeting global climate and nature goals.

In line with pursuing the long-term interests of stakeholders and ultimately investors, investment funds have looked to integrate ESG factors in their investment decision making process. The approach has evolved: in the past, the aim was to uphold corporate responsibility³ for reputational benefit; today, investors also recognise the potential for increased financial returns and risk mitigation.⁴

In the next sub-section, we will discuss trends driving sustainable investments, which has extended beyond an initial focus on renewables generation in Europe to now encompassing a wide range of sectors and geographies.

1 Report of The Secretary-General on the 2019 Climate Action Summit.

2 OECD (2017), Investing in Climate, Investing in Growth, OECD Publishing, Paris.

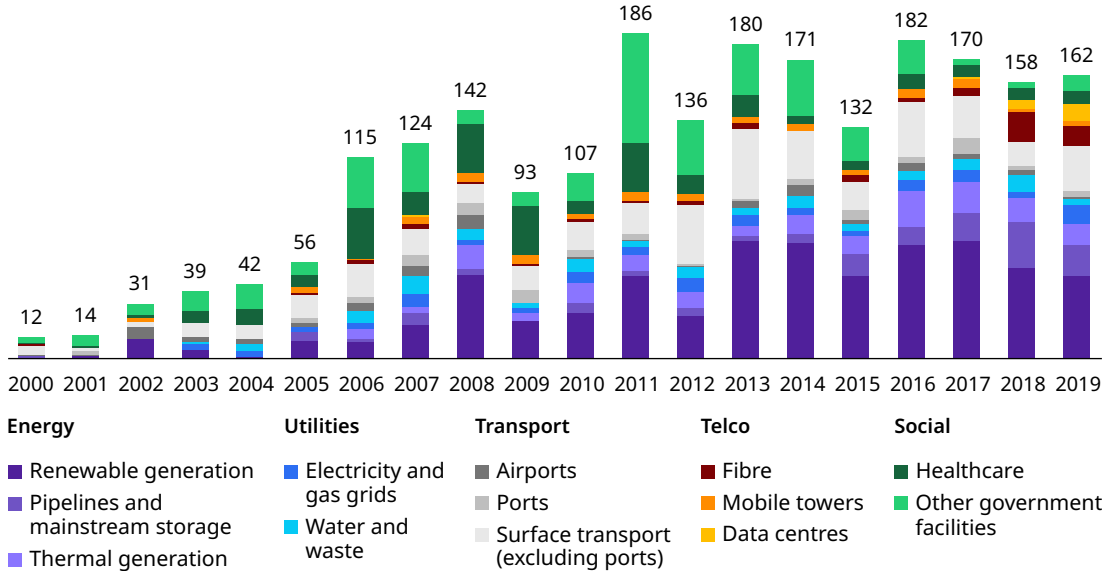
3 Morningstar, "ESG Investing Comes of Age."

4 PRI, "Primer on Responsible Investment in Infrastructure."

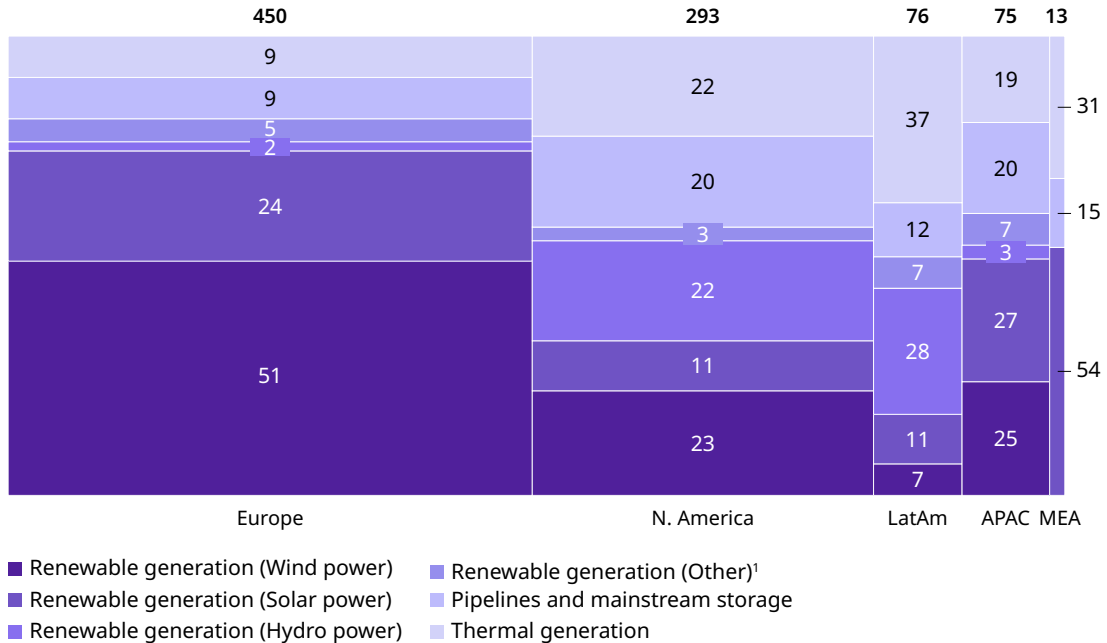
PRIVATE INFRASTRUCTURE INVESTMENTS OVER THE LAST TWO DECADES

Exhibit 1: Number of private infrastructure investments globally since 2000

Completed infrastructure investment by asset types
 Number of closed transactions, 2010-2019



Total completed energy deals, breakdown by region
 2010-2019, %



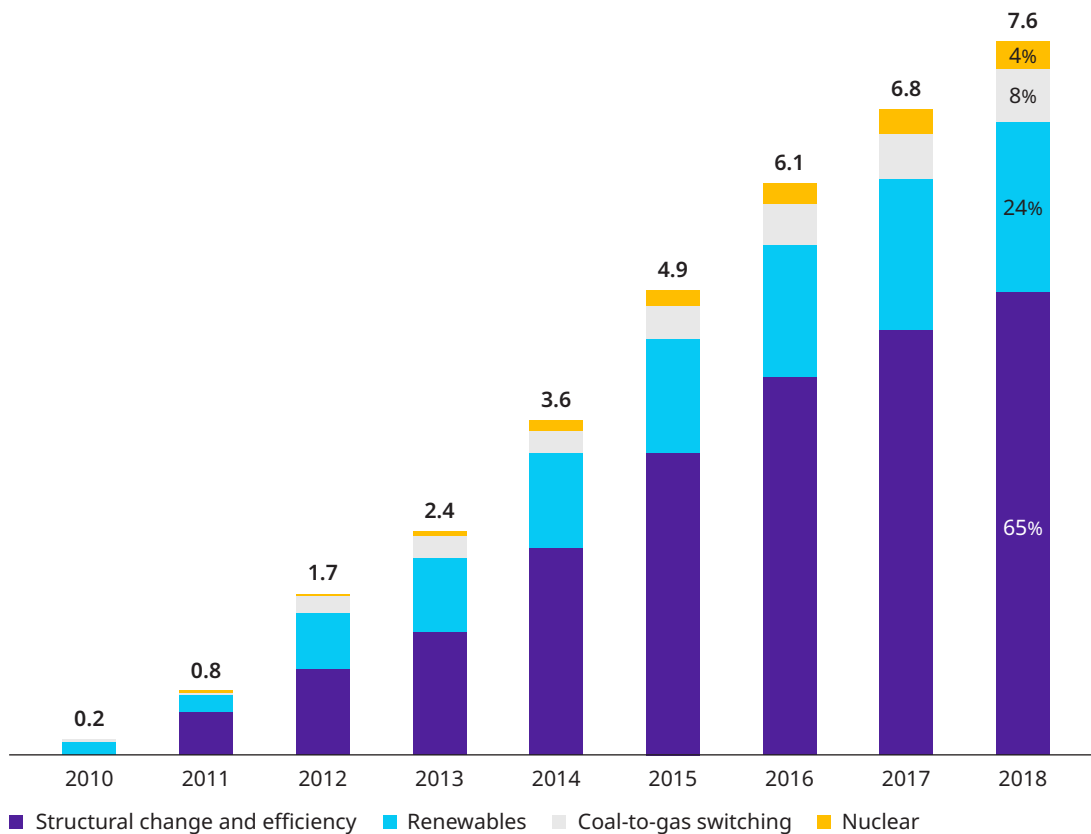
Note: APAC: Asia and the Pacific. LatAm: Latin America & The Caribbean. MEA: Middle East and Africa. There were no reported deals in the category "Energy services: EV charging"

1. "Energy: renewable generation (other)" includes biomass and biofuel facilities; geothermal power; and other green and renewable forms of energy

Source: Preqin Ltd

As emerging economies develop and urbanize, global infrastructure investment has grown at an average annualized rate of over 10 percent for the last two decades (see Exhibit 1). Energy projects account for 40 percent of the total number of investments, followed by social- and transport-related projects. Growth in energy-related projects has primarily been renewables-based (70 percent of total energy deals), in the form of wind, solar and hydro. With some of the most mature global government policies on sustainability⁵, Europe has been the main geographic area of renewables investments, whereby renewables make up more than 80 percent of energy investments (by number of deals). The significant growth of renewable energy infrastructure is at the forefront of global carbon-reduction efforts and has prevented over 1.8 Gt CO₂ of emissions since 2010 (see Exhibit 2).

Exhibit 2: Contributions to global CO₂ emissions reductions
2010-2018, Gigatonnes



Note: Structural change factors in the transport and residential sectors are also putting upwards pressure on energy use. These factors include increasing building floor area and appliance ownership, changes in the mode and type of vehicles used (including increased ownership of larger, less efficient passenger cars such as SUVs), and decreased vehicle occupancy rates
Source: IEA World Energy Outlook 2019

⁵ Examples include the 2020 and 2030 climate and energy frameworks, which gave rise to the EU emissions trading system (ETS).

Globally today, approximately four renewable projects are undertaken for every investment in traditional thermal generation. This contrasts with a ratio of approximately one-to-one in the early 2000s. This paper will show that investors are continuing to drive a shift toward sustainability through the adoption of ESG factors for investment decision-making in infrastructure sectors beyond energy, such as transport and telecommunications.

REPORT FOCUS

The report focuses on five key climate- and nature-related ESG factors, and we evaluate ways in which investors have embedded these considerations into their investment decision-making processes (see Exhibit 3). The report also summarizes key findings on the integration of nature- and climate-related ESG factors into decision-making along the investment lifecycle, as well as investors' motivations and approaches and the challenges they face.

Exhibit 3: Climate- and nature-related ESG factors

ESG factors	Description
GHG emissions	The release of greenhouse gases ¹ (e.g. carbon dioxide, methane), leading to global warming
Air pollution	The release of pollutants (e.g. PM2.5, NO _x , SO _x) detrimental to human health and the planet
Energy and resource efficiency	Adoption of high energy-intensity and consumption practices or materials
Physical impacts of climate change	Physical impacts of climate change arising from acute (e.g. floods) and chronic risks (e.g. rising sea levels)
Biodiversity	Practices that cause a loss of biodiversity (plant, natural life) typically occurs — habitats can no longer support the present species

1. The 6 UNFCCC/Kyoto protocol GHGs: carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulphur hexafluoride (SF₆), and nitrogen trifluoride (NF₃)

Source: Oliver Wyman

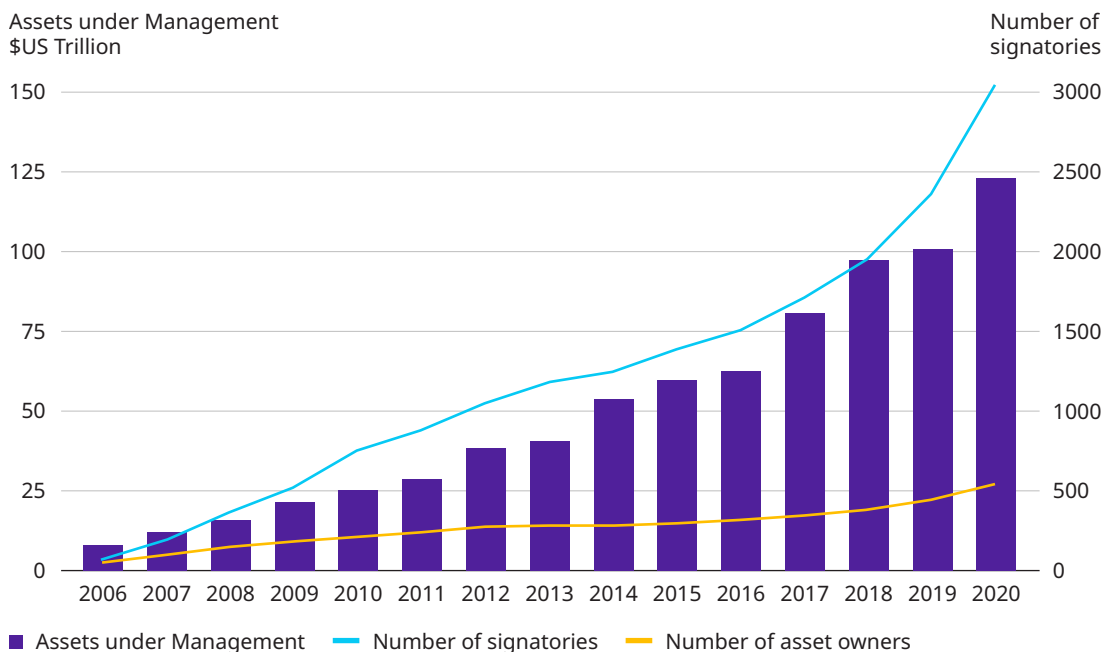
2. PROGRESS OF ESG INTEGRATION INTO INVESTMENT DECISIONS

CURRENT STATE OF PLAY IN ESG INTEGRATION

A broader societal focus on climate change and sustainability has encouraged integration of ESG factors into the investment decision-making process across asset types.⁶ Commitments such as the UN PRI⁷ have encouraged investors to integrate sustainability-related considerations into their decisions and later to monitor them.

Before the UN PRI initiative and national ESG-related policies, responsible ESG investing typically involved only negative screening.⁸ Today the number of PRI signatories has risen from 100 to more than 3,000, and their assets under management have grown more than 10-fold to about \$100 trillion (see Exhibit 4).

Exhibit 4: Growth of UN PRI initiative by number of signatories and assets under management



Source: UN PRI

6 UN PRI, “Responsible Investment Market Update: A Snapshot of Signatory Action.”

7 Key principles of the UN PRI include the pledge to incorporate ESG issues into investment analysis and decision-making processes; for asset owners to do likewise with ownership policies and practices; as well as to seek appropriate disclosure on ESG issues and to report progress towards implementing the Principles.

8 Morningstar, “ESG Investing Comes of Age.”

Researchers have also made an empirical case for better financial returns, showing that the integration of ESG factors into investment decisions can drive financial outperformance through lower cost of capital, improved operational performance of firms and increased stock prices.⁹ This has been attributed to a range of effects, including reduced risk of physical damage, enhanced worker productivity, and reputational impact. The findings on improved returns are particularly relevant for long-term investors such as infrastructure funds, as sustainability and resilience-related risks can impact cash flows and valuations over a long period of time.¹⁰

In addition, sustainable infrastructure is becoming more cost competitive due to a combination of technological advances and economies of scale. For instance, a recent IRENA study¹¹ found that in 2019 the majority of newly commissioned utility-scale renewable power plants generated electricity at a lower cost than existing coal generation. That was before accounting for the growing environmental abatement costs faced by fossil-fuel plants, such as carbon taxes. The cost of battery storage has also fallen dramatically over the last decade and is projected to fall even more in the future.¹² Looking forward, we expect new forms of sustainable infrastructure such as electrolytic hydrogen¹³ to mature and challenge traditional thermal assets.

The integration of ESG factors into investment decisions can drive financial outperformance through lower cost of capital, improved operational performance of firms and increased stock prices

9 University of Oxford and Arabesque Partners, "From the Stockholder to the Stakeholder: How Sustainability Can Drive Financial Outperformance."

10 Stanford Global Projects Center, Guggenheim Partners, and WWF, "State of the Practice: Sustainability Standards for Infrastructure Investors."

11 International Renewable Energy Agency, "Renewable Power Generation Costs in 2019."

12 Average market prices for battery packs (\$/kWh) have fallen from \$1,100 in 2010 to \$156 in 2019, an 87 percent fall in real terms. Prices are projected to fall to around \$100 by 2023. Source: Bloomberg New Energy Finance (BNEF).

13 Electrolytic hydrogen technology is enabled by greater use of solar PV and wind generation. The IEA forecasts that the cost of producing hydrogen from renewable electricity could fall by 30 percent by 2030. Source: IEA

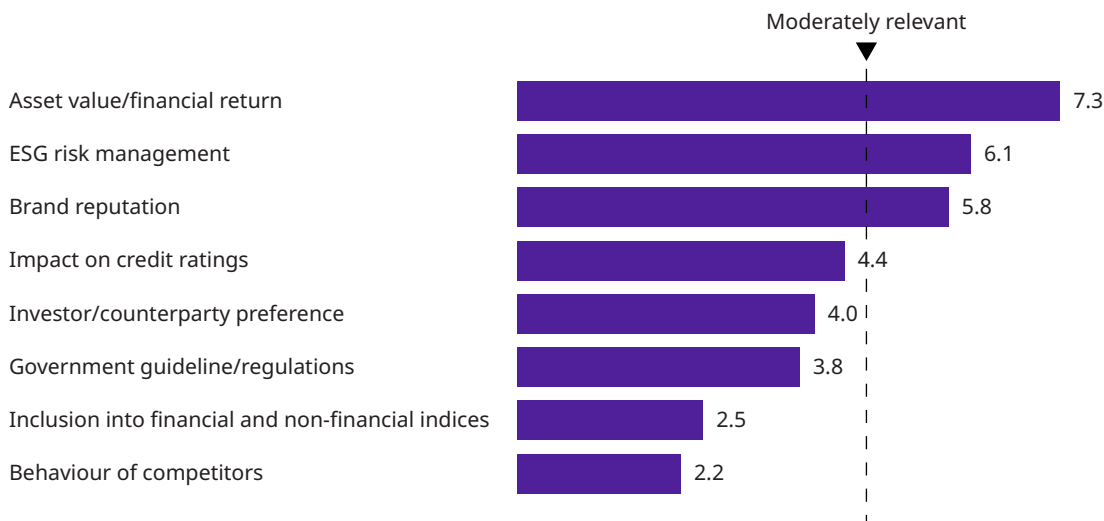
INVESTORS' RATIONALES FOR CONSIDERING ESG FACTORS IN INVESTMENT DECISIONS

Institutional investors are increasing their commitment to ESG considerations for a variety of reasons. Our survey found that the top three motivating factors are financial returns, ESG risk management¹⁴, and brand reputation (see Exhibit 5).

- **Financial returns:** The primary motivation for investors to consider ESG integration is the financial gain expected from investing in sustainable businesses.
- **ESG risk management:** Investors seek to protect against downside to physical risks from natural catastrophes and climate-related events, increasingly considering these as part of an investment due diligence. In 2017 and 2018, wildfires caused record-breaking economic losses, including over \$20 billion annually in California.¹⁵ The catastrophic fires led to the world's first climate-change bankruptcy: PG&E was found liable for damage because its power lines had potentially caused the wildfires.
- **Brand reputation:** Reputational risk is a key concern. As investors' ESG performance comes under greater scrutiny, stronger ESG standards brings a positive image of responsible investment and broader alignment to the UN PRI commitments. Insufficient efforts may increase reputational risk and potentially result in higher costs for investors.¹⁶

Exhibit 5: Importance of factors in ESG integration

On a scale of 8 = Most relevant to 1 = Least relevant



Note: Survey respondents were asked to rank the factors driving their organization's ESG integration

Source: Oliver Wyman and WWF ESG survey (N=26)

¹⁴ We largely refer to ESG risk management as the long-term mitigation of physical risks (mostly chronic and sometimes acute events) such as climate change impacts, which affect asset values. We note that the time horizon of ESG risk management varies across the investor community.

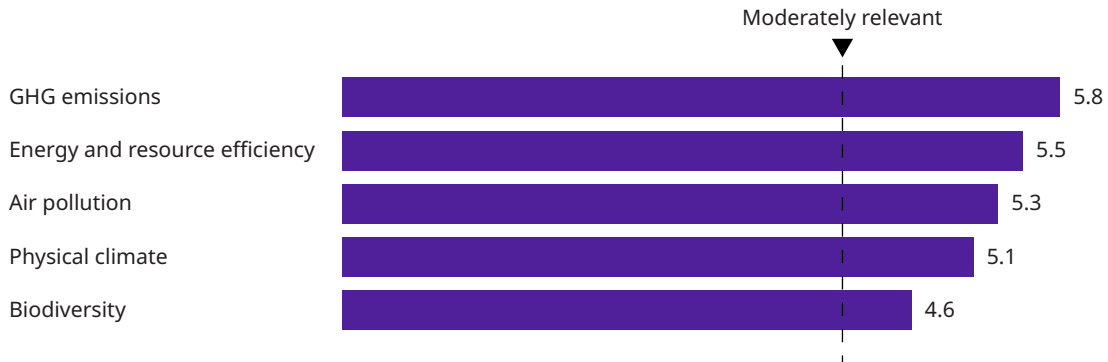
¹⁵ Marsh & McLennan Companies, "The Burning Issue: Managing Wildfire Risk."

¹⁶ Oliver Wyman, "The Hidden Cost of Reputation Risk: An Approach to Quantifying Reputation Risk Losses."

The survey indicates that investors consider GHG emissions to be the most relevant for infrastructure investments (see Exhibit 6). GHG emissions are also the most common factor used to make investment decisions for carbon-intensive sectors such as energy, utilities, and transport.

Exhibit 6: Relevance of ESG Factors to infrastructure investments

On a scale of 7 = Most relevant to 1 = Least relevant

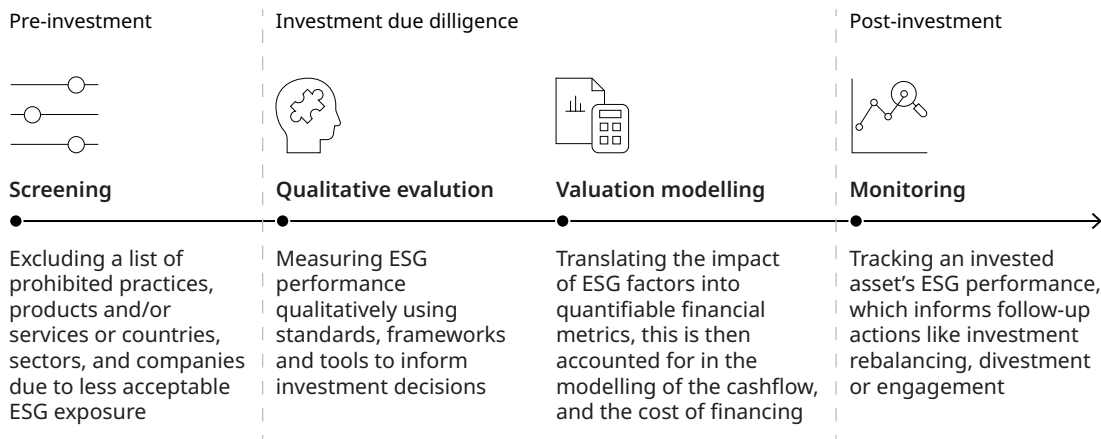


Note: Survey respondents were asked which ESG factors are most relevant to their organization's infrastructure investments
 Source: Oliver Wyman and WWF ESG survey (N=26)

INTEGRATION OF CLIMATE- AND NATURE-RELATED ESG FACTORS ACROSS THE INVESTMENT PROCESS

Across the four stages of the infrastructure investment process (see Exhibit 7), consideration of ESG factors is integrated to varying degrees. This is due to sector or ESG factor specific challenges in definition, quantification and tracking of suitable metrics. For example, while more companies are starting to track and report the intensity and volume of GHG emissions, the disclosure and integration of biodiversity into investment considerations are less prevalent.

Exhibit 7: Key stages of the infrastructure investment decision-making process



Source: Oliver Wyman

Screening: When negative screening is applied, the most common types of companies excluded are those that produce or use coal- and oil-related assets.

Qualitative evaluation: The screening phase is often part of a broader qualitative evaluation, in which other qualitative information is collected but might not be used to make a binary decision of whether or not to invest. Commonly adopted frameworks for ESG integration include the UN PRI and the TCFD, according to the survey.

Valuation modelling: ESG integration into valuation modelling includes the quantifying of ESG factors and assigning a financial value as an input to the asset price or cashflow. Most investors indicated that they do not embed ESG factors in valuation modelling, or do so only partially. Reasons include challenges in metric definition, tracking, and financial quantification.¹⁷ However, more than three-quarters of survey respondents indicated that a key priority going forward will be to work with asset owners and others to define, measure, and track data.

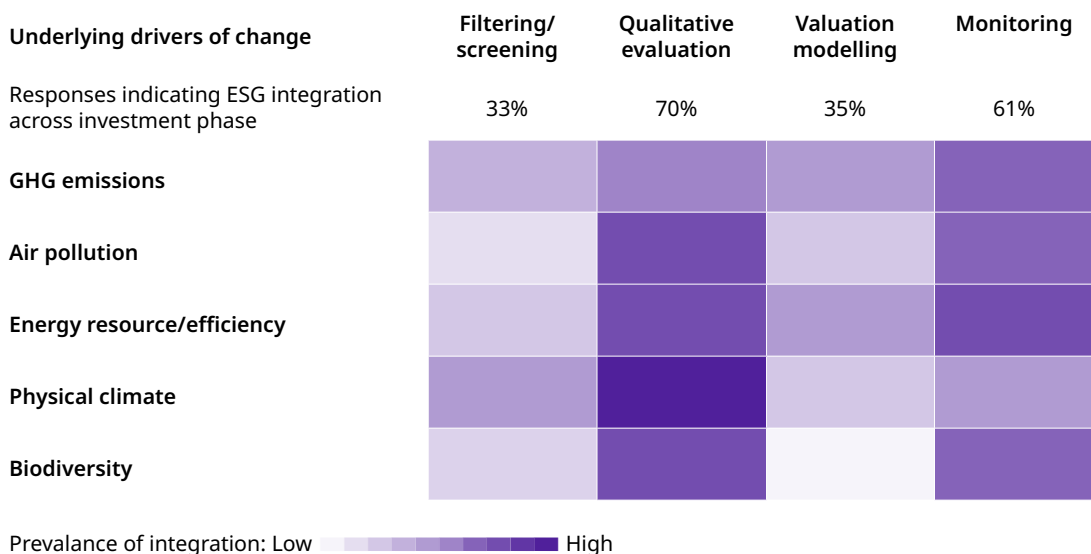
Monitoring: Ongoing monitoring and oversight of ESG performance post-investment is also widely practiced by investors (over 60 percent of survey responses). This can be done through centralized research dashboards that identify and track emerging ESG risks. Deal teams may also conduct further assessments of the risks, which then feed into decisions such as rebalancing the weight of an investment or even divesting an asset.

¹⁷ WWF Switzerland and B Capital Partners, "Guidance Note: Integrating ESG Factors into Financial Models for Infrastructure Investments."

Qualitative evaluation and monitoring are the stages of the investment process with the highest prevalence of ESG integration, and they are typically the starting point for investors to incorporate external assessments into investment decisions (see Exhibit 8).

Screening is less prevalent, as investors prefer a more nuanced approach with the opportunity to engage, advise and finance transitions to improved ESG outcomes. For example, some funds that had previously filtered out less sustainable assets would now consider investing in them, provided the assets have put in place — or are open to establishing — robust energy-transition plans.

Exhibit 8: Consideration of five ESG factors across the investment lifecycle



Note: Survey respondents were asked how they integrate each ESG factor
 Source: Oliver Wyman and WWF ESG survey (N=26)

Companies’ GHG emissions can come under intense scrutiny, given the well-publicized link to climate change, and leading bodies such as the Intergovernmental Panel on Climate Change (IPCC) have emphasized the importance of shifting towards an economy with net zero emissions. In emissions-intensive sectors¹⁸, a number of investors have started to use internal carbon pricing to factor the cost of carbon into projected earnings and cash flows.¹⁹ Some investors refer to the current market price or traded price of carbon cap-and-trade schemes, while others include forward projections. A newly emerging practice is the inclusion in decision-making of a more holistic “total societal” cost of carbon (this approach features in a case study later in this paper).

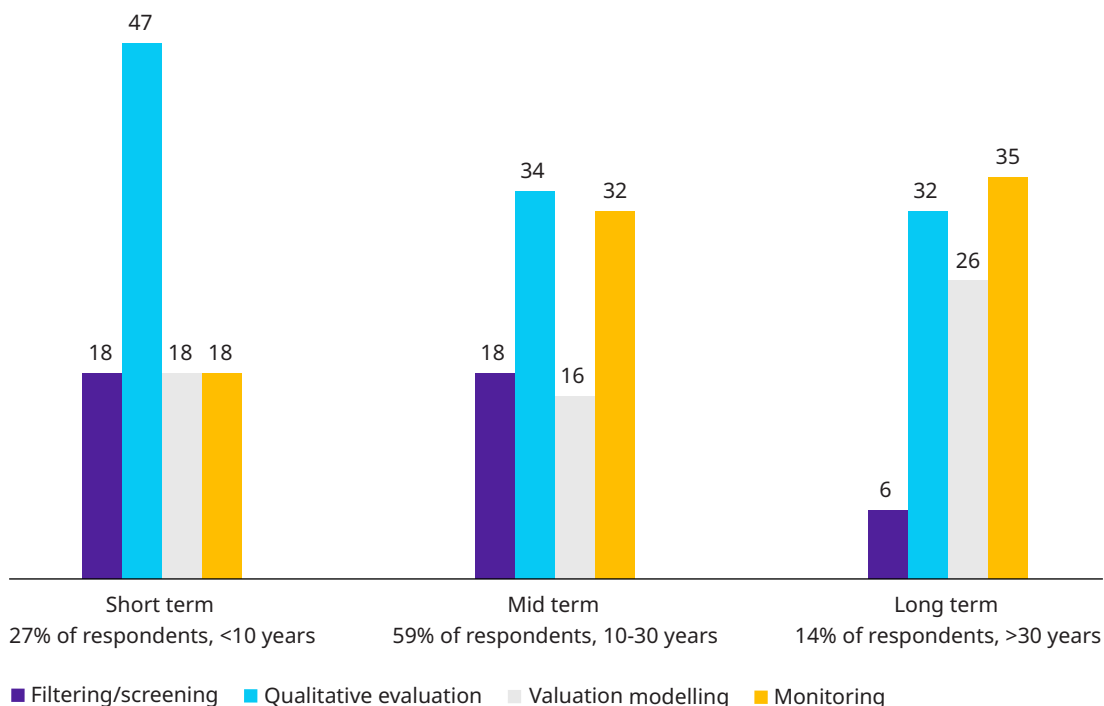
¹⁸ Oliver Wyman and CDP, “Doubling Down Europe’s Low-Carbon Investment Opportunity.”

¹⁹ Companies use internal carbon pricing to decide on capital investments and strategy, as well as to quantify and manage the financial and regulatory risks associated with carbon price schemes. Source: [Harvard Business Review](#)

Biodiversity is the least integrated factor of those in focus, particularly at the filtering and valuation modelling stages. A major reason is that key performance indicators are often difficult to quantify and cannot be readily translated into a quantifiable financial impact.²⁰ Therefore biodiversity considerations are typically integrated into the stages of qualitative evaluation and monitoring.

Investors with different investment time horizons also exhibit variation in ESG integration along the investment process (see Exhibit 9). Integrating ESG factors into financial modelling is more common among longer-term investors, for whom the longer-term impact of ESG factors is more prominent on performance and returns.

Exhibit 9: ESG integration into investment processes by investors' time horizon for cashflow modelling (%)



Note: Survey respondents were asked how they integrate each ESG factor and the length of the time horizon in their organization's infrastructure cashflow modelling (pre-"terminal value")

Source: Oliver Wyman and WWF ESG survey (N=26)

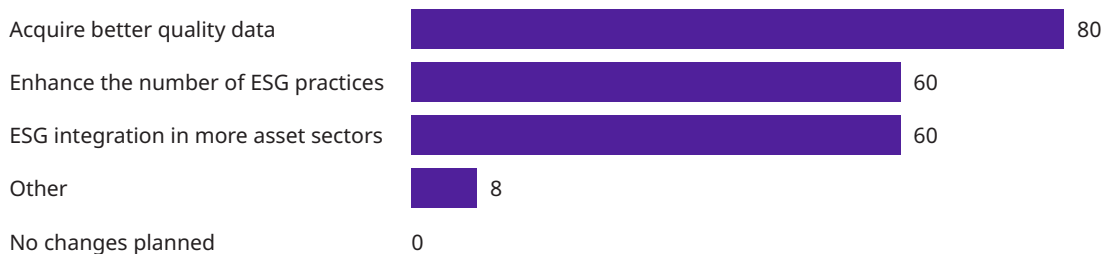
²⁰ WWF Switzerland and B Capital Partners, "Guidance Note: Integrating ESG Factors into Financial Models for Infrastructure Investments."

FORWARD-LOOKING TRENDS

All respondents plan to continue their commitments to ESG in the future. The main focus will be to acquire better-quality data, increase the number of ESG practices, and integrate ESG factors into more infrastructure sectors (see Exhibit 10).

Exhibit 10: Initiatives on ESG integration planning to be developed or improved over the next three years

% of respondents



Note: Respondents were asked which type of ESG integration initiatives they are planning to develop or improve over the next three years; Items in “Other” are climate risk and continued enhancement of ESG disclosure

Source: Oliver Wyman and WWF ESG survey (N=26)

Some investors are working with their portfolio companies to raise the quality and quantity of reported data and information. In parallel, they are also considering requesting ESG data from target businesses as part of their due diligence processes.²¹

As investors advance the extent of ESG integration into investment processes, they will continue to face challenges around data paucity and a lack of harmonized standards or benchmarks. Investors will therefore need to work with other stakeholders, such as non-profits, ESG tool developers, and the public sector, to overcome these challenges. Key action areas could involve the creation of ESG tools tailored to infrastructure sub-sectors; the maintenance of open-source databases linking ESG metrics to financial performance²²; and the definition of performance standards for what is “acceptable,” “good,” and “best practice.” They could be used as references by both investors and asset operators (some of these approaches to increasing the rigour of ESG integration are included in the case studies later in this paper).

²¹ From interviews.

²² WWF Switzerland and Cadmus Group, “Valuing Sustainability in Infrastructure Investments: Market Status, Barriers and Opportunities. A Landscape Analysis.”

3. HOW INVESTORS ARE ADAPTING SPECIFIC ESG METRICS INTO INVESTMENT PROCESSES

This section considers the application of ESG factors and frameworks based on investor type and asset sector.

INSIGHTS ON HOW INVESTORS APPLY ESG FACTORS TO INVESTMENT DECISIONS

All survey respondents indicated the use of ESG frameworks in their investment decisions, of which more than half of respondents use only external frameworks for ESG integration (see Exhibit 11). UN PRI and TCFD were most commonly used external frameworks.

We have also observed a bifurcation in approach. Firstly, smaller or indirect infrastructure investors typically rely on external frameworks, while secondly, direct infrastructure funds and multilateral institutions develop proprietary assessment frameworks to use alongside external frameworks.

In the first case, pension funds and non-infrastructure specific funds are examples which typically outsource ESG considerations to external consultants (as opposed to full time, in-house teams). They rely mostly on external frameworks, given these funds' focus on lower cost and more indirect exposure to infrastructure. In particular, the mandates of sovereign wealth or pension funds reflect their governments' priorities and therefore follow their governments' support of external intergovernmental frameworks such as the UN SDGs.

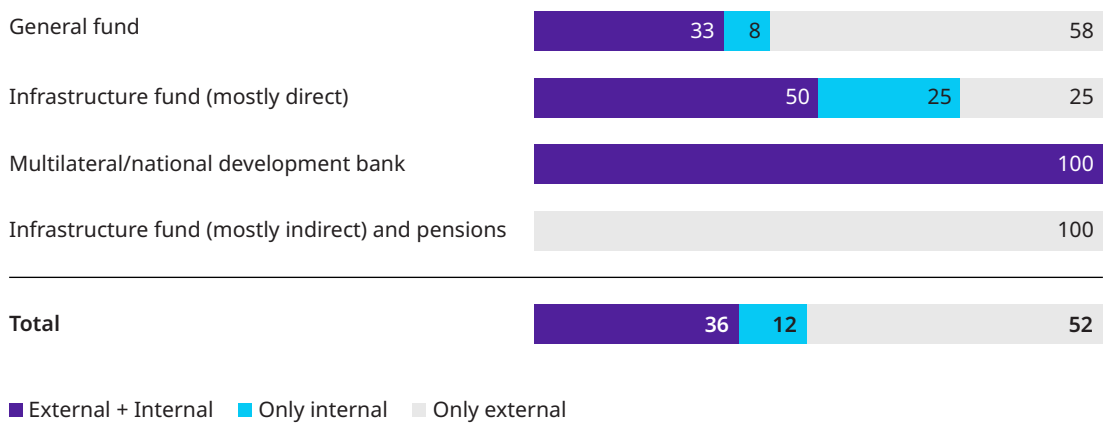
In the second case, we see infrastructure "specialists," often with higher infrastructure deal flows, using a combination of both internal proprietary methods and external approaches. Direct infrastructure investors are increasing the comprehensiveness and rigour of their ESG considerations in due diligence processes²³, as well as building out in-house ESG teams. Some funds have also elevated the ESG department's role by establishing a direct reporting line into the CEO and directly including ESG-related considerations into performance evaluations of investment deal teams.

²³ From interviews.

Multilateral development banks, which are seen as thought-leaders and pioneers of proprietary methodologies for ESG integration, must still reflect the external perspectives of public sector stakeholders (see the EIB case study). They therefore use a synthesis of internal and external frameworks in line with the interests of both private and public stakeholders.

Exhibit 11: Initiatives on ESG integration planning to be developed or improved over the next three years

% of respondents



Note: Survey respondents were asked their investor profile and whether they use any internal or external frameworks or scoring methodologies

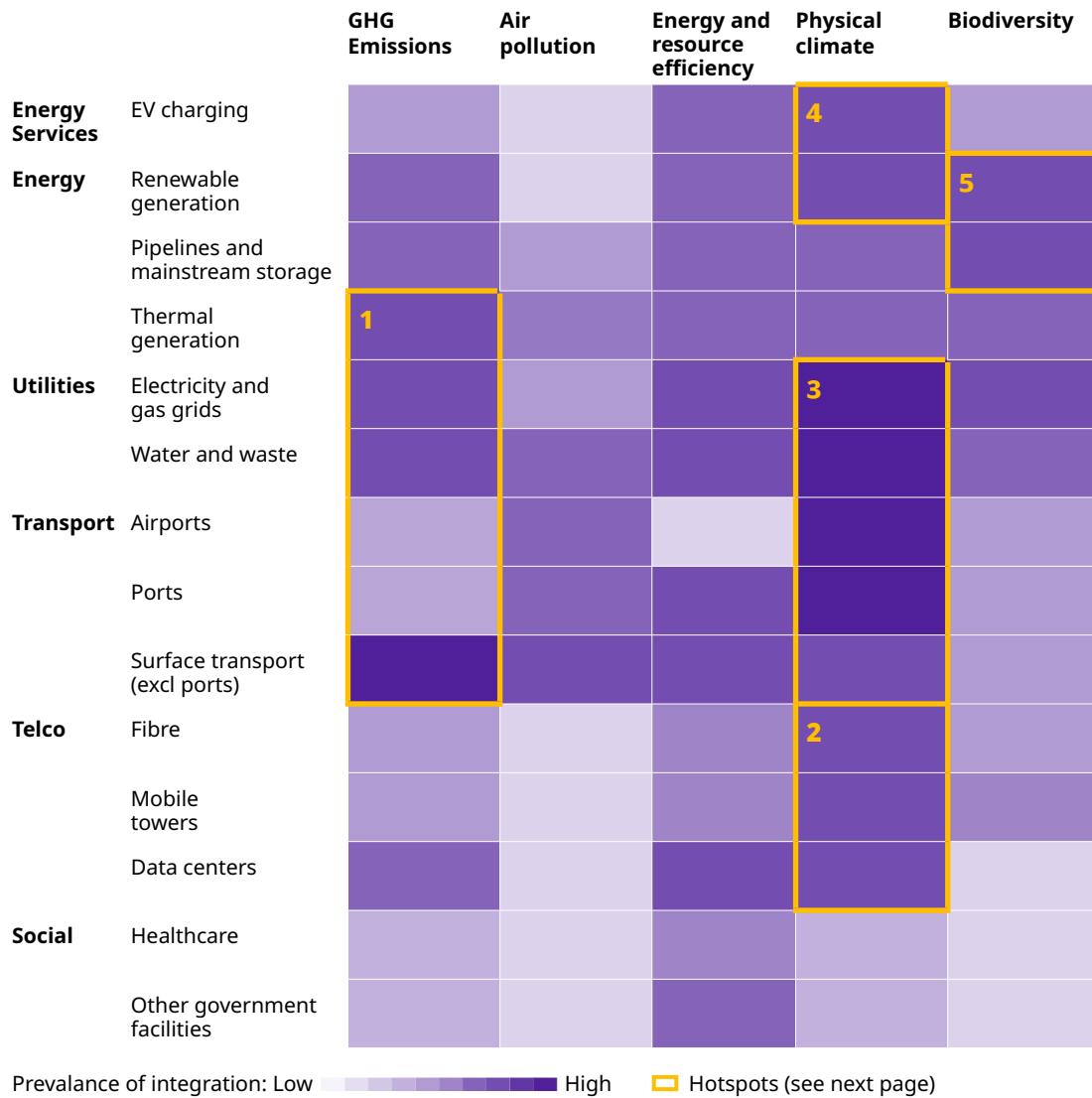
Source: Oliver Wyman and WWF ESG survey (N=26)

HOW INVESTORS ADOPT ESG FACTORS ACROSS INFRASTRUCTURE SECTORS

Exhibit 12 shows the prevalence of ESG factors when considering investments and assets in different infrastructure sectors. We have identified five hotspots with higher levels of ESG integration. The survey responses are consistent with current literature, demonstrating that investors in energy, utilities, and transport infrastructure are more actively integrating GHG emissions and physical climate risks. The results also indicate that air pollution is applied less consistently, even for known pollutive investments such as airports and thermal generation plants. However, this may reflect a selection bias, whereby investors who are concerned about air pollution do not invest in these sectors.²⁴

²⁴ Selection bias: Only funds that investing in an asset sector were asked whether they consider ESG factors. So, investors in thermal power generation might be less concerned about sustainability and thus might not include ESG considerations in their investment decisions.

Exhibit 12: Number of infrastructure investments over time by asset sectors
By energy assets and region



Note: Respondents were asked which ESG factors they apply to each asset class

Source: Oliver Wyman and WWF ESG survey (N=26)

Five hotspots can be seen across GHG emissions, physical climate risk, and biodiversity factors:

1. Utilities, transport and thermal generation are primary sources of GHG emissions in major economies, accounting for three quarters of GHG emissions.²⁵ Investors indicated a high prevalence of GHG emission factor integration in their investment decisions, with 60 percent of survey respondents integrating GHG emissions-related metrics such as cost associated with carbon emissions. This lets investors quantify and manage the financial and regulatory risks associated with emissions, while informing climate strategy and opportunity identification accordingly.²⁶ The mitigation of emissions is usually linked to energy and resource efficiency as well, with owners and operators taking a dual approach in investing in new technologies to minimize emissions, while focusing on increasing energy efficiency (bringing direct financial benefits).
2. Physical climate risk places telecommunications infrastructure in vulnerable positions, with overland cables threatened by rising sea levels; fiber optic cables in coastal regions are threatened by flooding; and rising ambient temperatures and the growing intensity of heatwaves require more-intensive cooling systems and increasing coolant costs.
3. Physical climate factors also occupy the mind space of investors in utilities and transport infrastructure. These are typically public goods and services requiring strong business continuity practices, leading investors to consider physical climate risks like sea level rise and wildfires as part of their risk mitigation strategy.
 - Utilities
 - Investors are now more aware of physical risks caused by climate change and their impact on both assets and society. A 2019 Blackrock study found that aging infrastructure within the US electric utility sector has underpriced risk to climate shock.²⁷ A global study by the C40 Cities Climate Leadership Group noted that close to 300 coastal power plants, responsible for providing energy to almost half a billion people, were at risk of flooding from a 0.5-meter sea level rise by the 2050s.²⁸
 - Infrastructure investors that do not consider physical climate factors put themselves at risk of underestimating asset damage, losses in asset efficiency or output, and increases in maintenance costs. These can have significant financial impacts, which in extreme cases can lead to bankruptcy. One investor interviewed cited physical climate risks as a reason for not investing in a gas distribution asset with otherwise strong financials — heavier snowfall due to climate change increases the likelihood of avalanches and landslides that prevent maintenance crews from reaching the asset, thus increasing the risk of service disruption.

25 United States Environmental Protection Agency (EPA), "Sources of Greenhouse Gas Emissions," last modified September 2020, European Environment Agency (EEA), "Total greenhouse gas emission trends and projects in Europe," last modified December 2019.

26 Joseph E. Aldy and Gianfranco Gianfrate, "Future-Proof Your Climate Strategy."

27 Blackrock Investment Institute, "Getting Physical: Scenario Analysis for Assessing Climate-Related Risks."

28 C40 Cities Climate Leadership Group, "The Future We Don't Want: How Climate Change Could Impact the World's Greatest Cities."

- Transport
 - Airports, for example, have faced acute extreme weather event risks like storms and typhoons, such as Osaka-Kansai airport halting operations for 17 days in 2018 after Typhoon Jebi breached coastal defense measures and caused flooding.²⁹
 - Chronic issues like sea level rise also impacts coastal airports. Research by the World Resources Institute (WRI) has shown that a one-meter rise in sea level by 2100 can cause an estimated 80 airports globally to be flooded.³⁰
- 4. Physical climate risk can have a material impact on EV charging and renewable energy infrastructure. In Australia, for example, acute risks like the 2019-20 bushfire season coupled with a surge in uptake of renewables threatened to destabilize the country's energy system.³¹ Chronic risks of rising temperatures has also placed a strain on hydropower plants in two ways. Higher rainfall and the acceleration of the speed at which glaciers are melting are making floods more frequent and increasing water inflows, which can cause structural damage to hydropower plants. At the same time, high temperatures can affect the water supply. The Colorado Basin, for instance, has been experiencing drought for nearly 20 years, as rising temperatures reduce precipitation, and drought is harming the performance of its hydroelectric plants.³²
- 5. The construction and operation of assets for midstream energy storage and renewable energy has clear implications for biodiversity. Pertinent issues include fuel leaks, land use and the loss of wildlife and habitat. In the case of hydropower plants, direct biodiversity impacts include loss of habitat due to lack of strategic planning and impact assessments (more than a third of European freshwater fish species are threatened with extinction of which hydropower dams are cited as a key driver³³). Indirect impacts include the deterioration of water quality and the trapping of sediment that protects riverbanks against floods and rising sea levels. Similarly, research has shown that wind farms can negatively impact on bird population through direct collision, disturbance, and loss of habitat, though these impacts can be managed by improved siting or painting wind turbine blades.³⁴

The integration of ESG factors into investment decisions is less prevalent in government-run sectors such as healthcare and other forms of social infrastructure. These sectors tend to have a lower material impact³⁵ on climate and nature than sectors such as energy.

29 Jamie Freed, "Sunk Costs: Airports Taking Action against Rising Seas, Storms as Climate Changes."

30 World Resources Institute, "Runways Underwater: Maps Show Where Rising Seas Threaten 80 Airports Around the World."

31 Energy Security Board, "The Health of the National Electricity Market."

32 S&P Global, "Climate Impact on Water Supplies Puts Squeeze on Hydropower."

33 WWF, "Hydropower Pressure on European. The Story in Numbers."

34 May, Nygård, Falkdalen, Aström, Hamre, Stokke, "Paint it black: Efficacy of increased wind turbine rotor blade visibility to reduce avian fatalities."

35 Issue of materiality — Infrastructure sectors have different impacts on the five ESG factors, affecting the level of investor consideration. For example, healthcare infrastructure might be inherently less polluting than surface transport.

DEEP DIVE: TYPES OF INFRASTRUCTURE ASSET EXPOSURES COMMONLY FILTERED OUT BY ESG FACTORS

Based on our survey, 48 percent of investors negatively screen out infrastructure asset exposures, largely due to GHG emissions as well as energy and resource efficiency considerations. Fossil fuels are most commonly excluded with coal making up the majority and the remainder in oil and gas (see Exhibit 13). Sectors filtered out typically are associated with higher regulatory and economic risks due to energy transition risks and technological improvements, where in the worst-case assets could become stranded.

With increasing regulatory guidance and clarity on ESG standards, investors have started to shift their approach from screening out less ESG aligned assets toward a more nuanced approach of including ESG factors in investment decisions (as discussed in Section 2). In doing so, investors mitigate the risks of their investments, while keeping their investible universe sufficiently broad to ensure optimal returns.

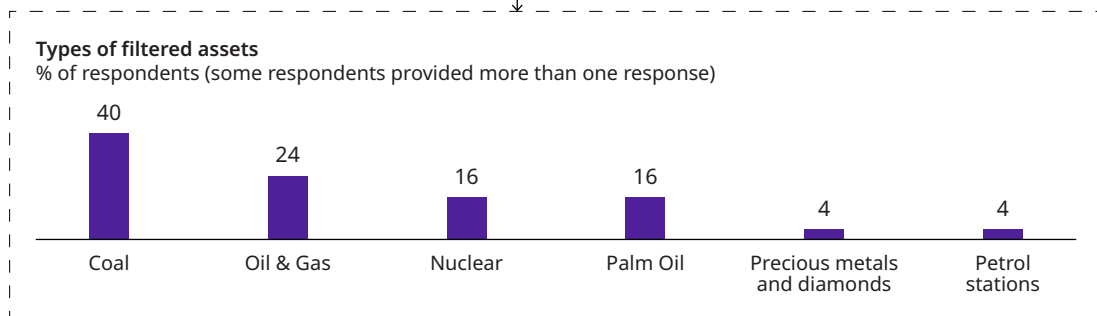
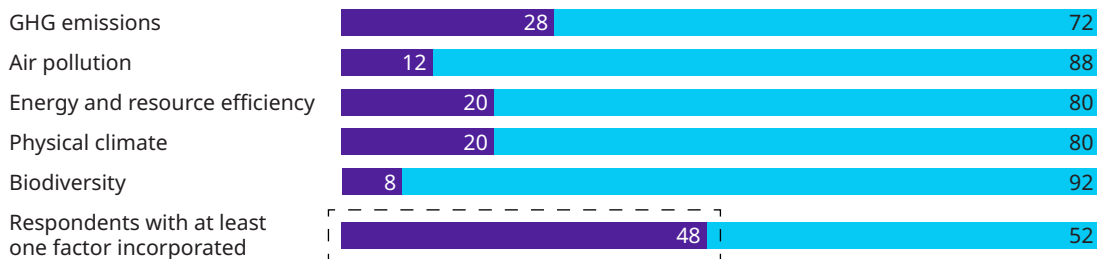
In recognizing the potential for excess returns, some investors are also choosing to invest in less “sustainable” assets or companies, while working closely with management to develop a clear roadmap transitioning towards sustainable practices, thereby benefiting from an investment yield shift.

However, higher potential returns do come with commensurate risks. To mitigate these risks, investors must also consider the differentiated cost and effort of monitoring, reporting and maintaining adherence with regulatory guidance across jurisdictions.

In general, with expanding regulatory guidance and the increasing maturity of ESG integration within the industry, we expect investors to be more meticulous in their approach, while advancing the sophistication and thoroughness of how they integrate and consider ESG risk factors into sector selection and investment due diligence.

Exhibit 13: Filtering of infrastructure asset exposures across ESG factors and breakdown of filtered out assets

Distribution of respondents, %



■ Filtered out ■ Not filtered out

Note: Respondents were asked which type of infrastructure asset exposures they filter out

Source: Oliver Wyman and WWF ESG survey (N=26)

DEEP DIVE: FACTORS (METRICS) USED TO INCLUDE ESG ISSUES IN FINANCIAL DECISIONS

Survey respondents were asked about the extent to which they integrate ESG factors into financial decisions, and the metrics they used to quantitatively track ESG factors.

Today, approximately half of respondents quantitatively account for ESG considerations. Metrics with a direct impact on capital or operating expenditures and are linked to GHG emissions as well as energy and resource efficiency made up the majority of those integrated into financial decisions. Other commonly used approaches did not cite specific metrics but instead referred to ad hoc sector specific metrics and third-party criteria, which is a result of difficulty in measurement or comparability of some ESG factors, as well as a lack of harmonized standards in quantifying certain ESG factors.

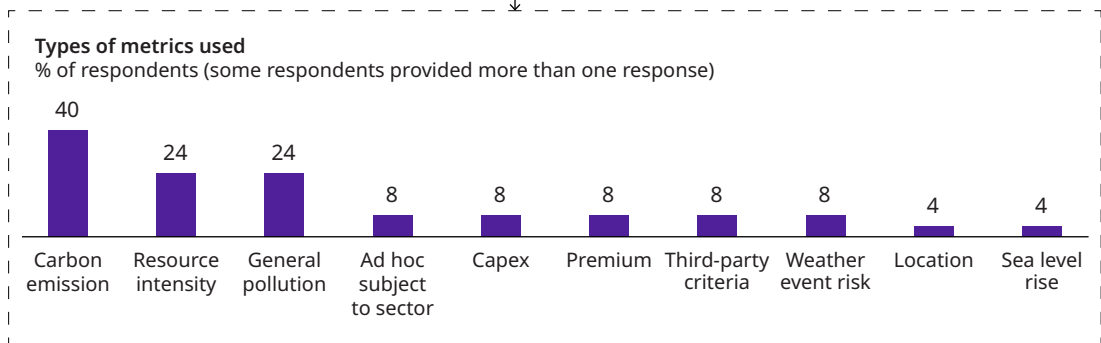
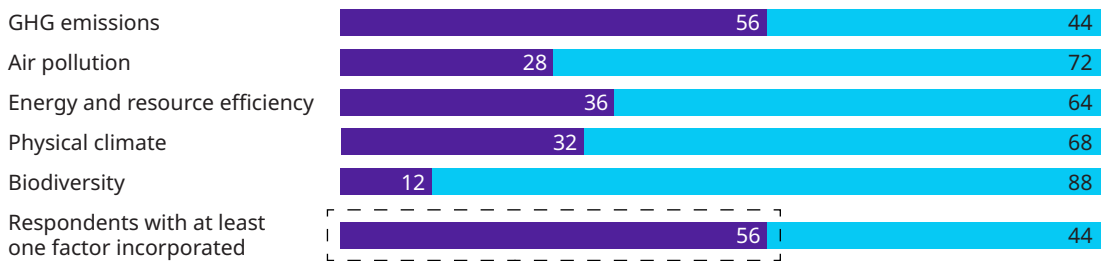
We have observed that investors are focused on metrics translatable into short-term financial impact (the use of metrics with a direct impact on capital or operating expenditures), highlighting the importance of financial return for ESG integration (as discussed in Section 2). In contrast, they tend to omit other difficult-to-quantify metrics, which may result from difficulties in collecting data due to non-standardized metrics being used across different locations, sites and sectors. As an example, the metrics collected for biodiversity differs between coastal and forest habitats, as well as between brownfield or greenfield projects.

In this regard, the public sector and non-governmental organizations (NGOs) have been leading efforts in laying the foundations for ESG integration within infrastructure through discussion of ESG analysis application, frameworks and tools to support the analysis, as well as the barriers and recommendations to further the utilization of ESG tools.

However, looking ahead we expect this foundation to be further built upon from greater collaboration between the public sector and NGOs with investors and ESG tool developers. One way is to create standardized ESG performance standards and benchmarks that can be used across asset sectors and locations. For instance, the UK government is working with multiple stakeholders to improve on the Defra biodiversity metric³⁶ (in the form of a quantifiable biodiversity impact calculator) for measuring biodiversity net gain.³⁷ From our interviews, some investors have expressed willingness to adopt this impact calculator when addressing biodiversity considerations and have plans to apply this tool at pilot sites across their investments.

Exhibit 14: Factors (metrics) for ESG considerations in financial decisions

Distribution of respondents, %



■ Factor used ■ Factor not used

Note: Respondents were asked what ESG factors they include in financial decisions — for example, carbon pricing, pollution costs, fossil-fuel pricing

Source: Oliver Wyman and WWF ESG survey (N=26)

36 The Defra biodiversity metric has four components, each with specific metrics or indicators. These are used to create an indicative score for biodiversity quality on a site (and offsite where applicable) before and after construction.

37 Biodiversity net gain is an approach that aims to leave the natural environment in a measurably better state after a project than before. To offset biodiversity loss from land clearing, for example, asset owners can restore a greater area of damaged land around the project site.

In summary, we have generally observed two leading motivations across infrastructure funds:

- Investors focused on the transformation of assets toward sustainability from a corporate responsibility angle.
- Investors seeking to benefit from potential increased returns using ESG as a factor.

While implementing sustainability practices were historically seen as additional costs, today these two motivations are converging. Beyond sustainability as a pre-condition for long-term financial viability, some investors have realized they are able to generate a higher yield from acquiring and transforming assets toward more sustainable practices.

As such, certain asset managers have recognized this potential and are leading the way in sustainable investments, while others within the infrastructure investment space are still at the early stages of grappling with the challenges of insufficient data, a lack of industry coordination around ESG standards and tools, as well as an awareness of the impact of ESG factors on valuation. To ensure continued advancement, we see a key role for NGOs and industries bodies to accelerate the coordination and promote adoption of ESG tools and standards within the infrastructure investment community.

4. CASE STUDIES

EIB: INTEGRATION OF GHG EMISSIONS AND AIR POLLUTION CONSIDERATIONS IN LENDING ACTIVITY

The EIB is a multilateral financial institution that serves as the lending arm of the European Union (EU) and supports its policy objectives.³⁸ Since 2012, the bank has invested €150 billion (25 percent of all its lending) in projects that reduce greenhouse gas (GHG) emissions, help countries adapt to climate change impacts and address environmental sustainability goals. The EIB recently announced that from end 2021 it will no longer finance unabated, fossil-fuel energy projects (including gas)³⁹, while also increasing climate action and environmental finance to 50 percent by 2025. As part of its 2019 Energy Lending Policy, the EIB also set a new Emissions Performance Standard of 250g of CO₂ per kWh, which replaced the previous standard of 550g CO₂ per kWh.⁴⁰ This makes the EIB one of the world's largest and most ambitious multilateral providers of climate finance.

³⁸ EIB, 2013: The Economic Appraisal of Investment Projects.

³⁹ EIB, 2019: Energy Lending policy.

⁴⁰ EIB, 2019: Press Release.

ESG integration: Estimates of external costs and integration into project analysis

The EIB integrates environmental externalities (greenhouse gas emissions, air pollutants, water and noise externalities) into project appraisal, by using a combination of proprietary methods and datasets. For airborne pollutants (such as NO_x and SO₂) the bank applies damage cost values from the 2008 HEATCO study (for transport) and the ExternE model (for energy).⁴¹ For greenhouse gas emissions, the bank uses industry-standard footprint methodologies⁴² to measure projects' absolute GHG emissions and compares them with the next best alternative to the projects — estimating relative or net emissions. For the price of carbon, the EIB currently applies a central-to-high value range from the recommendations of the High-Level Commission on Carbon Prices.⁴³ To account for the increasing marginal damage associated with growing emissions, annual “adders” have been applied since 2010. Currently, the central value is around €30 per tonne of CO₂-equivalent (for emissions in 2013), rising to nearly €50 per tonne in 2030.⁴⁴ To meet the EU's ambition of maintaining the global temperature increase below 1.5°C, this price will increase to €120 by 2050.⁴⁵

The bank uses a high carbon price to appraise low-carbon projects. That is, it screens out competitive technologies if a cost of carbon above the high value is required to justify the economic case for the project. In contrast, for conventional technologies, the central value is used — a project would be screened out if a carbon cost below the bank's central value is required to justify its economic case.⁴⁶ These carbon estimates provide reference points, but in practice, how values are applied to project appraisals depend on the policy setting. The cost-benefit analysis of an energy project, for example, needs to account for the degree to which the external project costs have already been internalised through policy measures.⁴⁷

Future Steps: Overcoming Challenges

EIB's carbon accounting includes all Scopes 1 and 2 emissions but excludes Scope 3 (except for certain sectors in which the scope 3 emissions associated with the projects are significant and can be estimated, for example transportation or biofuel production and bioenergy projects). Other externalities related to, for example, biodiversity are more difficult to quantify, and financial institutions are at an early stage of integrating natural capital risk assessment. The bank has recognised the risk posed by the climate misalignment of financial intermediaries, hence why it works to support its partners to implement climate strategies

41 HEATCO, 2005: Current practice in project appraisal in Europe. For modern power plants, EIB uses damage costs in the range of 1 to 3 Euro/MWh for gas-fired combined-cycle gas turbine and 4 to 8 Euro/MWh for coal-fired power plants (based on research done by ExternE). The NEEDS study, also provides estimates for damage costs of main air pollutants from transport with an EU average of 10,640 Euro/tNO_x/year and 10,241 Euro/tSO₂/year.

42 EIB's carbon footprint methodologies use emission factors from internationally recognised sources such as WRI/WBCSD's GHG Protocol and IPCC Guidelines for National GHG Inventories. Source: EIB. 2020. Project Carbon Footprint Methodologies. Version 11.1.

43 CPLC, 2017: Report of the High-Level Commission on Carbon Prices, Washington, DC. License: Creative Commons Attribution CC BY 3.0 IGO.

44 EIB, 2018: Environmental and Social Standards.

45 EIB, 2020: EIB Group Climate Bank Roadmap 2021-2025 — Position paper.

46 EIB, 2019: Energy Lending policy.

47 EIB, 2013: The Economic Appraisal of Investment Projects.

EIB case study:

Budapest District Heating Strategic Investments

The EIB approved an EFSI-guaranteed⁴⁸ loan of €71 million to finance investments in Budapest's district heating system from 2018 to 2020.⁴⁹ The aim was to satisfy current and future demand and to increase the area's installed capacity of heat generation facilities. Central to the project is replacing individual heat sources in residential and public buildings with centralised heat generation, by adding new renewable heat generation, modernising existing heat generation assets and increasing the overall efficiency of the municipal district heating system.⁵⁰ The project will reduce GHG emissions and other air pollutants (such as NO_x, SO₂)⁵¹, thus helping Budapest to mitigate its long-lasting and significant problems with air quality, especially in the densely populated central areas. It will also help to meet the targets for renewable energy generation in the EU 2030 Energy Strategy, the long-term Energy Roadmap 2050 and the Paris Agreement.⁵²

EIB's project appraisal was based on a comparison of the project's discounted heat costs with the costs of the best alternative. It took into account costs related to the investment, fuel, operations and maintenance, network rehabilitation, heat losses and environmental externalities. The bank also reviewed the environmental and social capacity of the promoter, including its organisation, processes and procedures, and deemed them to be good. Two project components (biomass heating plants) fall under Annex II of the EU's Environmental Impact Assessment (EIA) Directive (2014/52/EU), leaving it to the national competent authority to determine whether an EIA is required according to criteria defined in Annex III of the Directive.

ALLIANZ GLOBAL INVESTORS: PHYSICAL CLIMATE AND BIODIVERSITY IN THE THAMES TIDEWAY TUNNEL PROJECT

Allianz Global Investors (AllianzGI) is an active investment management firm and part of Allianz Group. AllianzGI manages €563 billion of assets on behalf of institutional and retail clients worldwide — from pension funds and blue-chip multinationals to charitable foundations, family offices and individuals. Allianz Capital Partners (ACP) is one of the Allianz Group's asset managers for alternative equity investments and are part of Allianz Global Investors. ACP focuses on investing into private equity, infrastructure and renewable energy. AllianzGI is an advocate for several sustainability-related initiatives, including the UN PRI, Climate Action 100+, the Science-Based Targets Initiative, and the Net Zero Asset Owner Alliance.⁵³

48 European Commission, 2020: The European Fund for Strategic Investments (EFSI).

49 EIB, 2018: Projects to be financed: Budapest District Heating Strategic Investments.

50 Ibid.

51 EIB, 2018: Environmental and Social Data Sheet.

52 EIB, 2019: European Fund for Strategic Investments.

53 Allianz Global Investors, 2019: Sustainability Report.

ESG Considerations As An Integral Part Of AllianzGI's Overall Investment Processes

AllianzGI aims to integrate environmental, social and governance (ESG) factors throughout their entire investment value chain to better manage risk and generate sustainable, long-term returns. Given the diversity of investors' objectives and requirements AllianzGI provides sustainable investing processes with a broad range of approaches, adaptable to different levels of ESG incorporation and client preferences. These enhance AllianzGI's clients' investment decisions while helping create benefits for society as a whole.

Holistic Approach To Screening And Qualitative Evaluation

For unlisted and direct investments in infrastructure, ESG factors are incorporated through a detailed screening process.⁵⁴ This ESG screening is mandatory for all transactions in 13 sensitive business areas. Where an ESG risk is identified in a transaction, a detailed assessment is then undertaken by the Investment Team together with the Group ESG Office.⁵⁵ If the risk cannot be addressed to the satisfaction of the ESG office, then the investment is not pursued.

Some investments are automatically excluded early in the investment process. This is determined by Exclusion Lists defined by Allianz. They are updated based on data from external service providers and in-house research, covering the exclusion and restriction of investment in certain businesses, such as those based on coal or oil and those that operate below an acceptable ESG threshold.

Active Stewardship

AllianzGI's ESG research team works hand in hand with sector analysts and portfolio managers, providing ESG knowledge and insights to support better investment decisions as they consider ESG risks and opportunities that may not have been fully priced by the markets. Consistent with its investment philosophy and approach, AllianzGI routinely engages in dialogue with investee companies and seeks proactively to present a viewpoint, effect change where necessary and monitor the results of its engagement.⁵⁶ For example AllianzGI engages companies to clarify open points, request additional disclosures (for example, heat consumption, scope 1, 2 and sometimes 3 emissions, gender parity), call for further improvement of operational practices, or conduct in-person meetings with management. If the company demonstrates significant action to improve ESG risk management the engagement is closed — however monitoring of the asset's performance continues with closer inspection depending on the engagement's level of success.

⁵⁴ Allianz Group. 2019. Sustainability Report.

⁵⁵ Allianz. 2018. ESG Integration Framework.

⁵⁶ Allianz Global Investors. 2019. Sustainability Report.

AllianzGI case study: Thames Tideway Tunnel Project

London's population has outgrown the capacity of its 150-year-old sewer system, resulting in 60 million tonnes of sewage spillage into the River Thames annually.⁵⁷ The Thames Tideway Tunnel is part of a major sewer system upgrade to remedy this, and reduce pollution by 94 percent.⁵⁸

Allianz is a leading shareholder in the 'Tideway' consortium financing, building, and operating the tunnel.

Physical Climate Risks Incorporated Into The Investment Process

The Met Office, the UK's national weather service, expects rising temperatures in the UK to result in drier summers and wetter winters, potentially causing:

- Reduced freshwater flow into the Thames, increasing the susceptibility of the surrounding ecosystem to pollutive sewage discharges during the summer.
- More frequent and larger discharges that would fill the tunnels to higher levels during winter.

A climate risk assessment was performed to take into account the physical impacts of climate change on the Tideway infrastructure — for example, modelling the impact of changing rainfall patterns on combined sewage overflows as part of scenario planning exercises.⁵⁹

Sustainability Appraisal To Maintain And Enhance Biodiversity

An evaluation was also conducted with the objective of preserving and enhancing biodiversity in the project area and the potential costs and benefits of this. For example, the potential for net loss of wildlife sites was appraised in accordance with the Mayor's Biodiversity Strategy, and the project's contribution to the protection and management of aquatic ecology was examined. Short-, medium-, and long-term impacts were identified, and mitigating actions were then planned to protect and promote biodiversity.⁶⁰

57 Tideway, London, 2020.

58 Allianz Global Investors. 2020. Thames Tideway Tunnel Project.

59 Thames Water, "Resilience to Change."

60 Thames Water, "Sustainability Statement."

A LEADING INFRASTRUCTURE FUND: ESG APPROACH AND ORGANIZATIONAL PRACTICES

The featured infrastructure fund invests directly in greenfield and secondary investment assets and has assets under management of more than \$10 billion, of which the majority are in Europe. They believe that integrating ESG factors into investment decisions allows them to optimize their investments' financial returns.

To achieve this, the fund has shifted towards a more comprehensive investment process and actively engages in the collection and utilization of their portfolio companies' ESG data. The fund also has rolled out compensation and performance policies to encourage good ESG practices and incentivizes deal teams to embed ESG considerations into their decision-making processes.

From Screening To A Multi-Faceted Process

The fund's approach has evolved from a binary, negative screening toward a more multi-faceted approach. They may invest in less "sustainable" assets if valuations are attractive and if potential targets have a transition plans toward more sustainable practices. This presents a wider range of opportunities to invest in. That could mean, for example, investing in a coal-fired power plant in order to accelerate its conversion to a gas-fired power plant, or to decommission the plant over the medium term and later build a solar farm on the site.

Better Data For Better ESG Integration

The fund began by working closely with portfolio companies to collect governance-related ESG data and is now expanding the scope of data collection to include additional environmental metrics over time such as water consumption, waste generated, and GHG emissions (Scope 1 and 2). The aim is to collect sufficient data to measure and benchmark the ESG performances of current investments, while also better integrating ESG factors into future investment decisions. Looking ahead, to further their data collection efforts, they may also include ESG data requests to targets as part of the due diligence process.

The fund has also initiated organizational policies to support the shift toward ESG integration. They have hired a sustainability manager internally from the deal teams with direct reporting line to the CEO and have included ESG-related key performance indicators (KPIs) into deal teams' performance evaluations.

Sustainability manager with experience in deal making reports directly to CEO

A sustainability manager reporting directly to the CEO has more authority in planning and executing ESG-related initiatives across the firm and can escalate any challenges. The manager works closely with the deal teams during their due-diligence processes and plays a supervisory role in integrating ESG integration into the investment process.

KPIs integrated into performance evaluation of deal teams

Deal teams have sustainability-linked KPIs or “mandates,” which feed into their performance evaluations and ultimately their remuneration. By directly incentivising employees, the fund aims to transform ESG considerations from a tick-box exercise to a fundamental component of the due-diligence process.

The fund has undertaken a holistic approach in refining their ESG integration practices by better leveraging data from their current and potential investments and has empowered the sustainability manager while also motivating the deals teams to treat ESG considerations in deals as a priority.

5. CONCLUSION

This report has outlined the current industry trends and leading practices for infrastructure investors within climate- and nature-related ESG factors integration. Based on our survey and interviews, investors plan to further integrate ESG factors into their decision-making practices and capabilities in the future.

This includes a focus on:

- **Acquiring better quality ESG data:** Working more closely with portfolio companies and including additional climate- and nature-related ESG measurement requirements as part of the due diligence process to expand the scope of data collection. This also includes the metric quantification to allow direct use within valuation modelling.
- **Enhancing the number of climate- and nature-related ESG factors to be integrated:** Alongside the drive to better data quality within a single ESG factor, such as broadening GHG emissions to include Scope 3 emissions, there is a focus to integrate a more holistic view of less prevalent ESG factors, including air pollution and biodiversity.
- **Increasing the range of infrastructure sectors for ESG factor integration:** Our survey indicated “hotspots” for higher areas of ESG integration across infrastructure sectors. However, with investors indicating a broader use of climate-related factors outside of carbon-intensive sectors, and an increase in ESG factor integration, there is the expectation that these considerations will be extended to other infrastructure sectors.

The case studies highlighted examples where leading investors are using climate- and nature-related ESG considerations in their decisions. These include dedicated sustainability managers with the authority to carry out their duties effectively, as well as ESG-linked KPIs. By understanding approaches that are working well at other investment firms, infrastructure investors can continue to track their own progress in fulfilling their ambitions for ESG factor integration.

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WWF is an independent conservation organization, with over 30 million followers and a global network active in nearly 100 countries. Our mission is to stop the degradation of the planet's natural environment and to build a future in which people live in harmony with nature, by conserving the world's biological diversity, ensuring that the use of renewable natural resources is sustainable, and promoting the reduction of pollution and wasteful consumption. Find out more at panda.org. WWF has worked with the finance sector for more than a decade to redirect financial flows to support global sustainable development, using our conservation expertise to integrate environmental, social, and governance risks and opportunities into mainstream finance. We contribute directly to leading initiatives, including the European Commission's Technical Expert Group on Sustainable Finance and the development of an international green bonds standard. WWF works with some of the largest asset owners, asset managers, banks, and insurers in the world to decarbonize financial portfolios, strengthen lending and investment criteria, fill critical research gaps, and unlock innovations in sustainable finance products.

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