Enhancing Environmental, Social, and Governance Policies and Performance for Global Infrastructure Investment

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Executive Summary

By enhancing environmental, social, and governance (ESG) performance, infrastructure companies can mitigate operational, physical, and regulatory risks, improve supply chain management, and build resilience to social and environmental shocks and stress. By pursuing long-term value creation, global infrastructure investors have focused on the ESG performance of their portfolio companies. The authors of this report collected and analyzed qualitative data from interviews with utilities and power generation companies and from industry reports that encompassed frameworks and methodology for ESG measurement and reporting; correlation of ESG performance to business performance; strategies for implementation of ESG policies; and industry trends. Based on this analysis, this research provides recommendations for enhancing ESG policies and performance of infrastructure companies.

Although ESG standards may differ across countries and industries, the factors may be described broadly as follows:

- Environmental: climate change, natural resource use, pollution, and waste
- Social: human capital, product liability, and stakeholder engagement
- Governance: corporate governance and corporate behavior

A company's performance on ESG metrics can serve as an indicator of shared value creation. Companies with high ESG ratings demonstrate a correlation with better financial outcomes and lower levels of risk. Risk is particularly important for infrastructure companies such as utilities, power generation/contracted power companies, and transportation assets (e.g., rail, airports, and sea ports). Most infrastructure companies hold a monopolistic position, so price and usage are not as sensitive to changes in the economy; rather, political, regulatory, and operational risk are major drivers of infrastructure investment. A company may reduce such risks by adopting ESG practices that promote resilience, which this report defines as the ability to withstand social and environmental shocks and stress. Among environmental factors, climate change presents a growing risk as demonstrated by multiple climate-related disasters exceeding a billion dollars in damage in the United States in 2018.

In this report, recommendations to improve ESG performance across operations include: 1) creating clarity on ESG metrics among stakeholders and improving communications with employees; 2) mapping the supply chain and evaluating ESG performance data from multiple sources; and 3) building resilience through business continuity, communications, diversification of energy and water systems, creation of "safe to fail" systems, and social equity. Ultimately, enhanced ESG policies and performance can advance positive outcomes for businesses, society, and our environment.

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Disclaimers

The authors completed this work in their capacity as students at the Nicholas School of the Environment at Duke University. Any recommendations and conclusions in this report are made by the authors. Readers of this report should not infer that any company has accepted or will implement any recommendations in this report.

List of Abbreviations

ESG	Environmental, social, and governance
FSB	Financial Stability Board
GRESB	Global Real Estate Sustainability Benchmark
GRI	Global Reporting Initiative
UNPRI	United Nations Principles for Responsible Investment
TCFD	Task Force on Climate-related Financial Disclosures

Introduction

Globally, we face an array of environmental and social challenges including climate change, water scarcity, pollution, natural resource depletion, human rights repression, and social inequality. In response to these issues, multiple stakeholders have called on business leaders to pursue sustainable practices in their operations—particularly in their supply chain management (Jacobs, 2017). Business leaders have also underscored the importance of ESG issues to their business models.

This viewpoint has gained momentum across both the business community and society. As Larry Fink, chairman and chief executive officer of BlackRock, noted in his 2019 *Letter to CEOs*, "Society is increasingly looking to companies, both public and private, to address pressing social and economic issues." Similarly, business leaders and investors have recognized that many of these environmental and social issues present a material threat to long-term value creation (The Investment Integration Project, 2017).

J.P. Morgan Chase & Co.
2017 Environmental, Social, and Governance Report

"*We work hard to earn the trust and respect of our shareholders, employees, customers, and the communities we serve every single day.*

Doing so starts with our uncompromising focus on getting the fundamentals right, which includes effectively managing environmental, social, and governance matters."

Jamie Dimon
Chairman and CEO
JPMorgan Chase

Accustomed to taking a long-term view and focusing on judicious business practice, infrastructure investors are uniquely positioned to evaluate the sustainability of their portfolio companies and to enhance ESG performance. Such an approach helps to minimize risks, bolster financial performance, and create shared value.

Infrastructure investments are projected to continue growing (see Figure 1). According to an annual survey by the asset data company Preqin (2018), "Increasing demand for infrastructure assets from institutional investors in recent years is a key driver in the growth of the industry, with institutions attracted to the stable cash flows and strong risk-adjusted return." As an asset class, infrastructure has demonstrated sustained growth—2017 set a record for assets under management—and more than 93 percent of investors responding to a survey by Preqin (2018) stated that their infrastructure investment performance had met or exceeded expectations.

Most infrastructure assets have a type of monopoly position such as a regulated utility with no alternate providers or an energy company (renewable or conventional power generation) with long-term contracts. While transportation assets are more dependent on economic growth than other infrastructure assets, an airport, rail line, or sea port may exist where alternate routes are not attractive to businesses or individual clientele. These factors reveal that revenues from infrastructure assets are resilient to economic downturns, and that politics, regulation, and operational risks are some of the other drivers of infrastructure investment (J.P. Morgan Asset Management, 2017). Addressing such risks is embedded within ESG standards.

Given their influential and growing position, infrastructure investments attuned to ESG principles are key to both a sustainable economy and a sustainable environment. As an illustration, the transition from fossil fuels requires investments in renewable energy and improvements in transportation that can alleviate environmental impacts (J.P. Morgan Asset Management, 2017). This project examined the current state of ESG performance assessment and the implications for businesses including infrastructure companies; how companies are reporting and being assessed on ESG performance; and what opportunities exist to improve ESG policies and performance across infrastructure companies. The premise of the authors is that business objectives and environmental protection and quality are not mutually exclusive; rather, they are intertwined and vital to sustain business, society, and our environment.

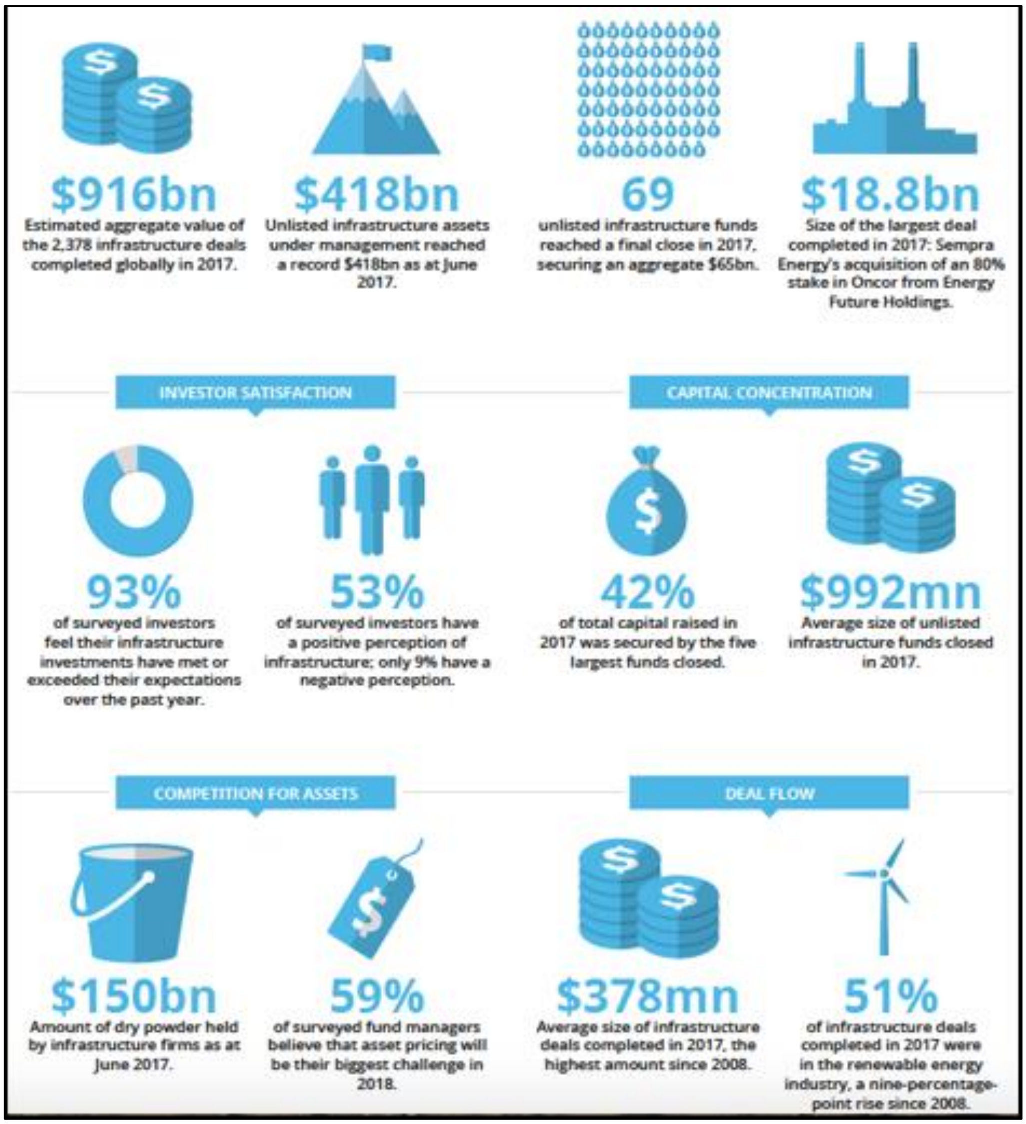

Figure 1. An overview of infrastructure assets in 2017 (Source: Preqin, 2018)

Why This Report?

The field of ESG investing continues to evolve, and a vast amount of information is being generated as institutional investors work to drive adoption of ESG policies. Yet, according to Dan Winters, head of Americas for GRESB, many companies raise fundamental questions about implementation of ESG standards and performance measures, such as:

- ESG means different things to different people, so what does it mean to our investors and for us?
- What kind of data should we gather and how should we use it?
- How do we get started?

The authors of this report sought to provide value by addressing these questions (see sidebar).

Key Aspects of this Report

Concise overview of ESG and why it matters

Explaining what is behind the major ESG frameworks and reports

Best practices on ESG implementation based on data from real infrastructure companies

Recommendations that an investor can share with an infrastructure company to enhance ESG performance

Project Description

Objectives

This project examined the correlations between ESG performance and business performance including risk management, resilience, and supply chain management; the assessment and reporting frameworks and methodology for ESG performance; opportunities and limiting factors for ESG performance by infrastructure companies; and trends and technology that may affect ESG performance. Using this information, this project presents an overview of factors that contribute to resilience, a set of case studies on infrastructure companies, observations of trends and technology implications, and recommendations to enhance ESG policies and performance for infrastructure companies. This project focuses primarily on environmental factors of ESG performance, although social and governance factors are also worthy of consideration.

Methods

To achieve the objectives of this project, the team of graduate students collected and analyzed qualitative data including industry reports on topics such as frameworks and methodology for measuring and reporting on ESG performance; strategies for implementing ESG standards; new technologies that may affect ESG performance and supply chain management; and trends in the field of ESG. The team analyzed the ESG framework, methodology, and survey instruments (when available) used by the Global Real Estate Sustainability Benchmark (GRESB); MSCI ESG Research, Inc.; Principles for Responsible Investment (PRI); and other sources. In addition, the team conducted direct data collection through interviews with GRESB and four infrastructure companies.

Defining ESG Standards

Environmental, social, and governance (ESG) standards are often discussed in the context of corporate social responsibility, socially responsible investing, sustainability, and similar concepts. Differentiating ESG standards provides a starting point for discussion and analysis.

ESG standards differ across countries and industries, and no reporting standard has gained universal acceptance. Although no legal statute defines ESG, a useful description would be that ESG investing is the consideration of ESG factors along with financial factors in investment decisions (MSCI ESG Research, Inc., 2018e). An ESG framework can look at specific themes and issues to then begin defining metrics (see Figure 2).

3 Pillars	10 Themes	37 ESG Key Issues	
Environment	Climate Change	Carbon Emissions Product Carbon Footprint	Financing Environmental Impact Climate Change Vulnerability
	Natural Resources	Water Stress Biodiversity & Land Use	Raw Material Sourcing
	Pollution & Waste	Toxic Emissions & Waste Packaging Material & Waste	Electronic Waste
	Environmental Opportunities	Opportunities in Clean Tech Opportunities in Green Building	Opp's in Renewable Energy
Social	Human Capital	Labor Management Health & Safety	Human Capital Development Supply Chain Labor Standards
	Product Liability	Product Safety & Quality Chemical Safety Financial Product Safety	Privacy & Data Security Responsible Investment Health & Demographic Risk
	Stakeholder Opposition	Controversial Sourcing	
	Social Opportunities	Access to Communications Access to Finance	Access to Health Care Opp's in Nutrition & Health
Governance	Corporate Governance*	Board* Pay*	Ownership* Accounting*
	Corporate Behavior	Business Ethics Anti-Competitive Practices Tax Transparency	Corruption & Instability Financial System Instability

Figure 2. Sample hierarchy of ESG issues (Source: MSCI ESG Research, Inc., 2018d)

Nearly all ESG issues are applicable to infrastructure assets. The Principles for Responsible Investment (PRI), an initiative supported by the United Nations, focuses on the investment implications of ESG factors and on supporting a network of investor signatories as they build ESG factors into their investment decision-making process. According to PRI (2018), ESG considerations in infrastructure include:

- Alignment with shareholder interests
- Anti-discrimination
- Biodiversity impacts
- Bribery and corruption
- Climate change impacts
- Conflicts of interest
- Health and safety standards
- Information and data security
- Labor standards
- Land rights
- Natural resource scarcity and environmental degradation
- Service reliability
- Social equity and inclusion
- Social license to operate
- Stakeholder management
- Supply chain sustainability
- Tax policy

Why Should Infrastructure Companies Care about ESG Performance?

Infrastructure investments, by virtue of being physical assets and subject to regulation, are affected by ESG issues. Typically, an investor or company integrates ESG measures for four reasons (MSCI ESG Research, Inc., 2018b):

1. Values-based investment constraints
2. Mitigating long-term systemic risks
3. Reducing risks caused by changes in the market and economy
4. Identifying risks and opportunities in their portfolio

For investors and companies alike, ESG performance carries implications across financial performance, risk, and resilience, as well as supply chain management.

Business Performance

"Companies with high ESG ratings in general experienced high levels of profitability and dividend yields and higher valuations, all drivers of long-term returns," according to a study by MSCI ESG Research, Inc. (2018b). This, of course, leads to the question of correlation versus causation; high ESG performance cannot be simply attributed as the direct driver of financial performance when a positive correlation is observed.

To that end, another study by MSCI ESG Research, Inc. (2017) sought to explain the effects of ESG performance on a company's financials. Their analysis pointed to ESG affecting valuation and performance through both systemic risk (i.e., reduced costs of capital and higher valuation) and individual risk profile (i.e., lower exposure to adverse events).

Risk Management

Infrastructure has the ability to perform well in a range of economic conditions, and most core infrastructure assets have a monopolistic position—meaning that price and usage are not highly sensitive to periods of economic downturn. A different set of factors, including political, regulatory, and operational risks drive infrastructure investments (J.P. Morgan Asset Management, 2017). ESG risk can be divided broadly into company-specific risk, systemic risk, and social risk (see Figure 3).

> "*Companies with high ESG ratings in general experienced high levels of profitability and dividend yields and higher valuations, all drivers of long-term returns.*"
>
> *MSCI ESG Research, Inc. (2018b)*

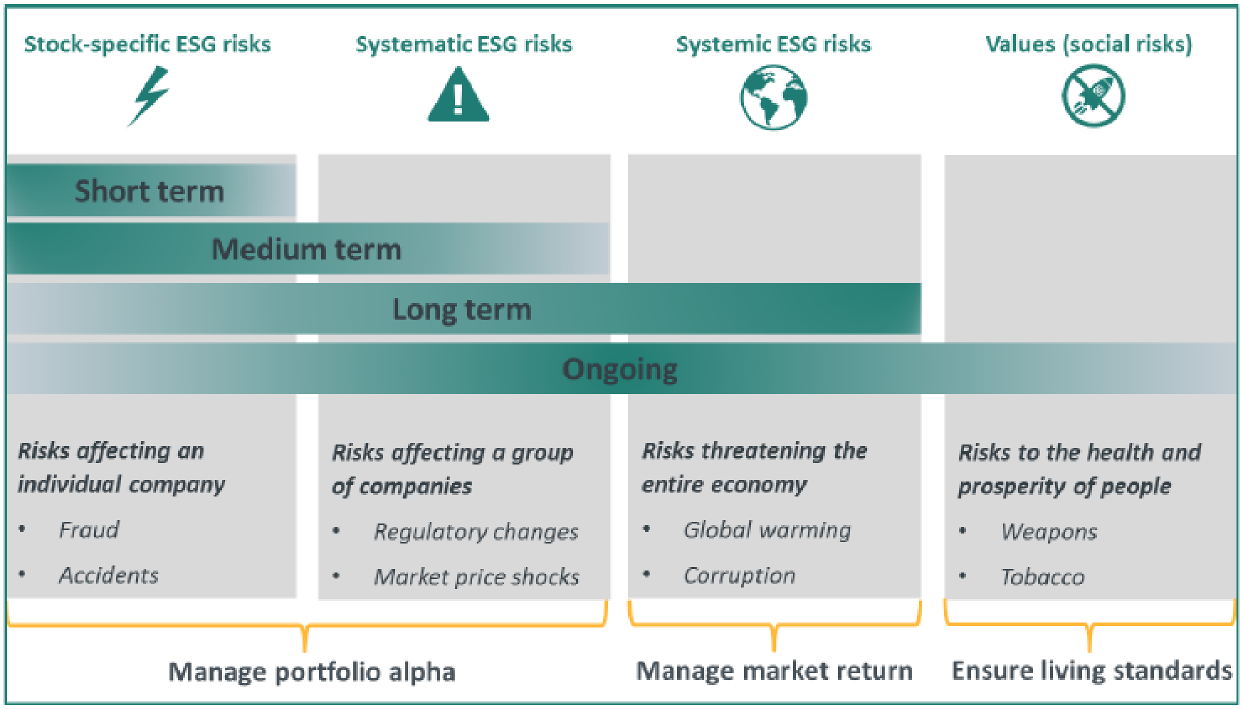

Figure 3. Types of ESG risks (Source: MSCI ESG Research, Inc., 2018b)

For investors, high ESG-rated companies may also reduce the problem of information asymmetry between companies and their investors as high ESG-rated companies are typically more transparent regarding their risk exposures and their risk management and governance standards (MSCI ESG Research, Inc., 2017). Similarly, a company's lower ESG ratings may signal an adverse event that is likely to occur at some point in the future, but has not yet been realized (MSCI ESG Research, Inc., 2018a).

Political and regulatory risks: Infrastructure assets operate under regulations that may be set at a local, state, and/or national level. A company's poor ESG performance can place not only the company, but also the industry, at risk for the ire of legislators and regulations that might undermine its ability to operate. This risk is even more salient if the company relies on government support, such as contracts, feed-in tariffs, or subsidies.

In addition, violations along ESG factors can diminish a company's reputation and risk its social license to operate. This is important because stable public policy plays a role in the success of infrastructure companies. For example, changes to subsidies across Europe undercut investor confidence in clean-energy infrastructure investments (Jones, 2015).

> “*Infrastructure investors have exposure to such risks because as long-term, typically illiquid assets, they are linked to energy systems, transportation, and social and environmental conditions.*”
>
> *GRESB (2018c)*

Operational and physical risks: A highly visible risk is the loss of all or part of a company’s physical assets or its ability to operate due to shocks or the cumulative effects of stressors. Environmental shocks represent major disruptions (e.g., fire, hurricane, and flood) whereas stressors represent conditions (e.g., environmental degradation, poverty, etc.) that can affect companies that are vulnerable. “Infrastructure investors have exposure to such risks because as long-term, typically illiquid, assets they are linked to energy systems, transportation, and social and environmental conditions” (GRESB, 2018c).

Climate change risks: Climate change represents one of the most significant challenges not only to infrastructure companies, but also to society. In 2018, the Intergovernmental Panel on Climate Change, known as the IPCC, issued a report with dire observations (see Figure 4).

- Global warming is likely to increase by an additional 1.5°C between 2030 and 2052.
- Climate-related risks to human health, food security, water supply, and economic growth will be exacerbated if warming reaches 1.5°C; even more so with warming of 2°C.

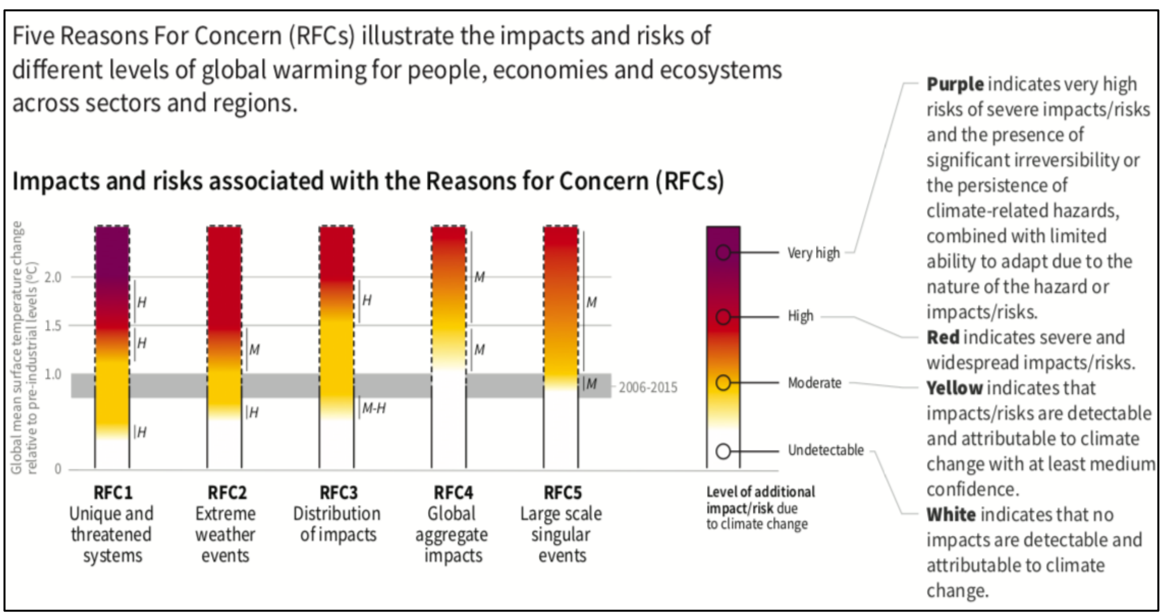

Figure 4. Impacts and risks of climate change to people, economies, and ecosystems (Source: IPCC, 2018)

The Financial Stability Board's Task Force on Climate-related Financial Disclosures (2017) developed an overview of the risks associated with climate change (see Figure 5).

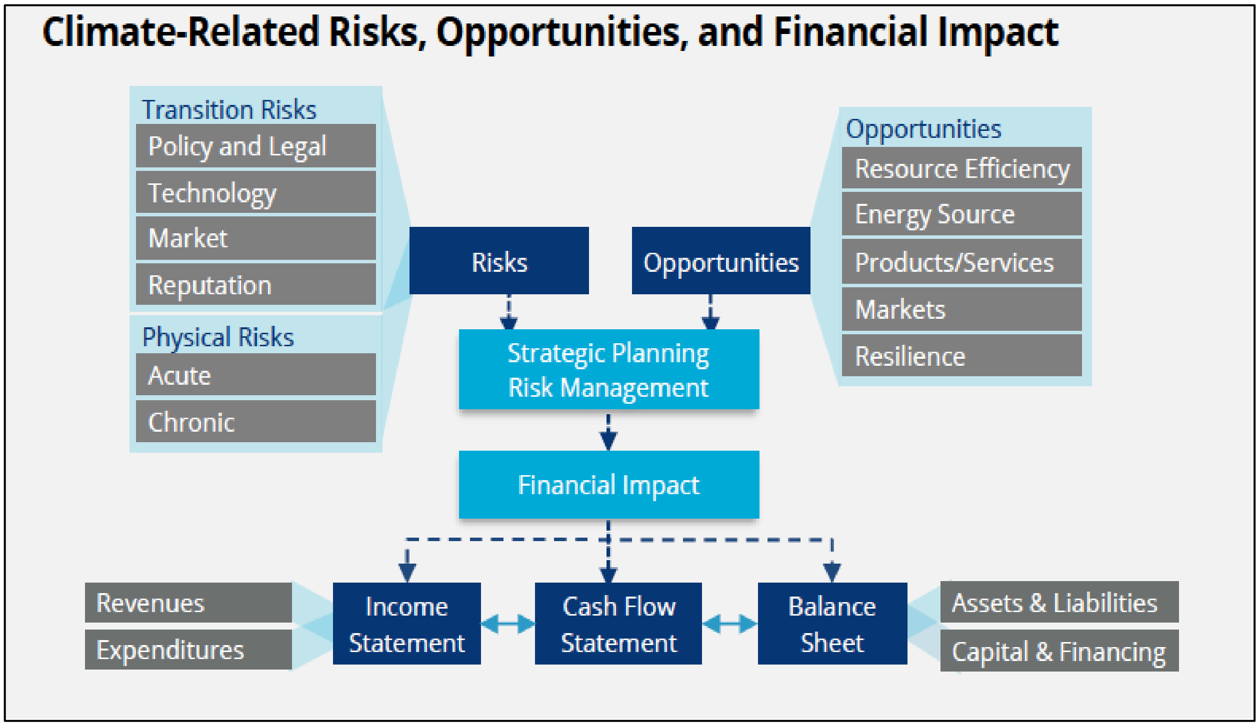

Figure 5. Climate-related risks, opportunities, and financial impact (Source: Financial Stability Board, 2017)

We are already committed to a certain level of climatic change regardless of what actions are taken regionally or globally, and infrastructure assets may be susceptible to effects such as higher temperatures, rising sea levels, and more extreme weather events (J.P. Morgan Asset Management, 2018a). Within the United States, the year 2018 provided stark reminders of the impacts of extreme weather events, exacerbated by a warming climate, according to the National Oceanic and Atmospheric Administration (2018).

- During the first 9 months of 2018, the U.S. experienced 11 weather and climate disasters that exceeded one billion dollars in damages each (see Figure 6). *This does not include the costs associated with Hurricanes Florence and Michael or the wildfires in California.*

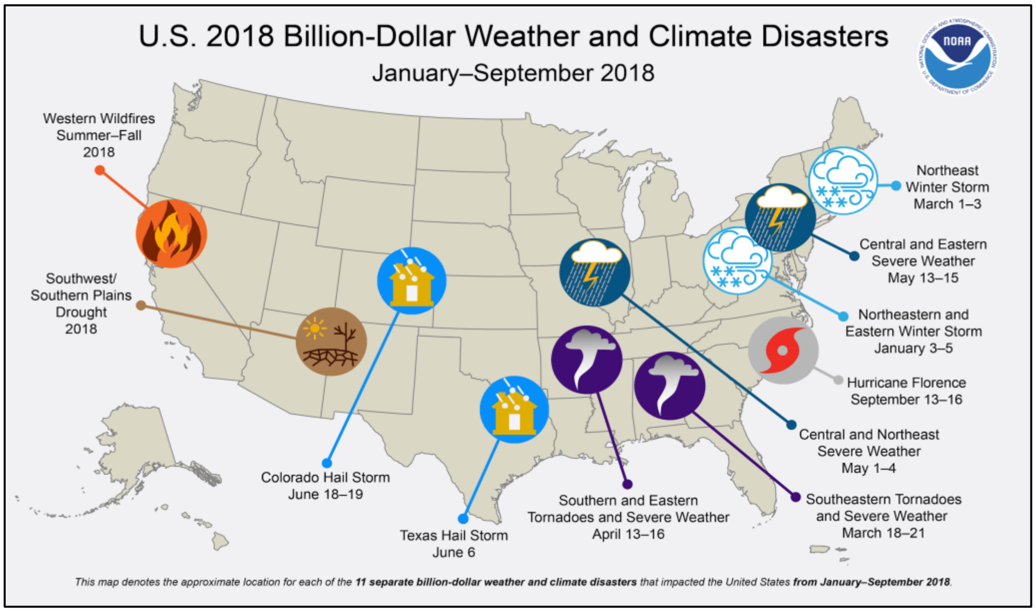

Figure 6. In the first nine months of 2018, the U.S. experienced 11 weather and climate disasters, each exceeding one billion dollars in damages (Source: National Oceanic and Atmospheric Administration, 2018)

- Since 1980, 238 weather and climate disasters, each exceeding one billion dollars, have impacted the U.S., and total costs have exceeded $1.5 trillion (see Figure 7).

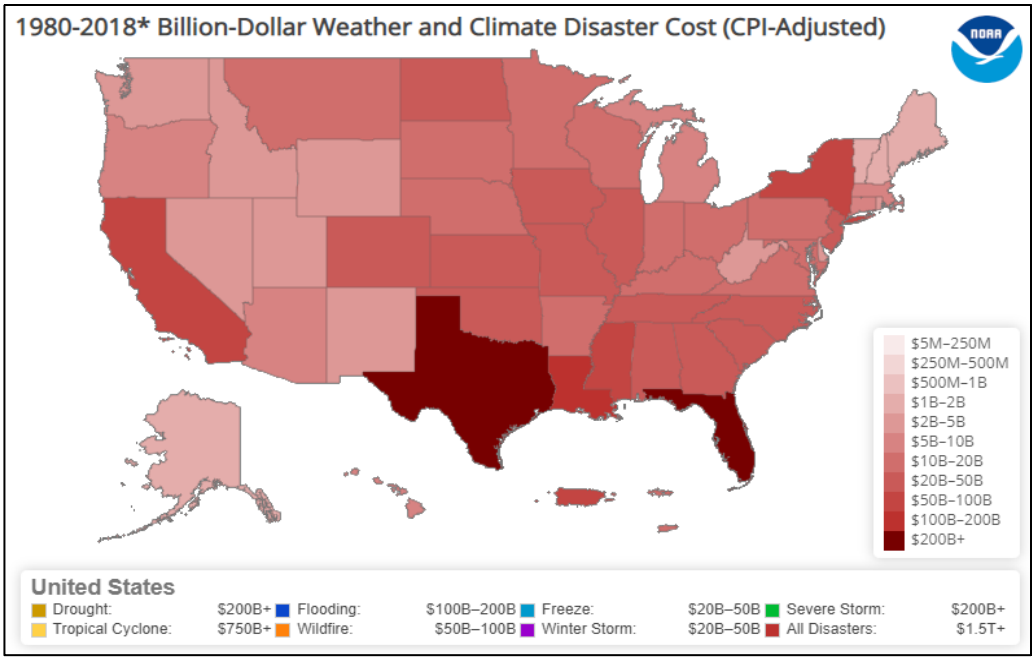

Figure 7. Overview of billion-dollar weather and climate disasters in the United States from 1980 to 2018 (Source: National Oceanic and Atmospheric Administration, 2018)

Examples of ESG Performance as a Signal of Risk

Violations of ESG standards may result in potential financial penalties or legal liability, as well as damage to a company's brand and social license to operate. Serious violations can affect all stakeholders including employees, customers, and investors, among others. In the worst-case scenario, a company may face bankruptcy. The following are examples that highlight the impacts of ESG violations on select companies.

Spotlight: Pacific Gas and Electric Co. Files for Bankruptcy after Years of ESG Concerns

Based in San Francisco, Pacific Gas and Electric Company (PG&E) is a large combined natural gas and electric energy company that provides service to approximately 16 million customers in northern and central California. In January 2019, PG&E filed for bankruptcy when facing billions of dollars in liability for wildfires in the state. Upon declaring bankruptcy, PG&E's shares plunged more than 50 percent, and the CEO resigned prior to the filing. Notably, the company had been on federal probation after an investigation of a natural-gas pipeline explosion that killed eight people and revealed violations of the Natural Gas Act. This ultimately led to obstruction-of-justice charges. ESG research and data company Sustainalytics had rated PG&E as higher risk on quality and safety since 2010 (Sustainalytics, 2019a). Improved governance oversight may help PG&E with both climate-related risks and opportunities.

Spotlight: Chinese Crane Operators Stage Nationwide Strike in Response to Labor Conditions

In May 2018, Chinese crane operators staged a nationwide strike, demanding a pay raise as they complained of low wages, long hours without overtime compensation, and unsafe working conditions (Wong, Lam, & Shan, 2018). Although the Chinese government did not disclose the financial losses, the strike put a halt to hundreds of construction projects including those by local governments and conglomerate businesses.

Spotlight: The Rana Plaza and Impacts on Company Brands from Supplier Actions

The Rana Plaza incident occurred on April 24, 2013, in Bangladesh's Dhaka District, when an eight-story commercial building, named Rana Plaza, collapsed. The death toll reached 1,134 workers (Hoskins, 2015) with approximately 2,500 injured (Alam & Hossain, 2013). It is considered the most fatal garment-factory accident in history. Although cracks had appeared in the building, the owners did not heed warnings about worker safety, instead ordering workers to return to work. The building collapsed during the morning rush-hour the following day (Nelson, 2013). Rana Plaza was part of the clothing supply chain for several major western brands including Walmart and Mango. Although no direct financial loss related to this collapse was disclosed, it led to worldwide criticism from politicians, advocacy groups, and consumers that spilled over to companies sourcing materials from the factory. Even retailers with no identified connection to the specific building contended with widespread concern regarding whether or not they had sourced any products from Bangladesh (Fox, 2013).

Spotlight: Volkswagen Scandal Highlights the Need for ESG Analysis

In September 2015, German car manufacturer Volkswagen admitted that they had installed defective devices on 11 million vehicles to cheat on emissions tests. The company's alleged violation of the U.S. Clean Air Act raised a series of questions about the company’s product management practices and corporate governance. This led to disastrous consequences when it came to both finances and reputation. The company faced recall costs for 482,000 vehicles, with 11 million vehicles potentially affected. Regulators in multiple countries began to investigate Volkswagen, and the company’s stock price fell by a third in the days immediately following the news (Boston, 2016). Beyond the attempt to deceive customers and regulators, the scandal also highlighted the failure of traditional valuation models—such as discounted cash flow—to reflect the full range of risks that companies face. Similarly, the scandal underscored the potential benefits of assessing companies using data about ESG performance to uncover risks that traditional analytical tools may not identify (MSCI ESG Research, Inc., 2015).

Addressing Externalities and Market Failures

A focus on ESG has the potential to address negative externalities, which result when the actions of a company have a direct, unintended, and uncompensated effect on the well-being of others. Economists describe this as a market failure where costs and benefits are not borne by the participants in the market transactions; this is driven largely by the absence of appropriate incentives (Keohane & Olmstead, 2007). For example, greenhouse gas emissions are a type of externality that have resulted in multiple approaches from market mechanisms such as California’s cap-and-trade market to regulation. According to Dan Winters, head of Americas for GRESB (personal communication, February 9, 2019), investors and industry want best practices to move forward, rather than waiting for regulation.

How are Companies Being Assessed on ESG Performance?

ESG Frameworks and Assessments

The following is an overview of ESG frameworks and ratings methodologies from GRESB and MSCI ESG Ratings, Inc., as well as a framework specifically for climate-related risks by the Task Force on Climate-related Financial Disclosures.

Global Real Estate Sustainability Benchmark (GRESB)

The Global Real Estate Sustainability Benchmark (GRESB) Infrastructure Assessment is a framework and a reporting and benchmarking resource to assess ESG performance for institutional investors and infrastructure assets (GRESB, 2018b). "GRESB is a framework to communicate and provide structured non-financial data," according to Dan Winters, head of Americas for GRESB (personal communication, February 9, 2019).

The 2018 GRESB assessment consisted of two components:

1. The Fund Assessment consisted of 11 indicators spanning ESG policies, leadership and accountability, communications, and other aspects.

2. The Asset Assessment focused on seven areas: management, policy, and disclosure; risks and opportunities; monitoring and environmental management systems; stakeholder engagement; performance indicators; and certifications.

Participants in the assessment receive their standing on the assessment relative to their peers, along with recommendations to improve ESG performance. GRESB has also developed an optional resilience module in connection with its Real Estate and Infrastructure Assessment. The GRESB resilience module is addressed later in the report.

In 2020, GRESB will divide the GRESB Real Estate and Infrastructure Assessments into two complementary parts: a management component and a performance component (see Figure 8). The management component will focus on inputs and outputs, such as ESG policies and measures at the organizational level. The performance component will assess the outcomes and impacts (GRESB, 2018b).

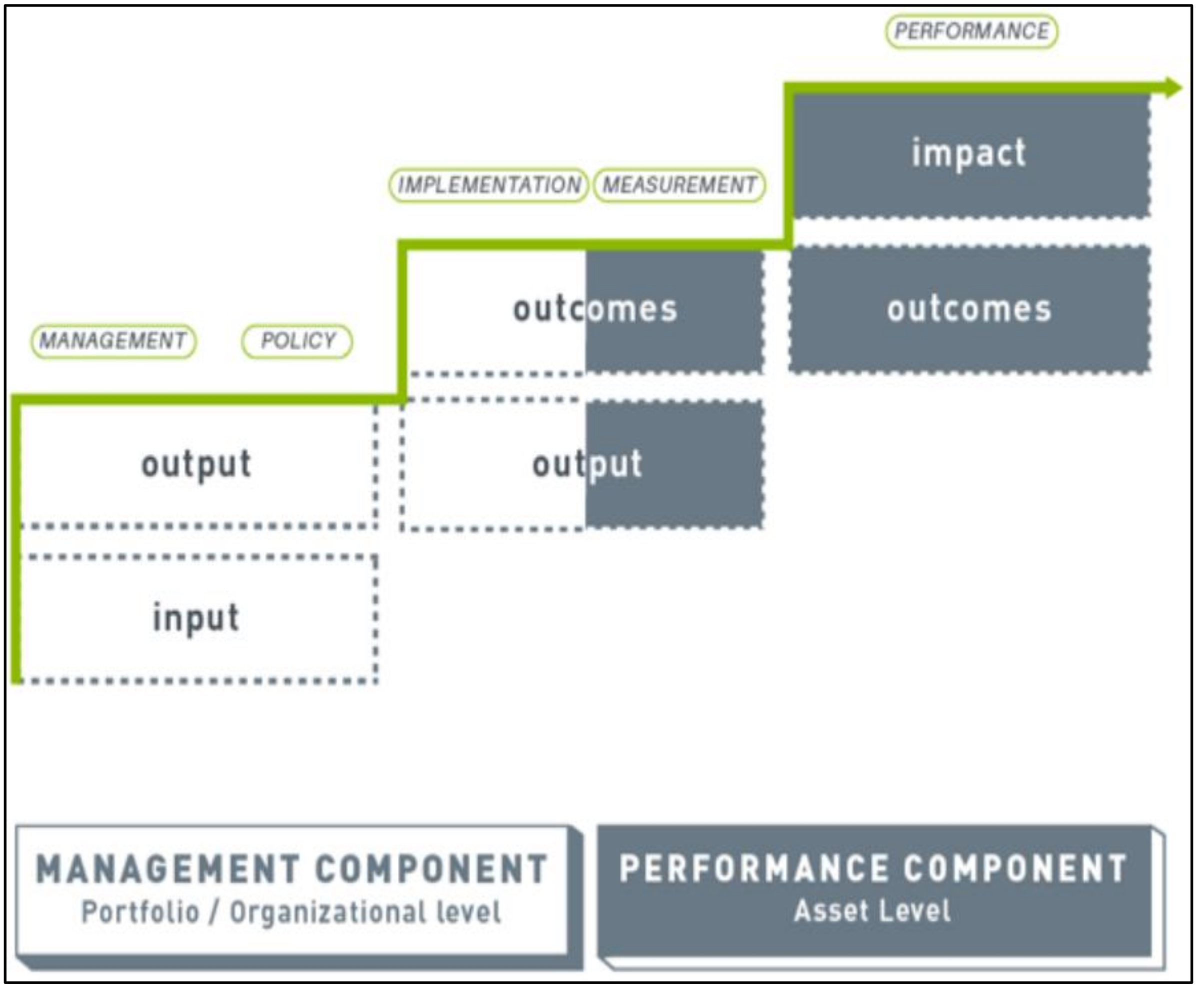

Figure 8. Eventually, GRESB will calculate ESG scores as a combination of the management and performance components of its assessment (Source: GRESB, 2018b)

MSCI ESG Research, Inc.

MSCI ESG Research, Inc. has published its framework for ESG ratings (see Figure 9). In measuring a company's ESG performance, the MSCI ESG ratings model (2018c) seeks to answer four key questions:

> *Nearly 65 percent of a company's ratings are driven by data sources beyond the company's voluntary disclosure*
>
> *MSCI ESG Research, Inc. (2018c)*

1. What are the significant ESG risks and opportunities for a company and its industry?
2. How exposed is the company to those key risks and/or opportunities?
3. How well is the company managing key risks and opportunities?
4. What is the overall picture for the company and how does it compare to its peers?

In its ratings, MSCI ESG Research, Inc. (2018c) found that nearly 65 percent of a company's rating is derived from data sources outside of the company's voluntary disclosure.

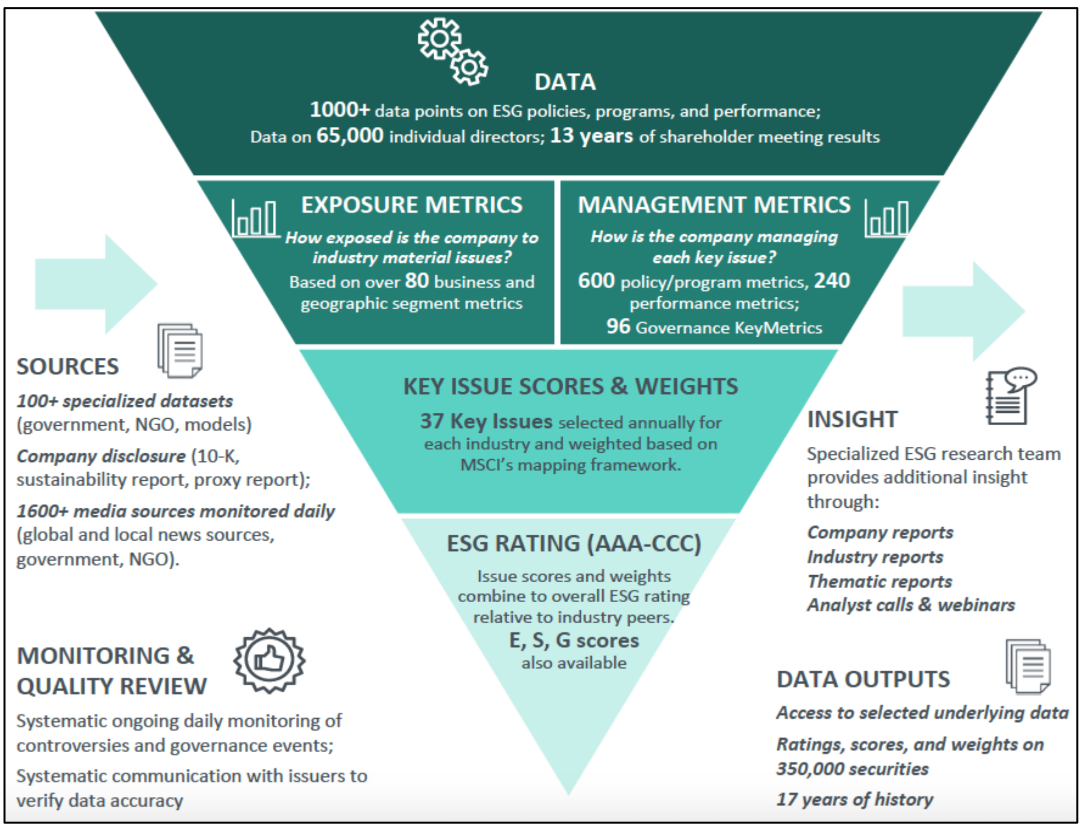

Figure 9. MSCI's ESG rating framework and process (Source: MSCI ESG Research, Inc., 2018d)

Task Force on Climate-related Financial Disclosures (TCFD)

The Financial Stability Board is an international organization that monitors and makes recommendations regarding the global financial system. In 2015, they formed the Task Force on Climate-related Financial Disclosures (TCFD) to establish voluntary, consistent disclosure recommendations for companies to provide their climate-related financial risks to investors, lenders, and insurance companies (UNEP-Finance Initiative, 2018). The TCFD developed four recommendations (see Figure 10).

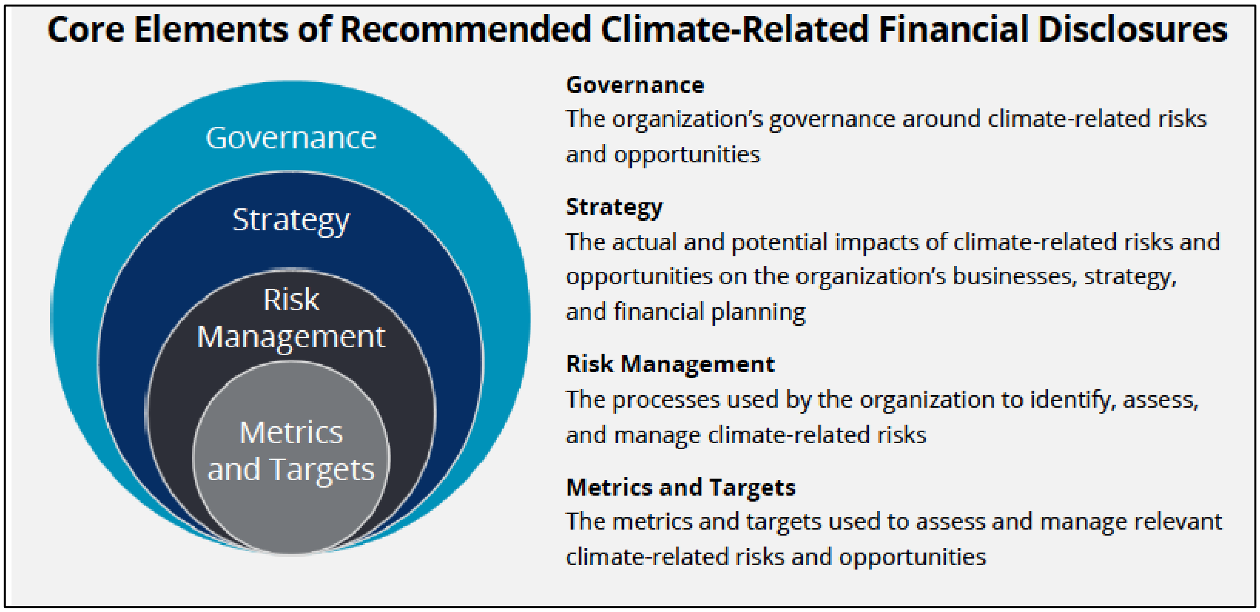

Figure 10. Recommended climate-related disclosures (Source: Financial Stability Board, 2017)

Reporting to Investors

Companies will fall along a spectrum of reporting on ESG performance from those that do not report to those that provide limited disclosure (e.g., a standalone sustainability report) to those that participate in robust reporting through participation in assessments (e.g., GRESB) and communicate their ESG initiatives and performance to stakeholders via multiple channels, such as:

Voluntary Disclosures	Mandatory Disclosures	Third-Party Disclosure
• Annual reports • Investor presentations and stakeholder meetings • Marketing and advertising • Newsletters • Industry-related assessments • Social media • Sustainability reports • Website	• Regulatory and legal filings required of the company (e.g. emissions reporting)	• Media or other stakeholder reports • Lawsuits or regulatory actions accessible by the public

Challenges of Accessing Data for the Infrastructure Investor

Despite the risk signals provided by data on ESG performance, investors may find that data is fragmented through reporting across the different channels (e.g., mandatory and voluntary disclosures), company communications (e.g., sustainability reports, etc.), external surveys and analysis (e.g., GRESB, MSCI ESG Research, etc.), and other means. In addition, if companies choose different frameworks and key performance indicators, investors will encounter challenges in making comparisons across companies.

The authors sought publicly-accessible information regarding reporting and participation in GRESB. GRESB has two member classifications. Investor membership offers access to the data and analytical tools to evaluate the sustainability performance of their investment portfolios and to engage with investment managers. Fund membership is open to entities reporting to the GRESB Real Estate or Infrastructure Asset and the GRESB Developer Assessment. Asset managers employ a variety of approaches to report on ESG performance (see

Figure 11).

Reporting by Investors

Company	Reporting to Investors	GRESB Real Estate Member	GRESB Infrastructure Member	Additional information on Climate Resilience
BlackRock	For the reporting period of July 1, 2017 to June 30, 2018, BlackRock engaged globally with 232 companies on climate-related risks. This includes letters sent to chief executive officers and general counsels at more than 100 of the most carbon-intensive companies in BlackRock's equity portfolios.	Yes (Fund member)	Yes (Investor member)	Adapting portfolios to climate change
Goldman Sachs	One section about financing sustainable infrastructure One section about impact investing in their annual ESG report on their website.	No	No	Environmental policy framework
Morgan Stanley	Disclosed they are scaling capital for low-carbon solutions and reducing the investment in the coal-mining industry in their sustainability report. No material information disclosed regarding climate resilience in their infrastructure portfolio.	Yes (Fund member)	No	ESG policy
UBS	Sector leader in GRESB Infrastructure Assessment 2018 (for 2017 result). The average score is 81 on a global level. Also, they reported on supply chain management initiatives in their sustainability report 2017.	Yes (Investor member)	Yes (Investor member)	Sustainability commitment

Figure 11. Overview of ESG reporting by investors, based on publicly accessible reporting

Enhancing ESG Policies and Performance

Case Study Method

As part of this master's project, the team of graduate students developed case studies to assess the factors that enhance or limit ESG performance among infrastructure companies. Case studies investigate a "contemporary phenomenon in its real-life context" (Yin, 1994). As such, these case studies offered an opportunity to gather insights on actual ESG implementation and reporting.

The team recruited four companies, spanning contracted power generation and utilities, for interviews. Each company participated in the annual GRESB assessment. The companies possessed unique characteristics such as size, nature of operations, location, and other factors that have influenced their capacity to implement, report on, and enhance their ESG standards and performance.

Case study research does come with a set of limitations. The primary limitation in this report is the relatively small sample size. In addition, findings from case studies cannot necessarily be considered applicable to other companies with different characteristics or to the broad field of infrastructure. Any case study research must also acknowledge that data gathered from interviews may not be fully accurate and must be verified.

Prior to conducting interviews, the team developed a list of questions to gather data that would provide insights into opportunities, challenges, lessons learned, and best practices for implementation of ESG standards for infrastructure companies (see Appendix 1). Interviews were recorded and transcribed and then coded for qualitative analysis.

In addition, the team interviewed a representative from GRESB to identify opportunities, challenges, and barriers for the infrastructure companies participating in the GRESB annual assessment. The interview also followed a series of related, but distinct questions (see Appendix 1).

Case Studies

The following are key findings from the interviews with the infrastructure companies. Per the request of the companies interviewed, the case studies do not identify any specific company. It should also be noted that the number of interviews were limited; thus, the conclusions may not be representative.

Case Study: Communicate Effectively on ESG Definitions and Implementation

The following elements led to effective communication at different levels:

- *Investors*: Investors placing a priority on ESG has been a major driver of ESG implementation and allocation of resources toward ESG at the company level
- *Executive leadership*: CEO and executives communicating the importance of ESG has helped to establish ESG as a company-wide priority
- *Employees*: Targeted communication and training has helped to identify how ESG standards are already present in many existing operations and to specify how metrics are applicable to specific functions
- *Other stakeholders:* Communicating the company's role as part of a resilient energy system has underpinned its social license to operate and improved relations with the communities where it operates

One energy company has demonstrated how improved communication has led to successful implementation of ESG standards and to improvements in their ratings on the annual GRESB assessment. As the field of ESG continues to gain prominence and the demand for ESG data grows, investors, companies, employees, suppliers, and other stakeholders are all seeking data; yet, a potential pitfall is that stakeholders are not referring to the same definitions and metrics are not conveyed clearly.

The company worked with their investor and matched the definitions and assessment of GRESB to the company's operations—this proved to be a major factor in improving ESG performance ratings. For one of the GRESB factors alone, once the definitions were clear, the company improved year-over-year to reach the highest score on that part of the GRESB annual assessment.

As the company representatives stated, any new initiative can face resistance or stagnate if employees lack clarity. And, a one-size-fits-all approach is unlikely to bear fruit. The ESG data and communication needed by an investor will differ from the type of data and detail needed by an employee at the plant level charged with implementing ESG into an operational or procurement process. For the company, training at the plant level has led to more acceptance of ESG standards and reinforced that many of the ESG standards tie directly into existing practices, such as the company's culture of safety.

The company worked with their investor and matched the definitions and assessment of GRESB to the company's operations.

In addition, a united message has helped to instill the importance of ESG across the company. The emphasis on ESG by investors has empowered people in the organization and this has been fueled by support from the chief executive officer. Resources have been devoted to ESG training and implementation, supplemented by communications via the company newsletter, thus reinforcing that ESG is not simply a statement of good intent; rather, it is a company-wide priority.

Communications have also assisted in addressing one of the limiting factors for the company because their technology uses fossil fuels, which by definition, have emissions. The company has communicated to stakeholders how their operation fits into overall energy generation and as part of a move toward a lower-carbon future. Renewable energy has grown, yet utility-scale energy storage is not sufficient to meet demand in many regions and having sufficient capacity and reliability in an electrical grid is essential.

Case Study: Build ESG Considerations into Supply Chain Management

Key aspects of successful integration of ESG into supply chain management included:

- Setting standards aligned with the World Bank Group and GRESB
- Creating transparency through communication with all stakeholders and making ESG commitments and policies publicly available
- Working within business considerations of staff time, costs, and product quality and availability as well as using other means such as third-party evaluation and select company-issued surveys, as opposed to widespread on-site audits
- Looking forward to emerging ESG issues (e.g., potential for new conflict minerals in battery storage) for the industry

A company with operations and a supply chain spanning multiple countries and jurisdictions can face differing regulatory environments, differing levels of supplier availability and transparency, and other challenges in implementing consistent ESG standards. When a company begins to integrate ESG considerations into their supply chain management, a measured approach that balances multiple decision factors, communicates the ESG expectations to employees and suppliers, and looks toward future ESG concerns may be the successful approach. An independent solar power company with an array of global power-generation plants offered a path to follow.

Initially, the company's ESG focus was on governance because of primary drivers in that arena (i.e., legal requirements). As the company matured, the focus on ESG expanded, aligning to standards set by the World Bank and referencing definitions from GRESB. The company's investors propelled ESG performance, and, in turn, the company has been pushing ESG standards into its supply chain. As part of this, the company has been transparent about its ESG commitments, making its ESG policies publicly available via its website. The company has also decided to reference its whistleblower policies to alert senior management to any significant ESG concerns.

When a company begins to integrate ESG considerations into their supply chain management, a measured approach that balances multiple decision factors, communicates the ESG expectations to employees and suppliers, and looks toward future ESG concerns may be the successful approach.

Balancing staffing and cost, the company has deployed efficient processes to assess ESG in its supply chain using a combination of third-party evaluation, select on-site assessments, and company-issued surveys. For example, rather than attempting to coordinate ESG audits in-house, which would be cost-prohibitive, the company has engaged Clean Energy Associates (http://cea3.com), a photovoltaic quality assurance and supply chain management firm. Notably, this began as purely a quality inspection process that morphed into a more comprehensive focus on the environmental and social issues, too.

In addition, to examine the issue of conflict minerals (tantalum, gold, and tungsten), the company again used third-party evaluation with the recognition that attempting to audit each of its suppliers to the manufacturer level would have been cost-prohibitive. Across the industry, this focus has had positive results. As the interview participants stated, even two to three years ago, conflict mineral information on solar panel manufacturing was available from approximately 30 percent of the supply chain; now, nearly 80 percent of the supply chain is responding proactively to that demand for information.

The company is also looking toward future ESG issues that may emerge. As the company stated, the battery storage industry is evolving and the demand for lithium and cobalt may lead to them becoming conflict minerals. The cobalt supply is nearly monopolistic as the Democratic Republic of the Congo accounted for nearly 70 percent of global cobalt output in 2017 (McKinsey & Company, 2018).

Case Study: Secure Multi-Level Stakeholder Buy-In

Key elements that were critical to ESG performance buy-in:

- Cultivating top-level support to make sure that employees across the organization understand ESG principles and how the principles correlate to their work
- Assessing best practices across their industry and benchmarking themselves against peer companies
- Aligning ESG performance with the overall company culture to drive improvement year-to-year
- Dedicating a group within one of their major divisions that is constantly assessing systems risks and ESG performance

For a utility company that is in the early stages of implementing their ESG standards, they have defined their ESG priorities based on internal risk and materiality assessments. As was the trend with other companies, all three aspects—leadership, communications, and engagement of employees and suppliers—have helped move their ESG performance forward.

In particular, the tone at the top of the company has set ESG principles for the company and moved performance ahead. Company executives have heeded suggestions from their investors as well as the industry's leading trade organization to make ESG a top priority. With management-level executives and investors as champions of a growing commitment to ESG, the company has to allocate resources to internal efforts to improve performance. With a focus toward the GRESB assessment, the company has worked to improve the sustainability of their supply chain, keeping in mind the impact that climate change will have over the longer-term, well beyond five years.

The company's investor has filled a crucial role by providing the company with a vantage to see across the entire industry to understand best practices and the most effective ways to improve their performance and GRESB assessment ratings year-over-year.

> *The tone at the top of the company has set ESG principles for the company and moved performance ahead.*

On the supply side, communications on ESG standards has helped the company create a stronger understanding of environment, health, and safety standards for its supply chain contractors as they solicit bids on new projects around the country. In 2018, the company incorporated a requirement that anyone sourcing goods or services must consider ESG factors when making a decision to select a new supplier. This was a major ESG development and win because it helped to demonstrate the importance the company placed on understanding where materials are sourced and who it is partnering with.

ESG performance has become a defining part of the company's culture and identity. Understanding the ways in which ESG performance has accelerated in the industry as a whole has been key to motivating the company's decision-makers and employees to embrace ESG principles as part of their daily work. Top-level support has ensured that employees across the organization understand the significance of the company's ESG principles and performance and can internalize how it correlates to the work that they are doing. For example, compensation, in part, is now tied to how the company continues to develop their ESG performance, allowing individuals to meet goals based on a corporate scorecard that helps measure performance for the company. Tying ESG performance to compensation has allowed employees to reach their own goals as part of a larger company mission and commitment to safer standards.

Case Study: Navigate ESG with Openness in an International Context

Key actions for moving ESG forward included:

- Respecting different social norms, listening to customers and stakeholders through panels and meetings to understand their ESG priorities
- Understanding differing levels of awareness and regulatory environments, offering direct guidance and expertise to suppliers to create a better ESG-managed supply chain
- Creating incentive mechanisms for stakeholder engagement to encourage a variety of stakeholders to review, amend, and comment on ESG strategy

Working in distinct regions across the world with different regulations and social norms, a company has sought to engage at a direct level with customers and suppliers to build relationships and feedback loops that inform ESG policies and performance. As part of this, the company has set up five-year investment plans that are driven by mandatory five-year regulatory timelines. This set-up has helped the company make tangible goals during each regulatory period to understand how they can improve ESG performance.

Customer Engagement

A major success for the company in developing their ESG principles over the last five years has been listening to their customers. The company regularly engages their customers in meetings and customer panels to understand what their customers are looking for from the company as related to ESG. That level of engagement has fundamentally changed the company's outlook on ESG and helped to drive the company to listen more closely and understand what their customers expect and look at that through the lens of what the company can change—both in the long and the short term. The GRESB survey has similarly encouraged the company to think about what ESG performance improvements are possible.

Supplier Engagement

The company is managing their supply chain and gaining a better understanding of their suppliers through a supplier questionnaire. The goal is to ensure that supplier standards are equivalent to or exceed the company's current set of standards. Again, much like its customer engagement, the company has chosen to bring in their top suppliers on an annual basis, sit with them, and discuss ESG policies in detail. This helps the company get a

> *Building this relationship with suppliers has also helped the company to effectively guide their suppliers in writing new policy that impacts their ESG work*

grasp on what their suppliers are seeing on the ground and what they are changing and improving in their own practices.

Building this relationship with suppliers has also helped the company to effectively guide their suppliers in writing new policy that impacts their ESG work. This hands-on guidance and expertise have helped the company develop new IT security and data protection policies with their suppliers that encourage a strong working relationship and improve other aspects of ESG work. While not every supplier is open to this kind of relationship, there has been significant step change in a majority of their suppliers' acceptance of ESG support.

Summary of Findings Across the Case Studies

The following is a summary of how infrastructure company representatives responded to questions during the interviews.

What is motivating the demand for ESG data and performance?

Investors are the primary drivers of the demand for ESG standards and performance. This was cited universally as the top motivation toward enhanced ESG performance.

How are the companies defining ESG?

GRESB was stated as a framework and a way to help define ESG standards; however, one company stated that they aligned their standards to the World Bank Group and International Finance Corporation (IFC), with GRESB serving primarily as a benchmarking resource and helping to drive conversations about ESG within the company.

How are ESG standards incorporated into supply chain management?

This dimension showed variation with one company issuing a supplier questionnaire and asking suppliers to confirm that they will either comply with the company's ESG policies or have equivalent policies in place. Citing the cost-prohibitive nature of conducting on-site assessments with all suppliers, two of the companies referenced the importance of third-party evaluations combined with on-site assessment for select suppliers only.

One company has implemented a process where they meet annually with their top 20 suppliers to review critical ESG policies with high-risk potential (e.g., policies around modern slavery, data protection, and waste disposal).

What are limiting factors?

Among the limiting factors to implementing ESG across the supply chain, as highlighted by two of the companies:

- Capacity to deliver necessary products in a specific timeframe
- Supplier specialization (e.g., specialty contractors)

What has led to major improvements in ESG performance?

During the interviews, participants cited three factors as improving their ESG performance significantly:

- Clear definition of the ESG standards for employees and explaining the applicability to their day-to-day work
- Support of the senior leadership of the organization (board of directors, CEO, and senior executives) for ESG
- Allocation of budget for ESG initiatives served as a signaling event of the importance of ESG to the company

In addition, two companies stated that ESG performance is now being incorporated into the performance reviews of select staff.

What is communicated to internal and external stakeholders on ESG?

Interviews revealed that one of the significant challenges—and drivers of ESG performance—was communication with employees to interpret the ESG definitions, why ESG is crucial to company growth and success, and how to apply ESG to existing work. For external stakeholders, the primary communications channel was the company website.

How are companies looking at climate change?

All companies considered climate change in terms of the impacts on business continuity due to weather-related events. Two companies reported having experienced a severe weather event (i.e., flooding and hurricane) that influenced modifications of their existing structures to guard against future impacts and that such resilience is part of the design of any new physical assets. A supplier's risk due to climate change was mentioned in one interview.

In connection with resilience, one interviewee described how they have implemented an emergency communications plan and how they conduct regular table top exercises of that plan to ensure that communications can continue if a severe weather event or other disruption occurs. For example, the company is exploring how some of their staff may be able to manage their customer call center from home if the office location or office phone system is inaccessible.

Stakeholder Engagement

A highlight from the GRESB report (2018a) concerned the engagement of stakeholders. Respondents reported that they nearly always considered employees and customers in risk assessments; however, respondents considered community groups, neighbors, and environmental organizations only half the time. This calls out a potentially overlooked opportunity to build relationships that enhance a company's reputation, as well as identify opportunities for ESG improvements.

Working with aligned nonprofit organizations: Several nonprofit organizations have strategies to engage with industry in ways that may help to boost ESG performance. For infrastructure companies, use of a natural resource may help to identify which organizations would be most advantageous to engage. For instance, using freshwater for dust control is a major source of water use at large solar installations (Hernandez et al., 2014). A study of 459 firms in nine countries (Husted & Milton, 2017) found that collaborative projects between the company and its stakeholders generated the greatest ESG performance benefits, more so than in-house and outsourced initiatives. This finding implies that working with stakeholders to solve a sustainability issue—for example, participating in a working group with local organizations to look at issues of water availability and quality—may ultimately result in higher ESG performance than outsourcing the work, such as through philanthropic contributions.

Working with Industry to Address Harmful Chemicals in the Supply Chain: *Sustainable Conservation's Brake Pad Partnership*

Sustainable Conservation, a nonprofit organization based in California, worked with the automotive industry on a partnership to remove copper from brake pads. When studies identified copper from car brakes as the greatest contributor to elevated copper levels in urban waterways, the organization worked with a coalition of brake manufacturers, public agencies, and environmental groups to address the issue. The manufacturers and their partners endorsed a state law in 2010 that would phase out copper from vehicle brake pads to eliminate the pollution, while giving industry the time and flexibility to develop, test, and produce alternative materials (Sustainable Conservation, 2018).

Supply Chain Management

Suppliers for a product or service are linked by flows of materials and information during the production process; these suppliers are commonly referred to as the supply chain (Seuring & Muller, 2008). Companies that govern the supply chain or design or sell the product or service will often be perceived as responsible for the environmental and social performance of their suppliers (Seuring & Muller, 2008). Thus, supply chain measures such as quality, cost, speed, and reliability have also come to include ESG standards.

Supply chain management may be the new frontier in ESG performance.

Companies with strong ESG performance typically have above-average risk control and compliance standards, including within their supply chain management (MSCI ESG Research, Inc., 2017). This higher risk control means that the companies suffer less frequently from incidents (e.g., litigation, regulatory penalties) that can impact the value of the company.

CDP, formerly the Carbon Disclosure Project, collected data from more than 4,300 suppliers around the world in 2016 and found that approximately 22 percent of respondents actively engage with their suppliers around climate and water issues (The Carbon Trust & BSR, 2016).

As their report indicated:

"The majority of businesses appear to be focusing their sustainability efforts exclusively on areas that are within their own direct control and not yet engaging with key suppliers...getting a critical mass of these large organizations to engage their suppliers on sustainability could be one of the best available solutions to the puzzle of creating a sustainable, low-carbon economy."

This observation raises the question of what impacts a company may face due to potential underperformance or violations of ESG standards by suppliers. In other words, is the company resilient if ESG commitments are not cascading beyond the company into the supply chain?

Measuring and Enhancing Resilience

Resilience may be described as the ability to withstand social and environmental shocks and stress. Environmental shocks are major disruptions (e.g., fire, hurricane, and flood) and stressors are conditions (e.g., environmental degradation, poverty, etc.) that can affect companies that are vulnerable to those conditions. Thus, resilience requires not only preparing for and responding to the shocks, but also minimizing vulnerability to stressors (GRESB, 2018a).

Recently, GRESB (2018a) launched a new resilience module with eight indicators as part of its ESG assessment. The results of this module provided an insight into resilience across the sector.

In the first year, 113 real estate companies and funds and 37 infrastructure assets self-selected to complete the module. Representing 13 percent of all 2018 GRESB Real Estate and Infrastructure respondents, this group was comparable in size and location to the total respondents. Most respondents reported they had the following indicators of resilience (see Figure 12):

- Clear internal leadership
- Social and environmental risk assessments
- Implementation of ESG strategies during development and operations
- Data collection about shocks, stressors, impacts, and near-miss events

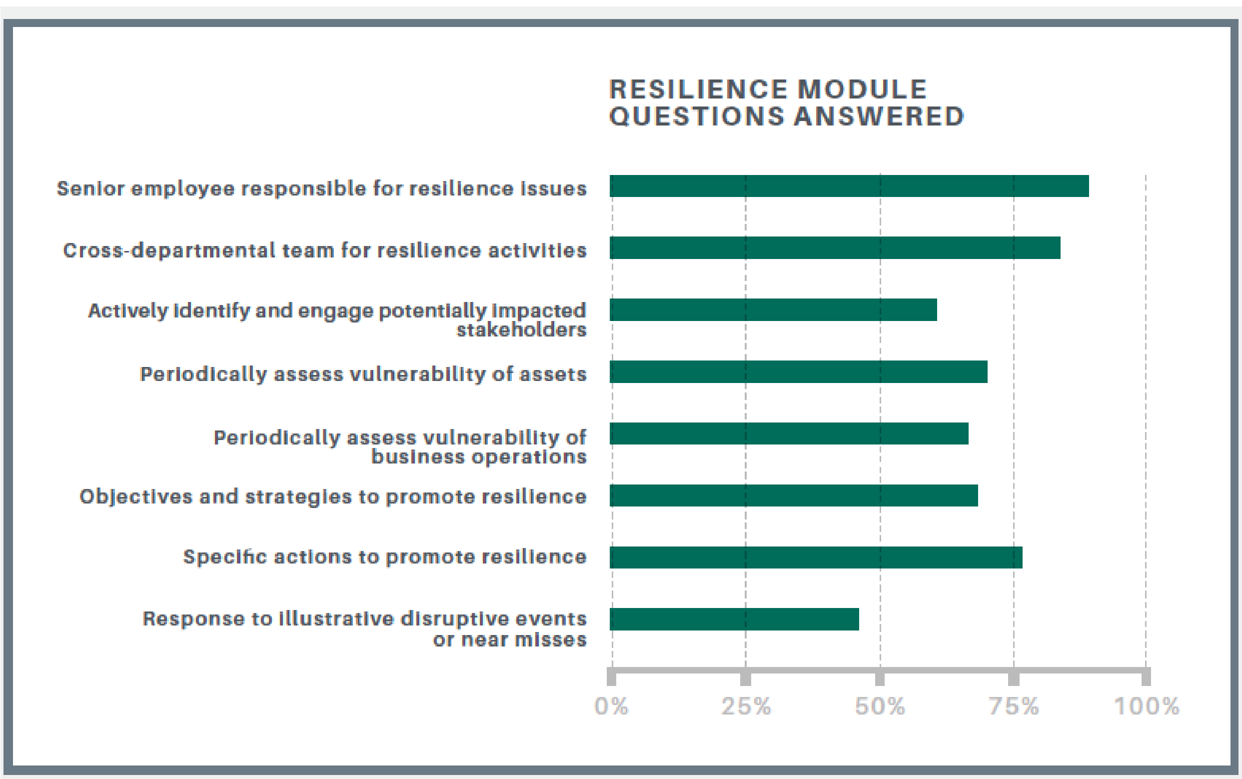

Figure 12. Responses from infrastructure respondents to the eight indicators in the GRESB Resilience Module (Source: GRESB, 2018c)

The respondents also reported on asset-level and organizational-level risk assessments (see Figure 13 and Figure 14).

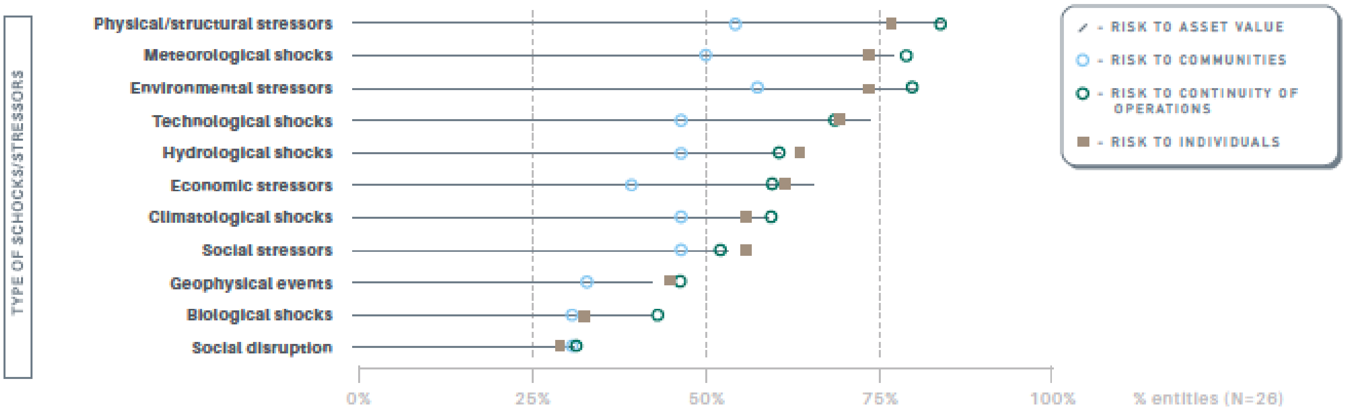

Figure 13. Infrastructure respondents reporting on assessing asset-level risk. More than 80 percent reported assessing physical risks; however, only about half reported assessing social stressors (Source: GRESB, 2018c)

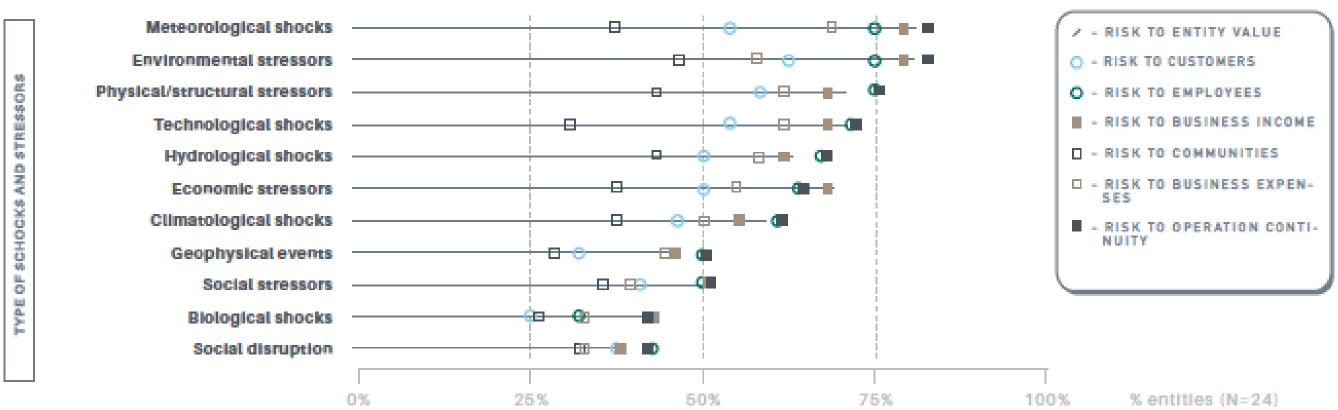

Figure 14. Infrastructure respondents reporting on organizational-level risk. Climate shocks and environmental stressors were among the top considerations (Source: GRESB, 2018c)

Notably, the GRESB report acknowledged that merely having the assessments or practices in place does not mean that they will produce the intended outcomes. Combining practices with outcome measures (i.e., insurance claims, changes in value, etc.) may help to clarify the efficacy of those resilience measures reported.

In addition, the reports revealed different interpretations of climate risk and resilience. Some respondents interpreted resilience to mean routine risk management. This underscored a need for more explicit questions about climate risk and resilience.

In December 2018, GRESB revised its resilience module to leverage a unique global dataset that is more closely aligned with the TCFD framework, particularly governance, risk management, business strategy, and performance metrics.

Emerging Technologies and ESG Implications

Blockchain May Support Supply Chain Management; Applications are in the Pioneering Stage

Associated primarily with cryptocurrencies, blockchain is a digital ledger with blocks of information linked together. Each party on a blockchain has access to all of the information, and no single person or entity controls a blockchain. Because each block of information (transaction) is linked to each previous one ("forming the chain"), the blockchain is immutable (White, 2017).

> "*The bottom line is that despite billions of dollars of investment, and nearly as many headlines, evidence for a practical, scalable use for blockchain is thin on the ground.*"
>
> *McKinsey & Company (2019)*

Accordingly, research (Kshetri, 2018) has identified potential advantages and challenges of blockchain applications in supply chain management:

Advantages of blockchain:

- Recording and validating transactions efficiently and permanently (e.g., self-executing contracts)
- Auditing all transactions (in particular, an audit trail that cannot be altered)
- Tracking time and location of actions (e.g., provenance of a key natural material)
- Reducing the risk of fraud or lost data
- Exerting pressure on supply chain partners to move toward greater accountability
- Providing immediate access to transactions occurring in the supply chain

Challenges of blockchain:

- Complexity of laws, regulations, jurisdictions, and institutions across a global supply chain
- Collaboration among all relevant parties
- Implementation of technology-based solutions for suppliers, both in developed and developing countries

Blockchain in Supply Chain Management for the Food Industry

The food industry has begun deploying blockchain to track their supply chain. In 2018, a coalition of 10 of the world's largest grocery companies including Walmart, Nestlé SA, and Dole Food Company announced that they had been working with IBM to build a blockchain that would track food distribution worldwide. Goals of the initiative include the ability to trace issues related to food contamination, to limit consumer exposure to contamination, and to facilitate recalls by tracking real-time data at every point from production to purchase by the end consumer (Nash, 2018).

Blockchain Remains in the Pioneering Stage

Although a distributed ledger can address pain points such as inefficiency, lack of transparency, and fraud, applications of blockchain have not reached scale and many of the use cases are still in the developmental stage (McKinsey & Company, 2019). The future will reveal whether blockchain moves from its current stage into widespread adoption across industries (see Figure 15).

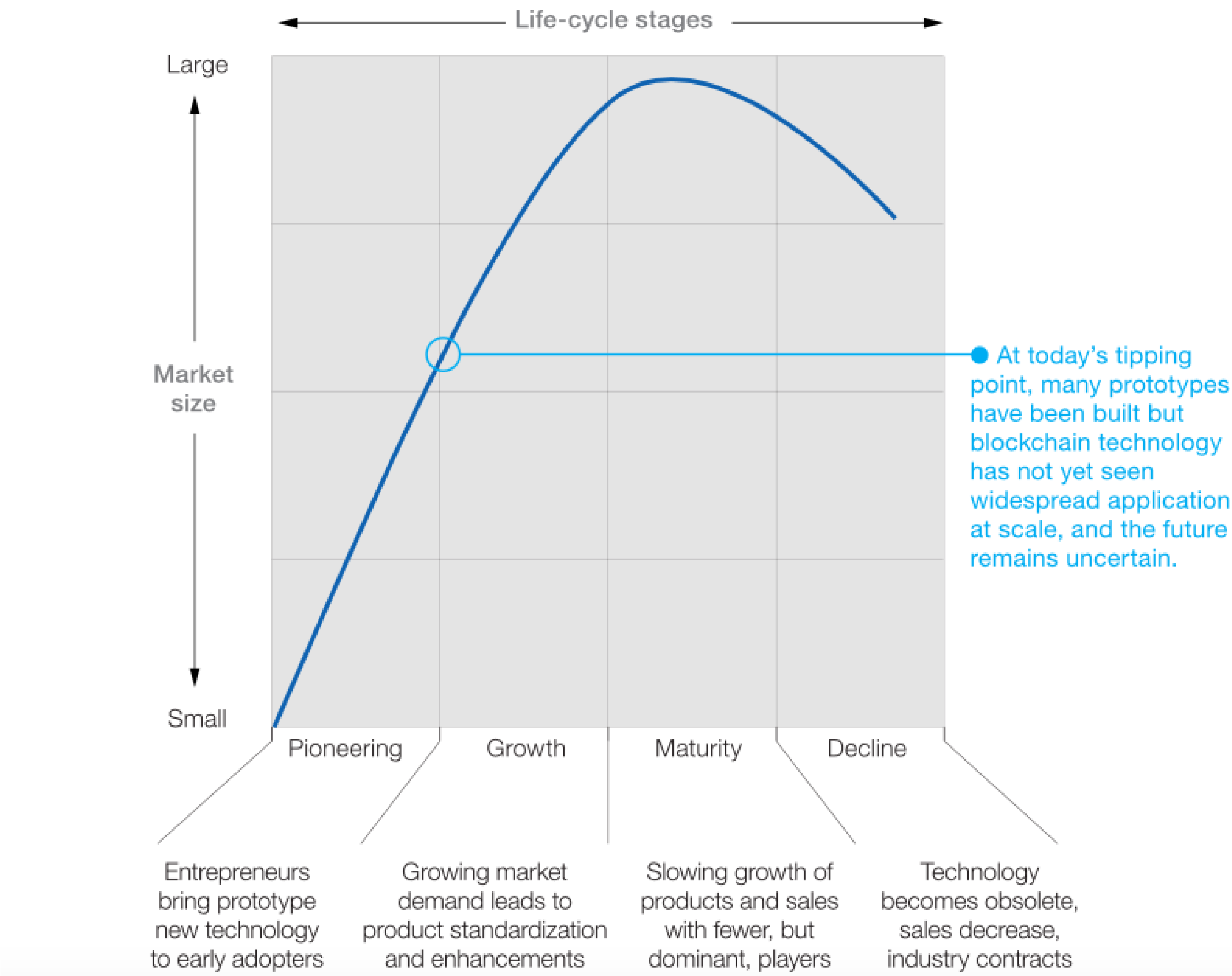

Figure 15. Blockchain life-cycle stage. Blockchain remains in the pioneering stage of its development (Source: McKinsey & Company, 2019)

Artificial Intelligence (AI) May Create a More Sustainable Supply Chain

With increased computing power and the proliferation of internet-connected devices (smart devices), machines are now able to complete some tasks or even make decisions previously made by humans. This application of computer technology is broadly described as artificial intelligence (AI). Researchers have plotted the relationship between the scale of data and the performance of machine learning and accuracy—the more data, the better the expected performance of the model (see Figure 16). AI has been applied in business from powering processes to automation to intelligent conversational interfaces to market prediction; however, the algorithms and models are still in the theoretical or trial stage for supply chain management. As the amount and flow of data increases and as the technology advances, AI application signals promise for automation, supply chain management, and natural language processing in data gathering.

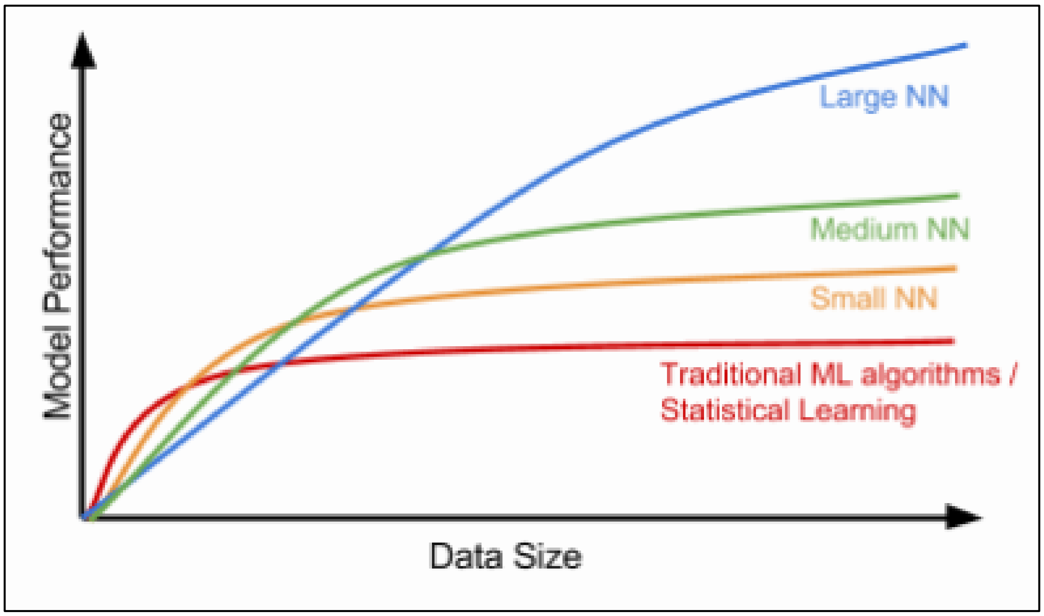

Figure 16. The relationship between data size and model performance showing that traditional algorithms perform well with smaller data sets, but with large data scales, artificial intelligence will be more accurate and efficient (Source: Weng, 2017)

AI and Automation

Automation is not new; however, unlike conventional automation in manufacturing, AI has the potential to eliminate the need for human intervention and reduce the probability of errors (Joseph, 2018). Toyota Jidoka is the second key component of the Toyota Production System, a process that stops the production system when a quality-concern issue arises, and then identifies the root cause of the problem, leading to savings in both labor and materials cost (BTOSE Insights, 2016). Using a similar approach, AI may eventually assist in identifying issues related to operations that trigger ESG concerns.

AI in Supply Chain Planning

Another application of AI could be supply chain planning. With the help of machine deep learning, a business can forecast supply and demand, while optimizing resource planning. Below are two examples showing how companies have used AI in their daily production planning.

- Hitachi is using AI to analyze big data and workers' routines to meet real-time fluctuating demand and make on-site improvements in production. In a pilot, the company observed an eight percent (8%) productivity improvement in logistics (Gershgorn, 2015).

- At Siemens, robots, equipped with vision sensors and laser scanners, use AI to communicate and manufacture on the go (Murphy, 2016).

AI in Natural Language Processing (NLP)

Natural Language Processing (NLP) is an element of artificial intelligence that works to decipher foreign language data and help streamline it for data processing. Given the amount of data that the logistics industry encounters, data quality is key to informing business decisions (Joseph, 2018). In the future, NLP may help in gathering and processing data from multiple sources, such as corporate sustainability reports, regulatory reports, investor filings, news media, and declarations by non-government organizations. In particular, for suppliers based in other countries, natural language processing may be able to translate foreign languages so that the information is more easily accessible and useful to a broader range of stakeholders.

Battery Storage as a New Class of Infrastructure with ESG Concerns

The development of battery technology has been discussed as a new frontier in alternative energy, with implications for infrastructure investors.

Without a financially viable way to store electricity, renewable energy projects sell power with limited consideration of the market price. Wind projects are typically more volatile in terms of energy generation than solar projects, but the same scenario occurs (J.P. Morgan Asset Management, 2018c). Affordable battery storage would allow renewable energy power projects to store electricity and sell at an opportune price. Bloomberg NEF (2018) has estimated energy storage to be a $620 billion investment opportunity.

Low-cost battery storage technology is likely more than 10 years in the future, but wind and solar projects will be beneficiaries of this technology advancement (J.P. Morgan Asset Management, 2018c). Yet, as large-scale battery storage comes online, the technology will also bring new ESG considerations (e.g., where storage facilities will be sited, sourcing of materials, and battery lifecycle and disposal).

Trends in ESG

An in-depth analysis of trends is beyond the scope of this report; however, the authors wish to call attention to trends that may be material for infrastructure companies and supply chain management. Trends in ESG reporting (MSCI ESG Research, Inc., 2019) include:

- Investors responding to escalating demands from regulators. The number of regulations has grown exponentially since 2000 and is expected to continue to rise (see Figure 17).

- Climate change will exert its impact on projects through weather and other disruptions as well as increased regulations. Investors will have to consider which assets may benefit and which will suffer in a climate change scenario.

- With increased transparency, investors are taking a more active look at investor rights and ability to take action in response to ESG-related scandals.

- Further, the social dimension of ESG is predicted to draw more attention. Worker safety in the sourcing of precious metals and the labor conditions of suppliers in Asia are continued areas of concern (Sustainalytics, 2019b). In addition, insurers have faced significant payouts from insured losses from weather events and will try to guard against such losses (Sustainalytics, 2019b).

ESG Trends At-A-Glance:

Responding to escalating demands from regulators

Discerning which assets may benefit and which will suffer in climate change scenarios

Considering investor rights and ability to take action in response to ESG social dimensions

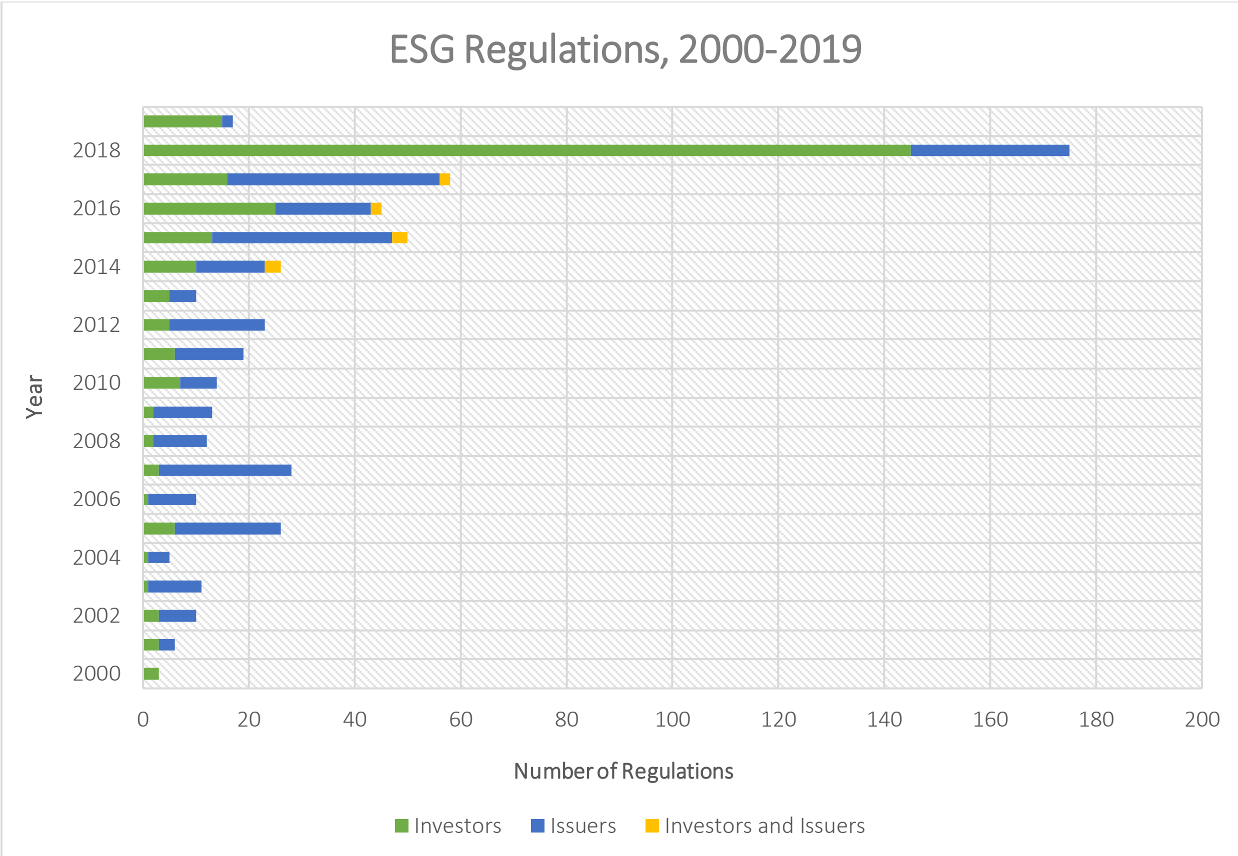

Figure 17. Increase in ESG regulations since 2000 (Source: MSCI ESG Research, Inc., 2019)

Recommendations

Our report found that ESG performance provides investors and other stakeholders with strong signals on a company's future performance, risks, and resilience, as well as its environmental and social impacts. The challenges of evaluating ESG performance stem from varying definitions of ESG standards, data reporting across multiple channels and frameworks, and a limited—though increasing—focus on resilience especially in the supply chain. Based on our analysis, the team recommends that infrastructure companies establish clear ESG standards and expectations with their investors, employees, and suppliers; seek data from multiple and complementary sources; and build policies that emphasize resilience including a focus on the rising impacts of climate change.

Create Clarity on ESG Standards: *For Investors, Portfolio Companies, and Suppliers*

Recognizing that no global definition exists for ESG standards, an infrastructure investor, company, and a company's suppliers must agree upon a definition of ESG standards; metrics; how performance will be assessed; and how that assessment data will be used and communicated. According to Dan Winters, head of Americas for GRESB, one of the most common questions from companies embarking on ESG assessment is "How do we get started?" (Personal communication, February 9, 2019).

Based on our analysis, below is a proposed process:

- *Step 1: Use a Framework to Coalesce Around Definitions and Metrics*

  An investor or other stakeholder must not only understand how a company is defining ESG standards, but also how ESG performance is being measured. Setting clear expectations will enhance communications on these issues. Frameworks, such as GRESB, provide a means to communicate and coalesce around definitions and metrics.

- *Step 2: Assess the Current State of ESG policies within the Company*

  For the investor, an initial question may be centered on where ESG policies find their place in a company. This may include gathering information on what framework has been used (if applicable); what definitions have been adopted; and how ESG is measured, reported, and communicated. In addition, the investor can inquire about whether the company's ESG policies extend to the company's supply chain. This will help investors understand the baseline of ESG activities within the organization. A similar process can be adapted by a company for its suppliers.

- *Step 3: Map the Supply Chain*

  When a company has its ESG policies in place and wishes to implement those across its supply chain, the first step may be to map the suppliers by placing a priority on potential risk factors such as sourcing materials from an area known for conflict minerals or labor issues or suppliers reliant on a natural resource in a resource constrained area (e.g., water use in a drought-prone region, etc.). Once the supply chain is mapped, collecting data on ESG policies and performance from the supply chain is feasible.

- *Step 4: Communicate with Suppliers*

  There are several options for a company to communicate its ESG expectations to its suppliers and to support them in pursuing a resilient supply chain.

  <u>Communications</u> – By communicating with suppliers (e.g., calls, presentations, meetings), a company can convey its expectations and the value-add of ESG standards in making supply chain decisions, avoid confusion around indicators, provide guidance to suppliers (e.g., point them toward participation in third-party assessments or scorecards, as needed), and establish a feedback loop so that companies and suppliers communicate about opportunities and challenges around ESG, along with other supply chain decision points such as price, quality, and availability.

  <u>Supplier self-assessment</u> – The organization CERES provides a Supplier Self-Assessment Questionnaire that serves as a "conversation starter" for companies beginning to assess the risks in their supply chain. The questionnaire can be downloaded online at https://www.ceres.org/sites/default/files/tool/2017-03/ceres_SAQ.pdf

  <u>Supplier code of conduct</u> – A code of conduct can create a mechanism for enforcing ESG standards in the supply chain so that any supplier doing business with the company would agree to abide by the provisions of the code of conduct that specifies the ESG standards.

Assess ESG Data from Multiple Sources: *For Investors and Portfolio Companies*

Companies may have mandatory disclosures (e.g., reporting on emissions) and voluntary disclosures (e.g., participation in an annual survey); yet, multiple sources of information may provide different pieces of the puzzle on actual ESG performance. The following are selected opportunities to monitor ESG performance in a multi-dimensional fashion:

- **Share data on realized outcomes:** Because many ESG disclosures are voluntary, infrastructure investors should seek information about realized outcomes of ESG performance that had a material effect on operations; similarly, companies may seek this information from their suppliers. This inquiry might include questions about any claimed insurance losses, business disruptions, warnings or violations issued by regulators, targeted protests by public interest groups, etc.

- **Perform on-site assessments:** The GRESB Infrastructure Assessment provides valuable insight, yet all surveys are subject to information manipulation. For a company looking toward its supply chain, on-site assessments of the suppliers (either by the company or a third-party) can validate the policies in action. Such assessments might include a number of actions, including a facility tour, a conversation with management, a records review, and an anonymous work survey.

A significant limitation here is that on-site assessment can be cost prohibitive; therefore, a company could use a scorecard system with a screening process to determine whether close scrutiny is warranted because of specific circumstances, such as if the supplier is critical to operations (e.g., alternate suppliers are not available); a specific input or process merits close scrutiny (e.g., supply of "conflict minerals" that might be sourced from regions of the world where armed groups control the mining and trade); and/or previous ESG-related violations (e.g., the aforementioned realized outcomes).

- **Systematize media monitoring:** Monitoring of media reports is available through services such as Google Alerts. Having a monitoring plan in place allows a company to assess controversies that might be arising with its suppliers, which can then be characterized into severity levels such as those proposed by Principles for Responsible Investment (2018):
    - serious controversy (may place license to operate in jeopardy)
    - significant controversy (potential for major impact financially and/or on reputation)
    - light controversy (limited impact but may indicate a sentinel event shedding light on an underestimated risk)

- **Subscribe to research services:** Although it is beyond the scope of this report, companies—such as MSCI ESG Research, Inc. and Sustainalytics—offer paid services to investors on ESG performance of companies.

- **Track evolving technology trends:** Technology holds promise for promoting visibility and accountability in supply chain management. Yet, technologies such as blockchain are not a panacea and carry challenges in operationalizing the technology, particularly in developing regions of the world.

Engage Stakeholders on ESG-Related Issues: *For Portfolio Companies*

Infrastructure assets rely on a legal and social license to operate. Although infrastructure assets often hold a monopoly position, stakeholders play a major role not only in business performance, but also in maintaining that social license to operate. Numerous 501(c)(3) organizations monitor environmental factors—from water resources to toxics in the environment to working conditions. Establishing a working relationship with such stakeholders may provide insights into ways to boost ESG performance, bring credibility to a company's initiatives, and create relationships that positively contribute to a company's social license to operate.

In addition, companies should devote focus to the social factors of ESG assessment. Environmental and governance factors receive attention because the metrics are typically quantifiable (e.g., level of emissions, resource consumption); whereas metrics for social factors are not as easily measured. Yet, social factors such as labor conditions and worker safety are garnering more attention.

Build Resilience into the Supply Chain: *For Portfolio Companies*

Companies will be at different stages in their assessment of ESG performance as well as their ability to act upon results of an assessment. Some companies may be at the early stages of collecting, reporting, and analyzing data whereas other companies may have integrated ESG policies into their key performance indicators, procurement practices, and supply chain evaluation. For both those at the nascent stage and those more advanced in ESG integration, factors that may enhance supply chain resilience include the following as also identified by GRESB (2018a):

- **Business continuity:** A plan and ability to continue or resume operations following a disruption.

- **Communications:** Having multiple communication channels and a contingency plan so that communications can flow within the company as well as to key stakeholders in the event of a disruption or emergency.

- **Diversification of energy and water systems:** Planning for alternative sources that can be deployed if access to the key systems are disrupted.

- **Design for resiliency:** Construction and processes that are able to withstand hazardous events (e.g., severe storms, flooding, etc.)

- **"Safe to Fail" systems:** Identifying and minimizing the potential that a failure of one part of operations will incapacitate the whole business.

- **Social cohesion and inclusion:** The inclusion of local stakeholders in decision-making that affects them and building relationships that will help when support is needed to recover from a disruption, to address a stressor (e.g., environmental quality issues), and to maintain the social license to operate.

- **Technology:** Use of emerging technologies, such as blockchain, can ensure the integrity of supply chain transactions and provide immediate access to information. Challenges of implementation must be considered, as previously noted.

- **Evaluating impacts of climate change:** The impacts of climate change are embedded in the recommendations above. Companies should also assess what impacts climate change (e.g., increased severity of drought, flooding, storms, temperature) may have on their operations and on their suppliers.

Opportunities for Additional Inquiry

As noted above, one of the recommendations is gathering information on realized outcomes that can be correlated to ESG performance. Future studies may look at company incidents to trace if ESG performance ratings did, in fact, point to an unrealized risk. Another potential area of inquiry may be how to ensure quality data is received via ESG assessments as both the reporting and the amount of data continues to rise.

Conclusion

With a physical presence and a long-term operating horizon, infrastructure companies are poised to lead on ESG performance. Conversely, unrecognized or unaddressed ESG risks, including within the supply chain, hold a potentially greater risk for the viability and performance of infrastructure companies than for other asset classes.

Increasingly, businesses are being asked to demonstrate not only their commitment, but also their performance on ESG standards by a range of stakeholders from consumers, employees, investors, regulators, and non-governmental organizations. Beyond expectations of corporate social responsibility, a focus on ESG performance can lead to long-term value creation for all stakeholders. “As wealth shifts and investing preferences change, environmental, social, and governance issues will be increasingly material to corporate valuations” (Fink, 2019). For the infrastructure investor who understands that ESG factors are inextricably linked to company performance over the long-term, enhancing ESG performance can lead to better results for business, people, and planet.

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Appendix

Interview Questions

Duke University, Nicholas School of the Environment
Master's Project Interviews
Questions for Infrastructure Company Case Study

I. Defining & Measuring ESG

1. How does the company define environmental, social, and governance (ESG) standards? For example, do you refer to the Global Real Estate Sustainability Benchmark (GRESB), Principles for Responsible Investment (PRI), internally developed standards, and/or other reference?

2. In considering ESG, how do you weigh the relative importance of each factor- Environmental, Social, Governance --for your company? On a percentage scale?

3. Which stakeholder group(s) do you see driving the demand for ESG data (e.g., community groups, customers, employees, investors, media, nonprofit organizations, regulators, others)?

4. Do you look at the potential impacts of climate change on your operations? If so, over what time period (e.g., 5 years, 10 years, other)?

II. Implications of ESG Performance

5. How do you assess the ESG performance of your suppliers (e.g., company-issued survey, on-site assessment, third-party evaluation, review of voluntary disclosures to assessments, etc.)?

6. How is this information used to inform decisions about suppliers?

7. What impacts or disruptions in the supply chain, if any, have you experienced due to ESG factors?

8. What has led to your biggest improvement in ESG performance?

9. What is the limiting factor to enhancing ESG performance?

10. How do you communicate the company's ESG performance to stakeholders?

III. Wrap Up

11. Is there any additional information about ESG standards, supply-chain management, or resilience that we have not covered, and you would like to highlight?

Duke University, Nicholas School of the Environment
Master's Project Interview
Questions for Global Real Estate Sustainability Benchmark (GRESB)

I. Measurement of ESG Performance

1. Which stakeholder group(s) do you see driving the demand for ESG data from infrastructure companies (e.g., community groups, customers, employees, investors, media, nonprofit organizations, regulators, others)?

2. Of the companies reporting on ESG performance, what percentage of companies are assessing the impact of climate change on their operations?

3. What percentage of companies are assessing their supply chain for ESG standards?

4. Do you see any trends in companies assessing their supply chain?

II. Factors Influencing ESG Performance and Reporting

5. What top three factors contribute the most to ESG performance among infrastructure companies?

6. What is the biggest technical or other challenge for infrastructure companies in reporting on ESG performance?

7. What might be an overlooked opportunity for infrastructure companies to improve their ESG performance?

8. What new technology is likely to impact ESG performance and resilience?

III. Wrap Up

9. Is there any additional information about ESG standards, supply chain management, or resilience that we have not covered, and you would like to highlight?