ENGINEERING & CONSTRUCTION SERVICES
Research Brief

Sustainable Industry Classification System™ (SICS™) #IF0301
Research Briefing Prepared by the
Sustainability Accounting Standards Board®
March 2016
ENGINEERING & CONSTRUCTION SERVICES

Research Brief

SASB’s Industry Brief provides evidence for the disclosure topics in the Engineering & Construction Services industry. The brief opens with a summary of the industry, including relevant legislative and regulatory trends and sustainability risks and opportunities. Following this, evidence for each disclosure topic (in the categories of Environment, Social Capital, Human Capital, Business Model and Innovation, and Leadership and Governance) is presented. SASB’s Industry Brief can be used to understand the data underlying SASB Sustainability Accounting Standards. For accounting metrics and disclosure guidance, please see SASB’s Sustainability Accounting Standards. For information about the legal basis for SASB and SASB’s standards development process, please see the Conceptual Framework.

SASB identifies the minimum set of disclosure topics likely to constitute material information for companies within a given industry. However, the final determination of materiality is the onus of the company.

Related Documents

- Infrastructure Sustainability Accounting Standards
- Industry Working Group Participants
- SASB Conceptual Framework

INDUSTRY LEAD

Bryan Esterly

CONTRIBUTORS

Andrew Collins    Arturo Rodriguez
Henrik Cotran     Jean Rogers
Anton Gorodniuk   Levi Stewart
Nashat Moin       Quinn Underriner
Himani Phadke     Gabriella Vozza

SASB, Sustainability Accounting Standards Board, the SASB logo, SICS, Sustainable Industry Classification System, Accounting for a Sustainable Future, and Materiality Map are trademarks and service marks of the Sustainability Accounting Standards Board.
# Table of Contents

- **Introduction** ......................................................... 1
- **Industry Summary** .................................................. 2
- **Legislative and Regulatory Trends in the Engineering & Construction Services Industry** ......................... 6
- **Sustainability-Related Risks and Opportunities** .......................................................... 7
- **Environment** .......................................................... 9
  - **Environmental Impacts of Project Development** .................................................. 9
- **Social Capital** ........................................................ 11
  - **Structural Integrity & Safety** ........................................ 12
- **Human Capital** ......................................................... 15
  - **Workforce Health & Safety** ........................................ 15
- **Business Model and Innovation** .......................................... 17
  - **Climate Impacts of Business Mix** .................................. 18
  - **Lifecycle Impacts of Buildings & Infrastructure** ................................. 21
- **Leadership and Governance** ........................................... 24
  - **Business Ethics & Bidding Integrity** .................................. 24
- **SASB Industry Watch List** ............................................ 27
  - **Climate Restoration Services** ........................................ 27
- **Appendix**
  - **Representative Companies : Appendix I** .................................. 29
  - **Evidence for Sustainability Disclosure Topics : Appendix IIA** .......................... 30
  - **Evidence of Financial Impact for Sustainability Disclosure : Appendix IIB** ............ 31
  - **Sustainability Accounting Metrics : Appendix III** ..................................... 32
  - **Analysis of SEC Disclosures : Appendix IV** .......................................... 34
- **References**
INTRODUCTION

Engineering and construction companies deliver an inherent benefit to society since they provide services to construct and support crucial infrastructure that allow societies and economies to function. These companies serve clients from multiple industries, such as energy, utilities, transportation, and telecommunications, as well as governments across the globe. Modern societies—in both developed and developing economies—rely on the services of engineering and construction companies, and projects carried out by this industry have and will continue to fuel economic development and commerce. This inherent societal benefit provides the Engineering & Construction Services industry with its social license to operate.

However, the scope of this license is constantly shifting. The emergence of global trends such as climate change, water scarcity, and resource constraints presents both risks and opportunities for the industry, as environmental and social considerations play an increasing role in its operations. For example, engineering and construction companies, as well as their governmental and private clients, are increasingly seeking ways to reduce any negative impacts that may occur as a result of their projects, while also striving to expand any positive impacts these projects may generate in their use phase. As a result, the industry has been the focus of regulation and public attention. As these regulatory and market-driven trends intensify, the Engineering & Construction Services industry will play an increasingly important role in how societies and economies in general transition to a more sustainable future.

Management (or mismanagement) of certain sustainability issues, therefore, has the potential to affect company valuation through impacts on profits, assets, liabilities, and cost of capital.

Investors would obtain a more holistic and comparable view of performance with companies in the Engineering & Construction Services industry reporting metrics on the material sustainability risks and opportunities that could affect value in the near and long term in their regulatory filings. This would include both positive and negative externalities, and the non-financial forms of capital that the industry relies on for value creation.

Specifically, performance on the following sustainability issues will drive competitiveness within the Engineering & Construction Services industry:

- Managing the environmental impacts during project design and construction;

SUSTAINABILITY DISCLOSURE TOPICS

<table>
<thead>
<tr>
<th>ENVIRONMENT</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental Impacts of Project Development</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SOCIAL CAPITAL</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Structural Integrity &amp; Safety</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>HUMAN CAPITAL</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Workforce Health &amp; Safety</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>BUSINESS MODEL AND INNOVATION</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Climate Impacts of Business Mix</td>
<td></td>
</tr>
<tr>
<td>Lifecycle Impacts of Buildings &amp; Infrastructure</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LEADERSHIP AND GOVERNANCE</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Business Ethics &amp; Bidding Integrity</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>WATCH LIST</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Climate Restoration Services</td>
<td></td>
</tr>
</tbody>
</table>
• Ensuring the structural integrity and safety of buildings and infrastructure projects to help reduce risks of personal injury and loss of property value—an increasing concern in the face of climate change;
• Creating a safety culture that reduces the number of fatal and non-fatal injury rates among employees and subcontractors;
• Managing the exposure to potential risks from projects in carbon-intensive industries, as well as the opportunities associated with developing infrastructure projects focused on renewable and alternative energy generation;
• Integrating environmental and social considerations into project design to reduce negative externalities throughout the lifecycle of buildings and infrastructure projects; and
• Implementing internal procedures to reduce the potentially harmful impacts of corruption and bribery violations, as well as ensuring ethical conduct and integrity during project bidding processes.

INDUSTRY SUMMARY

The Engineering & Construction industry is responsible for providing design, consulting, contracting, engineering, and construction services that support various projects related to transportation, energy transmission and generation, non-residential building, and other civil engineering projects. The industry has four major segments: Infrastructure Construction, Non-Residential Building Construction, Engineering Services, and Building Sub-contractors and Construction-related Professional Services.

The Infrastructure Construction segment includes companies that design and/or build infrastructure projects—and in some cases operate them through long-term concession agreements—for clients in industries such as oil and gas; communications; electric, gas, and water utilities; waste management; leisure facilities; and transportation. The segment also provides services to governments around the world. Projects developed by players in this segment include power plants, dams, oil and gas pipelines, refineries, roads, highways, bridges, tunnels, railways, ports, airports, waste treatment plants, water networks, and stadiums. Major players in the industry include U.S.-listed companies Fluor Corporation, Quanta Services Inc., MasTec Inc., and KBR Inc., as well as global publicly listed firms ACS (Spain), Bouygues SA (France), Vinci SA (France), China Railway Construction Corporation, and China Communications Construction Company.

The Non-Residential Building Construction segment includes companies that design and/or build commercial and industrial facilities for their clients. These facilities include factories, warehouses, distribution centers, data centers, offices, hotels, resorts, hospitals, schools, universities, and retail spaces such as malls and shopping centers. Important players in this segment are Tutor Perini Corporation and Fluor Corporation, both U.S.-listed, and Vinci SA and Hochtief (Germany).

The Engineering Services segment includes companies that provide specialized architectural and engineering services, such as design and

1 Industry composition is based on the mapping of the Sustainable Industry Classification System (SICSTM) to the Bloomberg Industry Classification System (BICS). A list of representative companies appears in Appendix I.

8 For sustainability topics applicable to residential buildings, please see SASB’s standards for the Home Builders and Real Estate industries.
development of feasibility studies for many of the project types described above. Companies in this segment are not in charge of the actual project construction. Important players in this segment include U.S.-listed AECOM and Jacobs Engineering Group Inc.

The Building Sub-contractors and Construction-related Professional Services segment includes smaller companies that provide ancillary services such as carpentry, electrical, plumbing, painting, attaching drywall and tile, waterproofing, landscaping, interior design, and building inspection.

The levels of integration are mixed in the Engineering & Construction Services industry; it is common for companies to participate in multiple segments. Firms in charge of construction activities may be involved in building major infrastructure projects as well as non-residential facilities; similarly, design and project feasibility services may be performed by the same company that is in charge of construction. For example, Jacobs Engineering Group provides project services; process, scientific, and systems consulting; construction; and operations and maintenance services for clients in multiple industries and end markets, including chemicals and polymers, oil and gas, infrastructure, and mining and minerals. However, some specialized firms focus exclusively on certain types of projects and/or services. This industry structure leads to variations in industry concentration that depend on the size of a project; for example, large projects are often awarded to only the largest companies, as size and breadth of services are competitive advantages.

Engineering and construction companies publicly listed on global exchanges and traded over the counter generated more than $1.768 trillion in revenue in fiscal year (FY) 2014. The Infrastructure Construction segment contributed the biggest share (55 percent) of global industry revenues, followed by the Non-Residential Building (almost 22 percent) and the Engineering Services (13 percent) segments. Large companies in this industry operate globally and source a significant amount of revenue from outside their country of domicile. For example, Fluor Corporation and Jacobs Engineering Group generated 65 and 41 percent, respectively, of their revenue in regions outside the United States, including Canada, the Middle East and Africa, Asia Pacific, South America, and Europe.

Companies involved in construction activities typically generate revenues through different types of contracts, including cost-reimbursable and fixed-price arrangements. Cost-reimbursable contracts typically provide for cost reimbursements plus a profit premium, which can come from markups or fees, either fixed or based on a percentage of costs incurred. Additionally, incentive fees may be provided for meeting targets, milestones, or performance factors determined within the contract. Fixed-priced contracts are normally either lump-sum bids or negotiated price-fixed contracts. In lump-sum contracts, companies bid against one another to win projects specified by the client. These contracts come with certain risks—including those related to technology, equivocal project specifications, and external economic factors—and are generally less desirable, as they often present a greater risk to companies and may lead to adversarial relationships with clients. In fixed-price contracts, the company generally bears the risk of cost overruns. For large companies in the industry, cost-reimbursable contracts represent involved in, as well as the level of integration of certain industry players, should be of special consideration as the reader goes through this industry brief.
the majority of business, at around 80 percent, while fixed-price contracts represent around 20 percent.\(^6\)

In general, demand for construction projects is driven largely by public and private investments and the level of interest rates and government funding programs.\(^7\) In the past, public spending has been used as a tool to resuscitate faltering economies during economic downturns, when private investments in infrastructure and building expansion projects tend to decrease.\(^8\) Since the 2008 financial crisis, the largest infrastructure projects have been financed differently than they were in the past; in particular, special purpose vehicles (SPVs) are created to house the projects and receive the construction companies’ equity. As with public and private partnership (PPP) projects, the SPV is financed with 10 to 30 percent equity and 70 to 90 percent bank debt. SPV shareholders may include governments, infrastructure funds, and developers and other construction companies.\(^9\) Innovations in financing mechanisms, such as SPVs and PPPs, may further drive industry growth.

Financing plays a key role in the development and construction of projects, particularly infrastructure projects. In the U.S., this segment received support during the five-year period from 2009 to 2014 from the American Recovery and Reinvestment Act of 2009, which provided more than $48.1 billion in funding following the 2008 financial crisis. However, government spending has tapered off, forcing companies to increasingly look to private investment to increase revenue. Private investment has been growing, as private sector earnings continue to improve in tandem with the overall economy.\(^10\)

More specifically, the demand for the industry’s services depends largely on a number of factors from its end-market segments. For example, projects for clients in the oil and gas industry, such as pipelines and refineries, are driven mainly by the production of hydrocarbons and market prices. As these commodity prices fall and extraction projects become less profitable, demand for related construction and engineering services decreases, presenting a risk to companies exposed to this end market.\(^11\)

The largest cost components for the industry include raw materials, equipment purchases, and wages.\(^12\) Industry margins have remained relatively low, declining slightly from 2009 levels. The industry experienced median gross margins of 16.13 percent in 2009 and 13.93 percent in 2013. Industry median net margins have also declined slightly, from 3.85 percent in 2009 to 2.94 percent in 2013.\(^13\) The change in margins has been driven primarily by the level of competition within the industry, as well as by the mix of projects with higher and lower margins.\(^14\)

Competition within the industry depends largely on the services being provided and the size of the projects in consideration. Large construction projects are typically awarded to the largest construction companies, which are capable of executing the projects from infancy to completion. Fluor Corp. states that its competition in its engineering, procurement, and construction segments comes from the company’s “ability to provide the design, engineering, planning, management, and project execution skills required to complete complex projects in a safe, timely, and cost-efficient manner.” Additionally, the company states that it derives its competitive strengths from its reputation for quality, project management expertise, ability to work on projects of varying sizes, strong safety record, and experience with multiple services and technologies, among other sources.\(^15\)
The broad trends affecting the industry include the aging infrastructure in some developed markets, the need for new facilities and infrastructure projects in developing economies, and a regulatory- and market-driven push to develop projects aligned with sustainable development principles and to improve the environmental and social impacts of modern infrastructure and buildings.

The U.S. and several Western European countries are among the developed markets currently facing problems with aging infrastructure. Recently, the American Society of Civil Engineers (ASCE) gave U.S. infrastructure an overall rating of D+. The U.S. ranks 143rd in spending on infrastructure projects and also ranks below many developed countries in terms of infrastructure investment as a percentage of gross domestic product (GDP): roughly 13 percent versus 18 to 22 percent in the majority of developed countries. ASCE estimates that the U.S. will need to spend $3.6 trillion to maintain and improve the nation’s crumbling infrastructure. This represents an opportunity for companies in the Engineering & Construction Services industry, especially those involved in the Infrastructure Construction segment and those providing specialized retrofitting services.

While the developed world is facing problems with aging infrastructure, emerging economies have a need for new buildings and infrastructure projects to continue their path to development. This is reflected in how global market shares for the construction market have shifted over time. According to Bloomberg Intelligence, the Asia-Pacific region surpassed Western Europe as the biggest construction market by revenue in 2010 and has increased the gap ever since. The region’s share rose from 32 percent in 2005 to 49 percent in 2014. During that same period, Western Europe’s share of construction sales dropped from 51 percent to almost 31 percent. North America’s share improved slightly, from 11 to 14 percent. The combined share of the three other regions—Central and Eastern Europe, Latin America and the Caribbean, and the Middle East and Africa—has remained stable, at around 7 percent.

Regulatory and market demands for sustainable projects are gradually changing the Engineering & Construction Services industry. New environmental trends such as climate change, increased environmental regulations, renewable energy generation, and investments in sustainable building and infrastructure projects present both risks and opportunities for companies in the industry. Some of the industry’s clients, for example, are increasingly exposed to climate change regulations that may negatively impact industry profitability and consequently the amount of spending on new projects. This is particularly true for clients in the non-renewable energy sector and segments of the utilities sector. Conversely, as governments and companies shift toward renewable and alternative energy sources and demand projects that lower environmental and social impacts during their lifecycles, services geared toward these areas are likely to provide engineering and construction companies with competitive advantages.

Valuation for companies in the industry focus on enterprise value/earnings before income, taxes, depreciation, and amortization (EV/EBITDA) and enterprise-value-to-sales and price-to-earnings (P/E) ratios. Important factors considered by analysts include geographical exposure, dependence on specific markets (e.g., energy, transportation), degrees of leveraging (e.g., net-debt-to-equity ratios), and order backlogs.
LEGISLATIVE AND REGULATORY TRENDS IN THE ENGINEERING & CONSTRUCTION SERVICES INDUSTRY

Regulations in the U.S. and abroad represent the formal boundaries of companies’ operations, and are often designed to address the social and environmental externalities that businesses can create. Beyond formal regulation, industry practices and self-regulatory efforts act as quasi-regulation and also form part of the social contract between business and society. In this section, SASB provides a brief summary of key regulations and legislative efforts related to this industry, focusing on social and environmental factors. SASB also describes self-regulatory efforts on the part of the industry, which could serve to pre-empt further regulation.

The industry is highly regulated by many types of federal, state, and local laws and regulations associated with the environment, employee health and safety, corruption and bribery, and building safety.

Multiple environmental laws influence the Engineering & Construction Services industry, including the Resources Conservation and Recovery Act (RCRA); the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, or Superfund); the National Environmental Policy Act (NEPA); the Clean Air Act (CAA); the Clean Water Act (CWA); and the Clean Air Mercury, and Toxic Substances Control Act (TSCA). Violations of these regulations can result in significant fines, liabilities, cleanup costs, and remediation activities. Specifically, the TSCA mandates reporting, testing, restriction, use, and disposal requirements for toxic substances such as asbestos, lead, radon, and polychlorinated biphenyls (PCBs).

Construction companies (and project owners) are often required to obtain permits from multiple levels of government (federal, state, and local) before construction activities begin. For example, the Environmental Protection Agency (EPA) is the permitting authority for construction general permits (CGP), which must be obtained for projects that disturb more than one acre of land. To obtain a CGP, companies must comply with stormwater effluent discharge requirements, as well as other mandates, such as the development of a stormwater-pollution-prevention plan.

The Engineering & Construction Services industry has some of the highest injury and fatality rates, given the physical nature of the work. As a result, the industry is highly regulated and required to comply with the employee health and safety standards set by the Occupational Health and Safety Administration (OSHA). These standards include safety protocols such as protective attire, harnessing, proper scaffolding, and ventilation. Failing to properly follow safety codes and procedures can result in fines and liabilities that limit a company’s social license to operate.

The industry is also exposed to international construction codes, including general building codes, electrical codes, plumbing codes, accessibility codes, state codes, and local ordinances. The International Code Council was established to create a unified system of construction codes, which are used to ensure the quality of materials and workmanship. Furthermore, ASCE has established standards for the industry. Typically, project engineers and architects must submit project designs to local ordinances.

---

This section does not purport to contain a comprehensive review of all regulations related to this industry, but is intended to highlight some ways in which regulatory trends are impacting the industry.
and other government officials to verify compliance with codes and obtain permits. Additionally, during construction, government officials may inspect projects to ensure compliance.\(^{28}\)

Large companies operating overseas may be exposed to potential breaches of the Foreign Corrupt Practices Act (FCPA), along with other anti-bribery laws. The FCPA prohibits companies from making improper payments to officials (typically governments) to obtain business. Companies that operate overseas in emerging markets where it may be local practice and custom to make payments to officials are the most susceptible to violations. If they are found liable, companies may face criminal and civil penalties, project cancellations, tarnished reputations, and even debarment from certain markets.\(^{29}\)

The infrastructure industry also faces indirect regulatory risks through its exposure to clients in highly regulated industries. For example, the Engineering & Construction Services industry works with oil and gas and other energy companies that are facing increasing regulatory pressure, particularly, from climate change and emissions regulations. New regulations in this segment could increase client projects costs, ultimately limiting construction companies’ revenue opportunities. Conversely, new regulations on mitigating greenhouse gas (GHG) emissions could spur the growth of new projects associated with renewable energy generation, which could boost the industry’s opportunities for new revenue.\(^{30}\)

Recent trends in the evolution of sustainability and construction projects have led to the creation of different green building and infrastructure rating systems. For example, the Leadership in Energy and Environmental Design (LEED) provides certification for residential and non-residential buildings. The Institute for Sustainable Infrastructure (ISI) created the Envision rating system, which focuses on civil engineering projects and addresses issues such as quality of life, resource allocation, influence on the environment, and climate change risks.\(^{31}\) The Building Research Establishment Environmental Assessment Methodology (BREEAM) also certifies residential and non-residential buildings and recently started doing the same for infrastructure projects. (See the “Lifecycle Impacts of Buildings and Infrastructure” section below, for more on these rating systems). Voluntary standards like these can help companies maximize social and environmental outcomes for projects of all kinds, which may help to reduce regulatory burdens and further expand opportunities.

**SUSTAINABILITY-RELATED RISKS AND OPPORTUNITIES**

Industry drivers and recent regulations suggest that traditional value drivers will continue to impact financial performance. However, intangible assets such as social, human, and environmental capitals, company leadership and governance, and the company’s ability to innovate to address these issues are likely to increasingly contribute to financial and business value.

Broad industry trends and characteristics are driving the importance of sustainability performance in the Engineering & Construction Services industry:

- **Environmental impacts:** The construction of large non-residential facilities and major civil infrastructure projects has an inherent impact on local ecosystems, particularly if the land is being developed for the first time. Failure to reduce environmental externalities may
weakens a company’s social license to operate.

- **Social impacts:** The industry has a tremendous influence on society through the building of facilities and infrastructure that seek to move society forward. However, when companies fail to properly design and execute these projects, users of a particular facility or project may be at risk. Companies can strengthen their licenses to operate by working to minimize structural integrity and safety problems, especially in the face of increasing safety risks from a changing climate.

- **Worker safety:** Construction requires significant amounts of labor that may at times expose workers to dangerous conditions. The industry has some of the highest worker fatality and injury rates, making fines and work stoppages common. Ensuring worker safety, including contractor safety, can help strengthen a company’s social license to operate.

- **Evolving sustainability concerns:** The industry is exposed to clients in industries such as energy that may face challenges from strict environmental regulation. These regulations, combined with growing sustainability trends, present opportunities for the industry to build clean energy infrastructure and provide environmental services and solutions to future issues.

- **Business ethics:** Companies in the industry derive an important share of their revenues from overseas—and increasingly from emerging economies. Having a diverse geographical footprint increases the exposure to risks from corruption, bribery, and fraud during project bids.

As described above, the regulatory and legislative environment surrounding the Engineering & Construction Services industry emphasizes the importance of sustainability management and performance. Specifically, recent trends suggest a regulatory emphasis on environmental protection, and efficiency which will serve to align the interests of society with those of investors.

The following section provides a brief description of each sustainability issue that is likely to have material financial implications for companies in the Engineering & Construction Services industry. This includes an explanation of how the issue could impact valuation and evidence of actual financial impact. Further information on the nature of the value impact, based on SASB’s research and analysis, is provided in Appendix IIA and IIB.

Appendix IIA also provides a summary of the evidence of investor interest in the issues. This is based on a systematic analysis of companies’ 10-K and 20-F filings, shareholder resolutions, and other public documents, which highlights the frequency with which each topic is discussed in these documents. The evidence of interest is also based on the results of consultation with experts participating in an industry working group (IWG) convened by SASB. The IWG results represent the perspective of a balanced group of stakeholders, including corporations, investors or market participants, and public interest intermediaries.

The industry-specific sustainability disclosure topics and metrics identified in this brief are the result of a year-long standards development process, which takes into account the aforementioned evidence of interest, evidence of financial impact discussed in detail in this brief, inputs from a 90-day public comment period, and additional inputs from conversations with industry or issue experts.
A summary of the recommended disclosure framework and accounting metrics appears in Appendix III. The complete SASB standards for the industry, including technical protocols, can be downloaded from www.sasb.org. Finally, Appendix IV provides an analysis of the quality of current disclosure on these issues in SEC filings by the leading companies in the industry.

ENVIRONMENT

The environmental dimension of sustainability includes corporate impacts on the environment. This could be through the use of natural resources as inputs to the factors of production (e.g., water, minerals, ecosystems, and biodiversity) or environmental externalities and harmful releases in the environment, such as air and water pollution, waste disposal, and GHG emissions.

Protecting environmental capital is critical to the success of the Engineering & Construction Services industry, as large infrastructure and construction projects can result in negative externalities and impacts on the natural environment, including pollution of local ecosystems and impacts on biodiversity. This section does not include issues associated with the environment during a finished project’s use phase; that is discussed later in the “Business Model and Innovation” section.

Failure to address environmental issues in a project’s design and construction phase can lead to material impacts. Companies may face significant fines for violating environmental laws and regulations, which can result in project delays and affect the viability of a project, as unintended consequences may raise concerns.

Environmental Impacts of Project Development

While infrastructure construction projects help improve economic and social development, they can also pose risks to the local environment. The Engineering & Construction Services industry can have significant environmental impacts, which oftentimes may be accompanied by negative impacts on local communities. Construction companies perform clearing, grading, and excavation activities and may generate harmful waste during project construction. These activities may disrupt local ecosystems and contribute to environmental pollution, which exposes companies to violations of federal and state environmental regulations, as well as community pushback on certain types of projects. Additionally, companies involved in the engineering and design phase of a project should seek to comprehensively understand these environmental compliance risks before construction begins.

Rigorous environmental assessments, which are generally required, can provide an understanding of a project’s potential impacts and the mitigation activities that are necessary before a project begins. Managing the environmental risks stemming from the various stages of the construction process can help companies in the industry win project approvals, secure financial funds for project execution, understand the total costs of a specific project, avoid going over budget, and minimize the potential of hefty fines, costly delays, and, in extreme cases, project cancellations.32 By assessing environmental considerations up front, construction and engineering companies may be better prepared to mitigate the potential environmental issues that may occur throughout the life of a project and, in so doing, minimize the chances of pushback from
affected communities surrounding the project’s site.

Company performance in this area can be analyzed in a cost-beneficial way through the following direct or indirect performance metrics (see Appendix III for metrics with their full detail):

- Number of incidents of non-compliance with environmental permits, standards, and regulations; and
- Discussion of processes to assess and manage environmental risks associated with project design, siting, and construction.

Evidence

Companies in the Engineering & Construction Services industry are often required to conduct Environmental Impact Assessment (EIA) for project approval. The task of performing an EIA is often the responsibility of the contractors working on the proposed project. For example, the High Commission for the Development of the Niger Valley mandated that AECOM, an engineering services company, conduct both an environmental and a social impact assessment on a proposed dam project in Niger. These assessments helped the project comply with the African Development Bank’s requests for environmental and social management plans.

Failure to properly conduct environmental (and social) impact assessments may jeopardize access to and cost of financial resources needed for project execution. Major projects in the industry are often financed by public-private partnerships or by global and/or regional financial institutions such as the World Bank. Lenders have a critical stake in ensuring that their borrowers are properly assessing both environmental and social risks, since they may alter project outcomes and influence the ability of borrowers to pay back loans. The 83 institutions that have adopted the Equator Principles worldwide have established guidance for borrowers to address environmental and social impacts, particularly in the developing world, where a big share of the industry’s growth will come from in the future. Lenders may refuse to make a loan or may demand repayment if a client cannot adhere to the environmental and social guidelines within the Equator Principles.

The Organization for Economic Cooperation and Development (OECD) estimates that between 2010 and 2030, $53 trillion—3.5 percent of global GDP—will be needed for large-scale infrastructure projects around the world. These projects include electricity distribution, road and rail transportation, telecommunications, and water infrastructure; an additional $11 trillion will be needed for ports and airports. Bank loans will provide the majority of funding for infrastructure project loans.

Fines and penalties may stem from a failure to manage the environmental impacts of construction. In the U.S., depending on the regulation or violation, civil penalties can hit $27,500 a day, with potential criminal penalties of up to $250,000. In 2011, Wright Brothers Construction Co. agreed to pay $1.5 million in penalties and more than $1.3 million in environmental remediation costs to offset violations of the CWA. The company was found liable for burying a stream in excess soil and rock generated from a highway expansion project. The company failed to receive environmental clearance for its fill site, which resulted in disturbance of a valuable aquatic habitat and water quality in northeastern Georgia. In another example, Tennessee Gas Pipeline Co. was

\[ \text{Social impact assessments (SIAs) are also common in the industry.} \]
found liable for multiple environmental violations when constructing a gas pipeline. Inspectors found that the company discharged sediment pollution into local waters in Pennsylvania and failed to “implement required construction best management practices to protect water quality.” As a result, the company paid a penalty of $210,000 and spent $540,000 to fund a cleanup program.  

Large representative companies in this industry recognize the risk of failing to comply with environmental laws and regulations in their Form 10-Ks. Chicago Bridge and Iron stated that it is “subject to environmental laws and regulations, including those concerning emissions into the air; nuclear material; discharge into waterways; generation, storage, handling, treatment and disposal of waste materials” and that it “may experience increased costs and decreased cash flow due to compliance with environmental laws and regulations, [and] liability for contamination of the environment.”

Environmental impacts may be inevitable because of the technical complexity of some projects, yet proper safety procedures should be followed to minimize the potential for further environmental damages that can raise project costs. Following voluntary sustainability certifications and establishing internal control procedures that address the environment may help designers and contractors reduce the environmental impacts of construction. For example, the Envision rating program addresses environmental capital, allowing projects to receive credits for environmental considerations in areas such as protecting wetlands and surface water, preserving greenfields, managing stormwater, and restoring disrupted soils.

**Value Impact**

Effectively assessing environmental impacts prior to construction may help mitigate unforeseen issues that can raise operational project costs and cost of capital and result in construction delays. Additionally, ensuring that proper environmental procedures are followed during construction activities can help reduce the negative environmental impacts associated with construction projects. Failure to comply with environmental regulations can result in costly fines and delays and damage a company’s reputation, thereby harming its ability to secure new business contracts in a competitive industry.

An analysis of the number of incidents of non-compliance with environmental permits and regulations is a lagging indicator of how well companies have managed these risks in the past. In tandem with a description of company processes to assess and manage these risks during project design, siting and construction, analysts may be able to better adjust a company’s risk profile.

**SOCIAL CAPITAL**

Social capital relates to the perceived role of business in society, or the expectation of business contribution to society in return for its license to operate. It addresses the management of relationships with key outside stakeholders, such as customers, local communities, the public, and the government.

Social capital is integral to the success of companies in the Engineering & Construction Services industry, as improved social outcomes are often the impetus for the projects these companies design and construct. Society depends on the safety of construction projects. If design failures occur, they can result in personal injury or
even death, which can lead to lawsuits and a tarnished brand reputation. Companies that are negligent in their construction or engineering services may see their license to operate eroded through adverse impacts on brand value, which can result in a loss of competitiveness for future projects.

**Structural Integrity & Safety**

Construction companies are expected to build and design projects that are safe and reliable for end users, while companies providing inspection and maintenance services are also expected to ensure the safety and reliability of existing infrastructure, especially in the face of increased risks to buildings and infrastructure projects from a changing climate.

Additionally, certain types of infrastructure projects may expose large populations or even entire communities to severe risks related to loss of life and property damage in the unlikely event of structural failure. Such projects may include levees, dams, retaining walls, and other types of large-scale critical infrastructure. Furthermore, infrastructure project design and construction must increasingly contemplate potential climate change impacts, such as the rising frequency and intensity of extreme weather events and sea level change. Compliance with minimum applicable codes and standards may not be sufficient in certain circumstances.

Companies provide engineering, design, architectural, consulting, inspection, and maintenance services and have a responsibility to ensure they follow professional standards for excellence. Design flaws or negligence in project design, construction, or inspection can result in structural failures during the use phase, which can cause loss of life, economic harm to the client, or both. Although these events are rare, when they occur, they can lead to significant liabilities, affect prospects of new business contracts, and tarnish engineering and construction companies’ reputations and social license to operate.

Company performance in this area can be analyzed in a cost-beneficial way through the following direct or indirect performance metrics (see Appendix III for metrics with their full detail):

- Amount of defect- and safety-related rework expenses; and
- Amount of legal and regulatory fines and settlements associated with defect- and safety-related incidents.

**Evidence**

Projects carried out by companies in the Engineering & Construction Services industry are often technically complex, and the failure to make judgments and recommendations with applicable professional standards, including engineering standards, could result in damages such as personal injury, loss of life, business interruption, loss in property values, and property damage, among others.

Large companies in the industry, including Fluor, KBR, and Jacobs Engineering Group, recognize the risk of faulty engineering and design failures during construction. For example, in its FY2014 Form 10-K, Fluor said: “Our business involves professional judgments regarding the planning, design, development, construction, operations and management of industrial facilities and public infrastructure. While we do not generally accept liability for consequential damages, and although we have adopted a range of insurance, risk management and risk avoidance programs designed to reduce potential liabilities, a catastrophic event at one of our project sites or completed projects resulting from the services we have performed could result in significant
professional or product liability, warranty or other claims against us as well as reputational harm, especially if public safety is impacted... An uninsured claim, either in part or in whole, if successful and of a material magnitude, could have a substantial impact on our operations.”  

Jacobs Engineering Group also reported in its FY2014 Form 10-K, “Design, construction or systems failures can result in substantial injury or damage,” adding that claims related to those damages “could be brought by our clients or third parties, such as those who use or reside near our clients’ projects... [t]he outcome of pending and future claims and litigation could have a material adverse impact on our business, financial condition, and results of operations.”

Building defects can occur for numerous reasons, including design flaws, poor implementation during construction, and quality-control failures. Failing to implement proper quality-control procedures can result in significant cost overruns and delays in project completion. For example, the building of a $48 million health and science center at Los Angeles Valley College was plagued by project miscues that caused major delays. During construction, inspectors found issues with the building’s foundation, as well as improper beam installation and poor fireproofing, which represented risks to public safety. These issues cost the college district an additional $3.5 million to fix and complete the project. Inspectors issued the contractor more than 422 citations for deviations from the original design. The contractor responded by suing the district and asking it to pay $1 million that the contractor said it was owed for the work. The district refused, stating that the contractor performed “defective work” and countersued for $1.5 million to cover the cost of necessary repairs.

Faulty construction and engineering can also lead to a loss in property values and, in some cases, even unusable buildings or infrastructure. In 2010, the McGuire, a then-nine-year-old apartment building in Seattle, Washington, was deemed too flawed to fix; according to third-party inspections, the $32 million project had problems that could be traced back to construction, which was carried out by two privately owned companies. Both companies were sued for alleged negligence and failure to adhere to industry standards. While the dispute was settled for an undisclosed amount, court documents state that repair costs and financial losses were estimated at $80 million, more than double the cost of construction. Hundreds of residents and business owners were asked to move out because of structural-integrity risks, and deconstruction of the building started in 2011. While this example focuses on the structural problems of a residential building, it highlights how major project-design flaws can impact society and how construction companies, in general, may face significant professional liability repercussions.

Apart from construction activities, companies that perform inspection and consultation services may also be found liable for negligence or for providing defective advice. For example, after the I-35W Bridge collapsed in Minnesota in 2007, killing 13 people and injuring 145 others, the state of Minnesota filed a suit against URS Corporation, now a division of AECOM, for $37 million in damages. The State alleged that URS breached its contract by failing to “adequately inspect, analyze, and evaluate the structural condition of the bridge” and for failing to “comply with the engineering standard of care in inspecting, analyzing, and evaluating the structural condition of the bridge.” Eventually, the company settled with the state for $8.9 million and paid out more than $52 million to the victims and their families.
In addition to litigation, companies unable to properly manage this issue are exposed to reputational harm when design or construction failures occur. For example, the “Big Dig” tunnel project in Boston, Massachusetts, for example, has been plagued by design flaws that resulted in a woman’s death when falling concrete crushed her passing car. Bechtel designed the tunnel and later faced increased criticism from the public and authorities at a time when the company was experiencing difficulties with other projects.\(^{49}\)

The expected increased frequency and severity of climate-change-related events are likely to exacerbate the importance of a project’s structural integrity and safety. According to the third National Climate Assessment, conducted by the U.S. Global Change Research Program, “sea level rise, storm surge, and heavy downpours, in combination with the pattern of continued development in coastal areas, are increasing damage to U.S. infrastructure including roads, buildings, and industrial facilities, and are also increasing risks to ports and coastal military installations. Flooding along rivers, lakes, and in cities… is exceeding the limits of flood protection infrastructure designed for historical conditions. Extreme heat is [also] damaging transportation infrastructure such as roads, rail lines, and airport runways.”\(^{50}\)

Engineering and construction companies have an increasing professional and, potentially, legal obligation to consider climate change in their work. Project design, construction, inspection, and consulting services that fail to consider the risks from a changing climate may pose safety risks to the industry’s clients and the general public, and a failure to address these potential impacts may result in claims of liability. While professional liability laws differ from one jurisdiction to another, in some such liability derives from the common-law principles of negligence, nuisance, and strict liability, among others.\(^{51}\) When sued for negligence or breach of professional contract, engineering and construction companies are generally held, at a minimum, to a standard of “reasonable care” applicable to the profession.\(^{52}\) For infrastructure practitioners, reliance on existing codes, standards, and related instruments would likely prove an insufficient defense, particularly if it is known that the codes or standards were inadequate under changing environmental conditions.\(^{53}\)

From a regulatory perspective, and in the context of infrastructure projects commissioned by the U.S. government, the Council on Environmental Quality has promulgated draft guidance, which directs federal agencies to account for the impacts of climate risks on proposed infrastructure projects and the affected environment when conducting environmental reviews under NEPA.\(^ {54}\) This has led several federal agencies to start incorporating climate-related considerations in their project-review processes. A recent report by Columbia University’s Sabin Center on Climate Change Law finds that 15 percent of federal EIAs incorporate climate change mitigation and adaptation risks into the final decisions on project design. This percentage varies by type of project; for example, 50 percent of EIAs for public works take into account these considerations, while the same figure for buildings and real estate, electric transmission, and electric generation projects is 16, 12 and 7 percent respectively.\(^ {55}\)

Professional associations as well as law and insurance firms are increasingly highlighting the potential legal repercussions for companies in the industry that fail to account for climate change and how it may impact a project’s structural integrity.\(^ {56}\) In particular, a recent report by Munich RE, a reinsurer, highlights that
“Architects, engineers, builders and others involved in construction are... likely to be targeted for climate change-related claims... [T]he frequency and severity of traditional claims may increase substantially... for failure to adequately account for allegedly climate-change-related events in designing, locating and constructing buildings.”

Meeting professional standards for quality and establishing internal control procedures to address potential design issues, including those resulting from climate risks, are essential practices for companies that want to maintain their social license to operate, protect their reputations, and avoid costly liabilities. This is particularly important for an industry with a diverse operational geographic footprint, as structural safety standards, negligence, duty of care, and professional liability laws may differ substantially between jurisdictions.

Value Impact

Engineering and construction companies have a professional responsibility to provide design, construction, inspection, and maintenance services that meet quality standards and that ensure the structural integrity of buildings and infrastructure projects and the safety of their occupants and users. Companies that fail in this regard, and in particular those involved in cases where public safety is at risk, may face reputational harm and decreased growth opportunities as a result. Moreover, as evidenced above, mismanagement of this issue may result in considerable cost overruns, increased insurance expenses, and potential liabilities from lawsuits from affected clients and other third parties.

Companies with a track record of high levels of defective and safety-related rework might face higher borrowing costs from lenders who assess these risks. Analysis of historical fines provides further information on company performance in this area.

The expected increased frequency and severity of climate-change-related events is likely to increase the importance of managing structural integrity and safety issues in the future.

HUMAN CAPITAL

Human capital addresses the management of a company’s human resources (employees and individual contractors), as a key asset to delivering long-term value. It includes factors that affect the productivity of employees, such as employee engagement, diversity, and incentives and compensation, as well as the attraction and retention of employees in highly competitive or constrained markets for specific talent, skills, or education. It also addresses the management of labor relations in industries that rely on economies of scale and compete on the price of products and services. Lastly, it includes the management of the health and safety of employees and the ability to create a safety culture within companies that operate in dangerous working environments.

The physical labor requirements of the Engineering & Construction Services industry generate health and safety risks for workers. Maintaining a healthy and productive workforce is crucial to retaining a company’s social license to operate and can be viewed as a competitive advantage within the industry. A company’s ability to protect employees’ health and safety, and to create a culture of safety at all levels of the organization, can directly influence the results of its operations.

Workforce Health & Safety

The Engineering & Construction Services industry requires a large amount of manual labor to
perform construction, maintenance and repair services, and other on-site activities. It has some of the highest fatality rates, compared with those in other industries, as powered-haulage and heavy machinery accidents, fall accidents, exposure to hazardous chemicals, and other unique and potentially dangerous situations can lead to worker and contractor fatalities or injuries.

Considering the hazards that workers face, engineering and construction companies must ensure that their operations are safe and that the number of fatal and non-fatal injuries is minimized. Companies need to prioritize creating a safety culture by implementing safety management plans, developing training requirements for employees and contractors, and conducting regular audits of their own practices, as well as those of their subcontractors.

Poor health and safety records, both for direct employees and supervised contractors, can result in fines and penalties, loss of contracts, and an increase in regulatory compliance costs from more stringent oversight.

Company performance in this area can be analyzed in a cost-beneficial way through the following direct or indirect performance metrics (see Appendix III for metrics with their full detail):

- Total recordable injury rate (TRIR) and fatality rate for direct employees and contract employees.

**Evidence**

Workforce safety is critical to the Engineering & Construction Services industry, as it has the highest rate of fatalities and the fourth-highest rate of injuries in the U.S.. In 2013, nearly one in five worker deaths were construction-related. More than half of all construction deaths were attributed to falls, being struck by an object, electrocution, or being caught in between objects. In 2013, OSHA cited fall-protection issues as the most common construction industry violation. The sub-segments of construction that contribute the most fatalities include Specialty Trade Contractors (NAICS 238) and Heavy and Civil Engineering Construction (NAICS 237), which had 477 and 189 fatalities, respectively, in 2013. Workers in these segments construct large engineering projects and perform activities like concrete pouring, site preparation, plumbing, and electrical work.

Ensuring the safety and well-being of all workers, including subcontractors, is important, as large companies are often hired to perform project management services and are therefore responsible for managing workers from multiple contractors, even those not directly employed by the company. Large companies in the industry, including Fluor, Jacobs Engineering Group, and Quanta Services, recognize the potential material impacts of occupational health and safety issues in their annual filings with the U.S. Securities & Exchange Commission (SEC). Specifically, Fluor Corp stated: “Our project sites can place our employees and others near large equipment, dangerous processes or highly regulated materials, and in challenging environments. Safety is a primary focus of our business and is critical to our reputation. Often, we are responsible for safety on the project sites where we work. Many of our clients require that we meet certain safety criteria to be eligible to bid on contracts, and some of our contract fees or profits are subject to satisfying safety criteria. Unsafe work conditions also have the potential of increasing employee turnover, increasing project costs and raising our operating costs.”

Companies that experience a large number of worker safety violations and accidents are exposed to fines and liabilities. For example, a
large natural gas explosion that occurred during the construction of a power plant killed six workers and injured 50 others. In this case, OSHA found 371 safety violations, 225 of which were considered “willful.” The agency fined three construction companies and 14 site contractors a total of $16.6 million, the third-largest fine ever issued by the safety organization for a single incident.64

With the large increase in construction projects around the United States, worker deaths in certain areas have been on the rise. As the cell-tower-network industry expands, workers often have to climb hundreds of feet to replace and repair equipment. Large cell-network providers typically subcontract out this work to engineering and construction companies, and require them to maintain a strong safety record and follow strict safety procedures. Still, in 2013, more than 10 cell-tower climbers fell to their deaths. In one incident, a Jacobs Engineering Group employee was working on an AT&T project when he suffered serious injuries from a fall. AT&T later said in a statement that “contractors must fully train their employees and follow all standards,” and that contractors who violate its safety policies are subject to termination.65 Not only do worker safety accidents often result in serious injury or tragic loss of life; they can also have direct business implications resulting from fines, settlements, tarnished reputations, and potential loss of contracts.

Companies have varying degrees of performance on accident and lost-time injury rates (LTIR). For example, in 2013, Fluor recorded 395 million worker and subcontractor hours and a TRIR of 0.30 per 200,000, a slight increase from 2012. In 2013, the company experienced a days away or transferred cases rate of 0.13, up slightly from 2012. In 2013, Bechtel had a TRIR of 0.373 per 200,000 hours, a decrease from 0.44 in 2012. Additionally, Bechtel had an LTIR of 0.049 in 2013, unchanged from 2012. Both companies experienced rates far below the 2013 Bureau of Labor Statistics construction industry average for TRIR and LTIR: 3.7 and 1.4, respectively.67

**Value Impact**

Poor health and safety records can result in fines, penalties, and increased regulatory compliance costs from more stringent oversight. Very serious incidents, that tend to have a low probability of occurrence but high potential impacts, can lead to acute, one-time extraordinary expenses and contingent liabilities from legal action or regulatory penalties.

Health and safety incidents can also result in project delays and downtime that raise project costs. Additionally, a company’s health and safety record can affect employee morale and increase turnover, adding to the impacts on operating expenses.

Ultimately, acute and chronic safety-related events can impact a company’s reputation and brand value. These factors may also exclude companies from bidding in government or private contracts, or at least reduce the competitiveness of their bids, and can contribute to a loss of revenue and market share.

Analysts may consider companies with high or increasing recordable injury and fatality rates to be riskier, due to potential acute and chronic costs associated with safety incidents.

**BUSINESS MODEL AND INNOVATION**

This dimension of sustainability is concerned with the impact of environmental and social factors on innovation and business models. It addresses the integration of environmental and social factors in the value-creation process of companies,
including resource efficiency and other innovation in the production process. It also includes product innovation and efficiency and responsibility in the design, use-phase, and disposal of products. It includes management of environmental and social impacts on tangible and financial assets—either a company’s own or those it manages as the fiduciary for others.

The Engineering & Construction Services industry works, at least to a certain extent, with other industries that are exposed to potentially disruptive climate regulation. Several companies in the industry provide services to and generate a potentially substantial share of revenues and profits from clients operating in carbon-intensive industries whose capital expenditures may be at risk from potential climate change regulation and the threat of stranded assets. In addition, some engineering and construction companies are increasingly focusing on projects associated with renewable energy and other services related to climate change mitigation. As sustainability trends increase, industry participants with expertise in these types of projects, as well as those providing environmental services and sustainable design, will see potential new opportunities.

**Climate Impacts of Business Mix**

Infrastructure projects often have significant direct and indirect impacts on GHG emissions after construction and when projects are in their use phase. Infrastructure projects that are likely to contribute to GHG emissions, for example, include those in the energy, oil and gas, and extractive industries. On the other hand, projects that are likely to mitigate emissions include mass transit systems, carbon storage, and renewable and alternative energy projects. The extent to which companies specialize in, or are concentrated on, projects with significant GHG emissions implications is often connected to the risks and opportunities embedded in company backlogs and future revenues. Risks may manifest through project delays, cancellations, and diminished long-term revenue growth, while opportunities may include competitive advantages that arise from focusing on growing markets. These company impacts may be driven by climate-change-related public policy, including emissions reductions policies and subsidies, and an overall investor and societal focus on GHG-emissions mitigation.

Discussions about strategy for managing these future challenges and opportunities may provide investors with better insight into the risk and opportunity profiles for companies in this industry.

Company performance in this area can be analyzed in a cost-beneficial way through the following direct or indirect performance metrics (see Appendix III for metrics with their full detail):

- Backlog for hydrocarbon-related projects and renewable energy projects;
- Amount of backlog cancellations associated with hydrocarbon-related projects; and
- Backlog for non-energy projects associated with climate change mitigation.

**Evidence**

Some companies in the Engineering & Construction Services industry produce an important share of their revenues from providing infrastructure construction services to customers in carbon-intensive industries. For example, Fluor operates an oil and gas segment that offers design, engineering, procurement, construction, and project management services for global oil and gas production; downstream refining; pipeline; and chemicals and petrochemicals projects. In 2014, this segment generated
roughly 53 percent of the company’s total revenue and employed 52.5 percent of its total salaried employees. For comparison, in the same year, Quanta Services generated 31 percent of its revenue through its oil and gas segment, which includes pipeline design, installation, repair, and maintenance and other oil and gas systems.

Growing global concern about climate risks may result in the imposition of additional environmental regulations—including legislation, international protocols or treaties, and other restrictions on GHG emissions—that could negatively impact some companies in the Engineering & Construction Services industry via increased costs and reduced demand for services and growth opportunities. Some companies are already listing exposure to evolving climate regulations as a key risk factor in the industry. For example, in its FY2014 Form 10-K, Fluor warned investors that market or regulatory responses to climate change “could affect our clients, including those who (a) are involved in the exploration, production or refining of fossil fuels… (b) emit greenhouse gases through the combustion of fossil fuels… or (c) emit greenhouse gases through the mining, manufacture, utilization or production of materials or goods.” The company explained, “Such legislation or restrictions could increase the costs of projects for us and our clients or, in some cases, prevent a project from going forward, thereby potentially reducing the need for our services which could in turn have a material adverse effect on our operations and financial condition.” Similar disclosure is provided by other infrastructure construction companies, such as Chicago Bridge and Iron, which highlights potential impacts to customers involved in coal- and gas-fired generation facilities; KBR and MasTec; and engineering services firms such as AECOM and Quanta Services.

The recent decline in oil spot prices highlights the potential risks to companies heavily involved in the oil and gas infrastructure construction segment, which are exposed to shifting capital spending from clients as the profitability of oil and gas projects fluctuates. Spot prices are affected by geopolitics and short-term cyclical forces and do not necessarily represent expectations for the medium to long term; however, they do provide an example of the dynamics at work when evaluating climate risks. According to a CERES report on climate asset risks, at least $200 billion in capital expenditures, primarily oil and gas projects, have been deferred or cancelled in part because of the fall in spot oil prices. Exxon Mobil, for example, planned to reduce capital expenditures by $4.5 billion dollars in 2015. The largest energy producers also announced plans to cut spending by more than $50 billion. While not all the reduction in capital spending is directly tied to new infrastructure construction or services, some energy firms do account for a considerable amount of revenue for several companies in the Engineering & Construction Services industry. For example, business from Exxon Mobil Corporation alone accounted for 15 percent of Fluor’s 2014 revenue; while business from Chevron accounted for 13 percent of KBR’s revenue during the first three months of 2015. As with declining oil spot prices, the new regulations around fossil fuels and the valuation of stranded assets may reduce the profitability of oil, gas, and other energy-related projects and influence industry capital expenditures, which could potentially harm a significant revenue stream for engineering and construction companies heavily exposed to these segments.

Climate change may also represent opportunities for companies in the Engineering & Construction Services industry. Renewable energy generation has been growing rapidly over the past few years,
increasing from roughly 6.3 quadrillion British thermal units (Btus) in 2006 to 8.7 quadrillion Btus in 2014. According to the U.S. Energy Information Administration, in the first quarter of 2014, renewables made up more than 14 percent of total energy generation in the United States. Increasingly, the bulk of new generation capacity is coming from renewable sources: over the first seven months of 2014, 53.8 percent of all new electrical capacity came from renewable energy, specifically from wind and solar. The Energy Information Administration estimates that in 2014, renewables accounted for 25 percent of world electricity generation, up from 21 percent in 2011.

More recently, an analysis by Bloomberg New Energy Finance estimated that meeting the goals of the landmark global deal on climate change agreed to in Paris at the end of 2015 would require $12 trillion of investments in clean-energy technology and infrastructure over the next 25 years. This presents opportunities for companies in the Engineering & Construction Services industry to capture this growth as new projects are proposed.

In fact, Fluor acknowledges some of these opportunities in its FY2014 Form 10-K, just after describing the downside risks referenced earlier. The company stated, “Legislation and regulation regarding climate change could also increase the pace of development of carbon capture and storage projects, alternative transportation, alternative energy facilities, such as wind farms, or incentivize increased implementation of clean fuel projects which could positively impact the demand for our services.” Other major players in the industry also recognize these opportunities. Quanta Services, for example, mentioned that “as demand for power grows, the need for new power generation facilities will grow as well. The future development of new traditional power generation facilities, as well as renewable energy sources such as solar, wind and certain types of natural gas generation facilities, will require new or expanded transmission infrastructure to transport power to demand centers.” The company anticipates future growth in these segments and thus higher demand for its expertise in renewable-energy-transmission design, construction, and engineering services.

**Value Impact**

Companies whose portfolios include projects and services for carbon-intensive industries may be at risk of decreased demand, as their customers face increasing pressures on profitability and capital expenditures from evolving climate change regulations. Depending on a company’s exposure to these industries, impacts on revenue can materialize. Additionally, given that the probability and magnitude of this topic is likely to increase in the future as climate mitigation actions ramp up, companies overexposed to those segments could have an increased risk profile, potentially raising their cost of capital.

Conversely, companies that dedicate research and development resources and develop expertise in low-carbon energy segments, such as renewable energy infrastructure, may be able to create a competitive advantage, capturing new revenue opportunities as capital investments flow into these growing market segments.

Backlog associated with carbon-intensive projects may be assigned a higher discount rate as a result of the potentially increased risk premium associated with successful project completion. Specialization in expanding (or contracting) markets can provide an indication of companies’ competitive advantages (or disadvantages) resulting in long-term, progressive impacts to company value through increased business. Analysts can benefit from having information on a
company’s track records of project delays, revisions, cancellations (that result in backlog cancellations) as it may provide an indication of how to value and discount future cash flows related to expected future carbon-intensive-related projects.

Lifecycle Impacts of Buildings & Infrastructure

Over much of the past decade, environmental concerns have shed light on the importance of developing and using sustainable materials for the construction of homes, residential and non-residential buildings, and, to lesser extent, other major infrastructure projects. Similarly, reducing the environmental footprint of buildings and infrastructure during their daily use – especially as it relates to their use of energy and water, as well as the generation of waste – has been a major point of emphasis in the design and construction of such projects.

Construction activities use large quantities of natural resources; in fact, according to the EPA, 60 percent of the raw materials (other than food and fuel) used in the entire U.S. economy can be attributed to construction activities. These materials include iron and steel products (see SASB’s Iron & Steel Producers standard); cement, concrete, bricks, tiles, drywall, wallboards, glass, insulation, shingles, and coating materials (see Construction Materials standard); and fixtures, doors, and cabinetry (see Building Products & Furnishings standard).

Key consumer and regulatory trends contribute to the growth of markets intended to reduce the lifecycle impacts of construction projects and buildings and infrastructure. As a result, multiple opportunities are being created for various industries in the value chain—from construction materials companies that can innovate products that minimize impacts on the environment and human health, to real estate owners that can increase the value of portfolios through integrating sustainability principles into their properties, to companies in the Engineering & Construction Services industry that can specialize in providing sustainability-oriented project design, consulting, and construction services.

As a response, various international certification schemes have been developed for various types of projects. For example, LEED provides certification for residential and non-residential buildings, such as retail and office spaces, health care and educational facilities, and warehouses and distribution centers. BREEAM also certifies these types of buildings and, since acquiring CEEQUAL, has recently been performing sustainability assessments for civil engineering projects. Envision, a joint collaboration between the Institute for Sustainable Infrastructure and Harvard’s Zofnass Program for Sustainable Infrastructure, is another rating system focused on certification for infrastructure projects such as roads, bridges, pipelines, railways, airports, dams, levees, landfills, and water systems, among other civil engineering projects. The GreenRoads rating system focuses on transportation infrastructure projects such as roadways and bridges.

The benefits of constructing green building and infrastructure projects are plentiful and include positive environmental outcomes such as resource savings, energy efficiency, water conservation, and greenhouse gas mitigation, as well as social benefits such as reduced negative impacts on human health. Engineering and construction companies able to take advantage of these trends are likely to gain a competitive advantage over infrastructure, landscaping and works in public spaces. It was launched in 2003 in the United Kingdom.
their peers as the industry continues to evolve based on regulatory and market forces. In other words, as the industry’s customers continue to seek economically advantageous methods to reduce the negative environmental and social impacts of their projects throughout project-use phases—and furthermore seek to create positive impacts—the industry and its specific participants that specialize in such areas stand to benefit.

Company performance in this area can be analyzed in a cost-beneficial way through the following direct or indirect performance metrics (see Appendix III for metrics with their full detail):

- Number of commissioned projects certified to a multi-attribute sustainability standard and active projects seeking such certification; and
- Description of process to incorporate operational-phase energy and water efficiency considerations into project planning and design.

Evidence

Green design in the construction and engineering industry is no longer a niche segment. In 2013, a global survey found that 94 percent of architects, engineers, contractor firms, consultants, and real estate owners were engaged in some level of green project certification. Of these professionals, 28 percent reported “high levels” of involvement in such projects—defined as more than 60 percent of their work either being certified or seeking certification. This figure is more than double the percentage of firms reporting the same level of involvement in 2009.84

International sustainable building and infrastructure certifications have grown considerably in the past decades. According to the U.S. Green Building Council (USGBC), every day more than 1.5 million square feet of space is certified using LEED.85 In December 2013, the USGBC announced that it had issued the 20,000th LEED certification since its creation in 1993. The organization reports that more than 56,000 commercial and institutional projects worldwide, totaling 10.5 billion square feet of construction space and more than 47,000 residential units, currently participate in LEED.86 BREEAM, on the other hand, has certified more than 539,600 developments worldwide, and more than 2.2 million have registered for assessment since its creation in 1990.87 Before being acquired, CEEQUAL had issued more than 260 awards, and in February 2015 the total value of the civil engineering work that had been or was in the process of being assessed exceeded £25 billion.88

This increasing demand for certification presents opportunities for companies positioned to meet the needs of a growing green building and infrastructure market. Estimates predict the global market for such projects will grow by around 13 percent annually between 2015 and 2020, driven largely by government policies focused on promoting green construction, increased client awareness of energy efficiency, and the benefits of green buildings relative to costs.89 In the United States, the USGBC estimated that in 2015, 40 to 48 percent of new non-residential construction would integrate resource-efficient initiatives, representing an opportunity of $120–$145 billion. Clients have increased their demands for green project designs; in 2012, 41 percent of all non-residential building starts integrated sustainable design factors, compared with only 2 percent in 2005.90 As a result, large companies are positioning themselves to capture this growing segment within the industry. For example, in

---

84 Note that these figures may include projects from other industries in SASB’s Sustainable Industry Classification System (SICS), such as Home Builders (SICS IF0401) and Real Estate Owners, Developers & Investment Trusts (SICS IF0402).
Jacobs Engineering Group reported having 587 LEED, and 13 BREEAM/CEEQUAL accredited professionals. During FY2014, the company generated $183 million from sustainably certified building projects.91

A few of the factors driving demand for green building and infrastructure projects are resource efficiency and costs. Both the construction and use phases of buildings, for example, require a significant amount of materials and use considerable amounts of energy and water. Globally, buildings use 40 percent of the world’s raw materials. In the U.S., buildings consume 73 percent of the country’s electricity and 13.6 percent of all potable water, while contributing 38 percent of all carbon dioxide emissions. LEED Gold standard buildings generally consume 25 percent less energy and 11 percent less water, have maintenance costs that are 19 percent lower, generate 34 percent less greenhouse gas emissions, and have increased occupant satisfaction rates. Additionally, LEED projects utilize less materials and have helped divert more than 80 million tons of waste from landfills.92

Currently the cost premiums for building green structures above code differ depending on the level of certification. For example, the majority of green buildings generally have cost premiums ranging from 0 to 4 percent; for higher-level certifications, such as LEED Silver or Gold, costs range from 0 to 10 percent, and the highest levels (LEED Platinum, zero carbon) are from 2 to 12.5 percent.93

Moreover, green buildings generally offer increased asset values relative to conventional-code buildings. While these values are not ultimately a part of engineering and construction companies’ balance sheets, they do help explain why industry clients are increasingly asking for designs that integrate sustainability considerations, as well as clients’ willingness to pay premiums for projects. Studies show that green residential and non-residential buildings generally have higher rental and lease rates, lower operating expenses, higher occupancy rates, and lower yields (i.e., higher transaction prices)—price premiums range between 0 and 30 percent.94 However, it should be noted that issues surrounding causation versus correlation are often present in such analyses. As the market better understands the benefits of certified buildings, the demand for sustainable building consulting and construction expertise will likely increase, presenting opportunities for companies well positioned in this growing segment.

In their annual SEC filings, companies are starting to recognize that focusing on sustainable building and infrastructure design can give them a competitive advantage over their peers. While most disclosure is provided in the form of a simple and generic narrative, it highlights how the industry is increasingly thinking about this issue. In its FY2014 Form 10-K, Granite Construction, an engineering services firm, mentions “We believe sustainability is important to our customers, employees, shareholders, and communities, and is also a long-term business driver. By focusing on specific initiatives that address social, environmental and economic challenges, we can minimize risk and increase our competitive advantage.”95 Empresas ICA SAB, a Mexico-based infrastructure construction company, provides additional insight into its sustainable infrastructure activities. In its FY2014 Form 20-F, the company informed investors: “In order to promote sustainability and evaluate the quality of our projects, we started collaboration with the Zofnass Program for Sustainable Infrastructure of Harvard Design School. In 2014, two case studies were conducted on ICA’s projects… By analyzing these two cases, we seek to create guidelines for evaluating and improving the performance of sustainability matters in our projects.”96
company’s Necaxa-Tihuatlán Highway project, a four-lane, 37-kilometer-long stretch of a larger highway concession which includes six double tunnels and 12 bridges, required a $75 million investment and was developed through a public-private partnership. The project integrates sustainable techniques to reduce the negative impacts on the local communities and environment through actions such as slope re-vegetation programs and hillside stabilization schemes.97

Value Impact

Companies with expertise in sustainable building and infrastructure services could experience a competitive advantage in both the near and long term, with the expected growth in demand for a sustainable built environment. A company can build its reputation for expertise in this area, which can contribute to revenues as well as growth opportunities. Companies may be able to charge price premiums for certain specialized services.

A description of the processes to incorporate operational-phase energy and water efficiency considerations into project planning and design can provide analysts with a sense of how companies are addressing opportunities stemming from this issue. Similarly, the number of commissioned and active projects that are either seeking certification or already certified can be helpful to compute the share of a company’s projects that contribute to a sustainable built environment. Analyst can use this information to compare companies at any given point in time, and measure individual company performance through time. As market and regulatory trends continue to favor the design and construction of sustainable buildings and infrastructure projects, the probability and magnitude of this issue is likely to increase in the future.

LEADERSHIP AND GOVERNANCE

As applied to sustainability, governance involves the management of issues that are inherent to the business model or common practice in the industry and are in potential conflict with the interest of broader stakeholder groups (government, community, customers, and employees). They therefore create a potential liability, or worse, a limitation or removal of license to operate. This includes regulatory compliance, lobbying, and political contributions. It also includes risk management, safety management, supply chain and resource management, conflict of interest, anti-competitive behavior, and corruption and bribery.

Due to the industry’s global nature, governance issues within the Engineering & Construction Services industry have primarily been focused on managing bribery and corruption risks. Similarly, the industry’s competitive nature makes bidding integrity an important governance aspect that companies should manage to avoid risks to their social licenses to operate.

Business Ethics & Bidding Integrity

The global operations of the large players in the industry, as well as the nature of the business, which may at times require securing contracts with foreign government agencies and managing multiple local agents and subcontractors, can expose companies to business ethics risks, such as bribery, corruption, and anti-competitive practices. The industry is exposed to these risks in part given its work in high-risk regions, the magnitude of the contracts involved in building large infrastructure projects, and the competitive process necessary to win contracts.
There are examples of companies in the industry violating anti-bribery laws around the world, often by making illegal payments to government officials or private employees to receive favorable considerations during the bidding and project-awarding processes. Bribes are not the only method of bid-rigging. In some cases, given the relatively small number of major infrastructure projects and the small number of companies with the technical and financial capabilities to address them, some firms have been found to illegally coordinate among themselves to inflate project bids. Complementary bidding\(^8\) (the practice of submitting an artificially high or unacceptable bid for a contract that a bidder does not intend to win) and bid-pooling (the practice of coordinating to split contracts and assure each bidder is awarded a certain amount of work) are two schemes that have been used by some companies in the industry.\(^9\)

An important share of the projects carried out by companies in the Engineering & Construction Services industry are commissioned by national governments, so corruption, bribery, and bid-rigging mechanisms have social and economic repercussions. These violations also expose companies to investigations by authorities in multiple jurisdictions and may result in significant fines and costs that may be considered material to investors.

Company performance in this area can be analyzed in a cost-beneficial way through the following direct or indirect performance metrics (see Appendix III for metrics with their full detail):

- Number of active projects and backlog in countries that have the 20 lowest rankings in Transparency International’s Corruption Perception Index;
- Amount of legal and regulatory fines and settlements associated with charges of bribery or corruption and anti-competitive practices; and
- Description of policies and practices for prevention of corruption and bribery and anti-competitive behavior in the project bidding processes.

**Evidence**

Transparency International publishes the Bribe Payers Index, which highlights the industries that are most susceptible to bribery. The index finds that Public Works Contracts and Construction, which includes the Engineering & Construction Services industry, is the industry most likely to be involved in corrupt practices. The issue is an important one for industry executives; according to the 2015 Annual Global CEO Survey carried out by the consulting firm PwC, 58 percent of engineering and construction CEOs are concerned about it, compared with 51 percent of the CEO sample overall.\(^9\) Factors that heighten this risk include the regions in which companies operate, the level of interaction with government officials, the size of projects, the length and nature of contracts, the often limited number of tenderers for major projects, the use of intermediaries to do business, a decentralized business model, locally operated bank accounts, and the use of gifts.\(^10\)

Anti-bribery laws, such as the FCPA in the U.S. and the U.K. Bribery Act of 2010, regulate companies in the industry. Nearly every large engineering and construction services company recognizes the potential material impacts from violating these anti-bribery laws in its Form 10-K.\(^10\) More specifically, Jacobs Engineering Group states, “We could be adversely affected by violations of the U.S. Foreign Corrupt Practices Act and similar worldwide anti-bribery laws...We

---

\(^8\) Complementary bidding is also referred to as “cover bidding,” “cover pricing,” or “courtesy bidding.”
operate in many parts of the world that have experienced governmental corruption to some degree and, in certain circumstances, strict compliance with anti-bribery laws may conflict with local customs and practices.” The company highlights that violations of anti-bribery laws “either due to our own acts or our inadvertence, or due to the acts or inadvertence of others including our partners, agents, subcontractors or suppliers could result in criminal or civil penalties or other sanctions, including contract cancellations or debarment, and loss of reputation, any of which could have a material adverse effect on our business.”

Several companies have been fined for violating the FCPA. For example, KBR Inc., which was a subsidiary of Halliburton until 2006, was found guilty of bribing Nigerian government officials to obtain contracts in the region between 1994 and 2004. KBR allegedly paid more than $180 million in bribes to Nigerian officials to win more than $6 billion in engineering and construction contracts for a liquefied-natural-gas project. The company agreed to pay more than $579 million to settle criminal and regulatory charges over the incident, the largest fine imposed on a U.S. company since the 1977 FCPA law was passed. The company was also forced to implement an independent monitoring scheme to review its accounting practices and ensure future compliance with anti-corruption laws.

Examples of companies collaborating to inflate project bids can be found in both developed and developing economies. In England, for example, the Office of Fair Trading fined 103 construction firms almost £130 million for participating in complementary bidding schemes on multiple non-residential building projects across the country, such as schools, universities, and hospitals. The largest fines, totaling £17.9 million and £11.6 million, were awarded to Kier and Interserve, respectively; both companies are publicly listed on the London Stock Exchange. The 103 companies were fined an average of £1.26 million, which, at the time, represented 1.14 percent of their annual global revenue.

In South Africa, authorities fined 15 construction companies, including several publicly traded on JSE Limited, a total of $141 million in June 2013. The fines were levied after a probe found that that these companies had colluded to drive up prices for the construction of six stadiums and accompanying infrastructure leading up to the 2010 FIFA World Cup; the price-fixing affected public and private sector contracts. According to the official investigation, companies colluded to exchange cover prices, allocate tenders, and establish inflated profit margins. More recently, in Japan, antitrust authorities raided the offices of several engineering and construction companies under investigation for allegedly colluding on bids for road-paving projects. While these examples include companies publicly traded outside the U.S., they highlight the potential acute financial impacts, via fines and penalties, which companies in the industry can have if internal controls and procedures fail to minimize these risks.

While fines and penalties may affect companies on a one-time basis, long-term financial impacts
may also stem from mismanaging this issue. Companies that participate in illegal business ethics acts may face sanctions preventing them from working on futures projects, thereby presenting lost revenue opportunities. The World Bank, which funds infrastructure construction projects globally, maintains a list of companies that are banned from receiving awards for World Bank–financed contracts for extended periods of time because of violations of its fraud and corruption policies. In October 2015, the World Bank included SNC-Lavalin, a publicly listed Canadian infrastructure construction company, and any legal entity that it directly or indirectly controls, in its debarment list for an eight-year period for illegal misconduct related to several projects in Africa and Asia. Similarly, the privately owned Louis Berger Group was banned from projects for one year for corrupt practices on two Vietnamese infrastructure projects. Regional development banks, such as the Asian Development Bank, the European Bank for Reconstruction and Development, the Inter-American Development Bank, and the African Development Bank, have similar policies and share a cross-debarment agreement for mutual enforcement with the World Bank. This highlights the potential impacts to growth opportunities stemming from violations of bribery policies worldwide.

Companies can minimize the possibility of violating these laws by implementing a culture of ethics and monitoring activity. For example, to mitigate these risks, Fluor trains staff on applicable laws, informs its partners, subcontractors, and agents about the laws, and implements internal controls to monitor compliance. Jacobs Engineering Group reports that 79 percent of its staff participated in its online anti-corruption policy training in FY2014. Both companies, however, warn investors in their FY2014 Form 10-K that despite their training and compliance programs, there is no assurance that their internal controls and procedures will protect them against illegal acts committed by their employees or agents.

**Value Impact**

Fines from violations of existing anti-corruption and competition laws can result in significant one-time costs and contingent liabilities from legal and regulatory actions and settlements. High-profile cases of unethical conduct pose risks to a company’s reputation, brand value, and intangible assets. Additionally, companies found guilty of bribery and corruption and/or collusion during bidding processes may face debarment from certain projects or markets, limiting their ability to generate revenue and gain market share, especially if these debarments cover long time periods.

The number of active projects and backlog in countries with the lowest rankings in Transparency International’s Corruption Index can aid analysts in assessing a company’s current and future exposure to potential corruption risks. The amount of legal and regulatory fines associated with bribery and anti-competitive practices during the bidding process is a lagging indicator of how well companies have managed this issue in the past. In conjunction with a description of policies and practices aimed at preventing both types of behavior, analysts can have a better understanding of a company’s performance on this front and adjust each company’s risk profile accordingly.

**SASB INDUSTRY WATCH LIST**

The following section provides a brief description of sustainability disclosure topics that are not likely to constitute material information at present but could do so in the future.
Climate Restoration Services: Economies and society in general depend largely on the proper functioning of infrastructure. Apart from being in charge of project design and construction activities, which are increasingly taking into consideration resiliency to physical climate change risks (see the Structural Integrity & Safety disclosure topic above), the Engineering & Construction Services industry is tasked with maintaining and upgrading critical infrastructure, as well as restoring key infrastructure in the event of natural disasters. In certain geographical areas, infrastructure projects are increasingly exposed to risks of damage from events related to climate change, such as rising sea levels and the increasing frequency and intensity of extreme weather events. Such risks may present opportunities for companies that have expertise in maintaining and restoring crucial infrastructure in the event of damages due to severe weather or other physical conditions. Companies often operate in this space by providing emergency restoration work, which contributes to higher business margins.\textsuperscript{116} For example, in 2012 Quanta Services experienced a $77.2 million boost in revenue from emergency restoration work as a result of Hurricane Sandy.\textsuperscript{117}

As the resiliency of local environments and ecosystems is threatened by exogenous factors such as natural and human influences, the ability to offer environmental solutions related to climate change adaptation may produce a competitive advantage. AECOM, for example, was selected by the U.S. Federal Emergency Management Agency (FEMA) to study river and coastal flood risks associated with climate change. The goal of the study was to identify “increasingly hazardous coastal areas” and opportunities for “reducing the risk of flooding to people and property,” and to suggest options to improve the National Flood Insurance Program’s long-term viability.\textsuperscript{118}

As governments and private companies continue to increase their climate adaptation and response efforts, engineering and construction companies’ services will be in greater demand. This trend presents revenue opportunities for companies that specialize in such services.
APPENDIX I

FIVE REPRESENTATIVE ENGINEERING & CONSTRUCTION SERVICES COMPANIES

<table>
<thead>
<tr>
<th>COMPANY NAME (TICKER SYMBOL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fluor Corp. (FLR)</td>
</tr>
<tr>
<td>AECOM (ACM)</td>
</tr>
<tr>
<td>Chicago Bridge &amp; Iron N.V (CBI)</td>
</tr>
<tr>
<td>Quanta Services (PWR)</td>
</tr>
<tr>
<td>Jacobs Engineering Group (JEC)</td>
</tr>
</tbody>
</table>

*IX This list includes five companies representative of the Engineering & Construction Services industry and its activities. This includes only companies for which the Engineering & Construction Services industry is the primary industry, companies that are U.S.-listed but are not primarily traded over the counter, and for which at least 20 percent of revenue is generated by activities in this industry, according to the latest information available on Bloomberg Professional Services. Retrieved on March 1, 2016.*
### APPENDIX IIA:
Evidence for Sustainability Disclosure Topics

<table>
<thead>
<tr>
<th>Sustainability Disclosure Topics</th>
<th>HM (1-100)</th>
<th>IWGs</th>
<th>EI</th>
<th>Evidence of Financial Impact</th>
<th>Forward-Looking Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>%</td>
<td>Priority</td>
<td>Revenue &amp; Cost</td>
<td>Asset &amp; Liabilities</td>
<td>Cost of Capital</td>
</tr>
<tr>
<td>Environmental Impacts of Project Development</td>
<td>88*</td>
<td>90</td>
<td>3</td>
<td>High</td>
<td>•</td>
</tr>
<tr>
<td>Structural Integrity &amp; Safety</td>
<td>25</td>
<td>95</td>
<td>1</td>
<td>High</td>
<td>•</td>
</tr>
<tr>
<td>Workforce Health &amp; Safety</td>
<td>69*</td>
<td>95</td>
<td>2</td>
<td>High</td>
<td>•</td>
</tr>
<tr>
<td>Climate Impacts of Business Mix</td>
<td>19</td>
<td>75</td>
<td>6</td>
<td>Medium</td>
<td>•</td>
</tr>
<tr>
<td>Lifecycle Impacts of Buildings &amp; Infrastructure</td>
<td>96*</td>
<td>90</td>
<td>5</td>
<td>High</td>
<td>•</td>
</tr>
<tr>
<td>Business Ethics &amp; Bidding Integrity</td>
<td>69*</td>
<td>88</td>
<td>4</td>
<td>High</td>
<td>•</td>
</tr>
</tbody>
</table>

**HM:** Heat Map, a score out of 100 indicating the relative importance of the topic among SASB’s initial list of 43 generic sustainability issues. Asterisks indicate “top issues.” The score is based on the frequency of relevant keywords in documents (i.e., 10-Ks, 20-Fs, shareholder resolutions, legal news, news articles, and corporate sustainability reports) that are available on the Bloomberg terminal for the industry’s publicly listed companies. Issues for which keyword frequency is in the top quartile are “top issues.”

**IWGs:** SASB Industry Working Groups

**%:** The percentage of IWG participants that found the disclosure topic likely to constitute material information for companies in the industry. (-) denotes that the issue was added after the IWG was convened.

**Priority:** Average ranking of the issue in terms of importance. 1 denotes the most important issue. (-) denotes that the issue was added after the IWG was convened.

**EI:** Evidence of Interest, a subjective assessment based on quantitative and qualitative findings.

**EFI:** Evidence of Financial Impact, a subjective assessment based on quantitative and qualitative findings.

**FLI:** Forward Looking Impact, a subjective assessment on the presence of a material forward-looking impact.

1 The IWG figures for the “Business Ethics & Bidding Integrity” disclosure topic are the average of the scores for the “Business Ethics” and “Bidding & Consulting Integrity” IWG issues. Elements of these IWG issues were merged per stakeholder feedback to create a single disclosure topic as presented in this Brief.
APPENDIX IIB:
Evidence of Financial Impact for Sustainability Disclosure Topics

<table>
<thead>
<tr>
<th>Evidence of Financial Impact</th>
<th>Revenue</th>
<th>Operating Expenses</th>
<th>Non-operating Expenses</th>
<th>Assets</th>
<th>Liabilities</th>
<th>Cost of Capital</th>
<th>Industry Divestment Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Market Share</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>New Markets</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pricing Power</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cost of Revenue</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R&amp;D</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CapEx</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extra-ordinary Expenses</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tangible Assets</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intangible Assets</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contingent Liabilities &amp; Provisions</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pension &amp; Other Liabilities</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **Environmental Impacts of Project Development**
- **Structural Integrity & Safety**
- **Workforce Health & Safety**
- **Climate Impacts of Business Mix**
- **Lifecycle Impacts of Buildings & Infrastructure**
- **Business Ethics & Bidding Integrity**

**HIGH IMPACT**

**MEDIUM IMPACT**
## APPENDIX III
### SUSTAINABILITY ACCOUNTING METRICS—ENGINEERING & CONSTRUCTION SERVICES

<table>
<thead>
<tr>
<th>TOPIC</th>
<th>ACCOUNTING METRIC</th>
<th>CATEGORY</th>
<th>UNIT OF MEASURE</th>
<th>CODE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Environmental Impacts of Project Development</strong></td>
<td>Number of incidents of non-compliance with environmental permits, standards, and regulations</td>
<td>Quantitative</td>
<td>Number</td>
<td>IF0301-01</td>
</tr>
<tr>
<td></td>
<td>Discussion of processes to assess and manage environmental risks associated with project design, siting, and construction</td>
<td>Discussion and Analysis</td>
<td>n/a</td>
<td>IF0301-02</td>
</tr>
<tr>
<td><strong>Structural Integrity &amp; Safety</strong></td>
<td>Amount of defect- and safety-related rework expenses</td>
<td>Quantitative</td>
<td>U.S. Dollars ($)</td>
<td>IF0301-03</td>
</tr>
<tr>
<td></td>
<td>Amount of legal and regulatory fines and settlements associated with defect- and safety-related incidents*</td>
<td>Quantitative</td>
<td>U.S. Dollars ($)</td>
<td>IF0301-04</td>
</tr>
<tr>
<td><strong>Workforce Health &amp; Safety</strong></td>
<td>(1) Total recordable injury rate (TRIR) and (2) fatality rate for (a) direct employees and (b) contract employees</td>
<td>Quantitative</td>
<td>Rate</td>
<td>IF0301-05</td>
</tr>
<tr>
<td><strong>Climate Impacts of Business Mix</strong></td>
<td>Backlog for (1) hydrocarbon-related projects and (2) renewable energy projects</td>
<td>Quantitative</td>
<td>U.S. Dollars ($)</td>
<td>IF0301-06</td>
</tr>
<tr>
<td></td>
<td>Amount of backlog cancellations associated with hydrocarbon-related projects</td>
<td>Quantitative</td>
<td>U.S. Dollars ($)</td>
<td>IF0301-07</td>
</tr>
<tr>
<td></td>
<td>Backlog for non-energy projects associated with climate change mitigation</td>
<td>Quantitative</td>
<td>U.S. Dollars ($)</td>
<td>IF0301-08</td>
</tr>
<tr>
<td><strong>Lifecycle Impacts of Buildings &amp; Infrastructure</strong></td>
<td>Number of (1) commissioned projects certified to a multi-attribute sustainability standard and (2) active projects seeking such certification</td>
<td>Quantitative</td>
<td>Number</td>
<td>IF0301-09</td>
</tr>
<tr>
<td></td>
<td>Description of process to incorporate operational-phase energy and water efficiency considerations into project planning and design</td>
<td>Discussion and Analysis</td>
<td>n/a</td>
<td>IF0301-10</td>
</tr>
</tbody>
</table>

* Note to **IF0301-04**—Disclosure shall include a description of fines and settlements and corrective actions implemented in response to events.
### APPENDIX III (CONTINUED)

**SUSTAINABILITY ACCOUNTING METRICS—ENGINEERING & CONSTRUCTION SERVICES**

<table>
<thead>
<tr>
<th>TOPIC</th>
<th>ACCOUNTING METRIC</th>
<th>CATEGORY</th>
<th>UNIT OF MEASURE</th>
<th>CODE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Business Ethics &amp; Bidding Integrity</strong></td>
<td>(1) Number of active projects and (2) backlog in countries that have the 20 lowest rankings in Transparency International’s Corruption Perception Index**</td>
<td>Quantitative</td>
<td>Number, U.S. Dollars ($)</td>
<td>IF0301-11</td>
</tr>
<tr>
<td></td>
<td>Amount of legal and regulatory fines and settlements associated with charges of (1) bribery or corruption and (2) anti-competitive practices***</td>
<td>Quantitative</td>
<td>U.S. Dollars ($)</td>
<td>IF0301-12</td>
</tr>
<tr>
<td></td>
<td>Description of policies and practices for prevention of (1) corruption and bribery and (2) anti-competitive behavior in the project bidding processes</td>
<td>Discussion and Analysis</td>
<td>n/a</td>
<td>IF0301-13</td>
</tr>
</tbody>
</table>

** Note to IF0301-11—The registrant shall provide a brief description of its approach to managing ethical risks specific to the countries referenced above where the registrant has active projects and/or backlog.

*** Note to IF0301-12—Disclosure shall include a description of fines and settlements and corrective actions implemented in response to events.
APPENDIX IV: Analysis of SEC Disclosures | Engineering & Construction Services

The following graph demonstrates an aggregate assessment of how representative U.S.-listed Engineering & Construction Services companies are currently reporting on sustainability topics in their SEC annual filings.

**TYPE OF DISCLOSURE ON SUSTAINABILITY TOPICS**

<table>
<thead>
<tr>
<th>Engineering &amp; Construction Services</th>
<th>0%</th>
<th>10%</th>
<th>20%</th>
<th>30%</th>
<th>40%</th>
<th>50%</th>
<th>60%</th>
<th>70%</th>
<th>80%</th>
<th>90%</th>
<th>100%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental Impacts of Project Development</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>90%</td>
</tr>
<tr>
<td>Structural Integrity &amp; Safety</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>95%</td>
</tr>
<tr>
<td>Workforce Health &amp; Safety</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>95%</td>
</tr>
<tr>
<td>Climate Impacts of Business Mix</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>75%</td>
</tr>
<tr>
<td>Lifecycle Impacts of Buildings &amp; Infrastructure</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>90%</td>
</tr>
<tr>
<td>Business Ethics &amp; Bidding Integrity</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>88%¹</td>
</tr>
</tbody>
</table>

IWG Feedback*

*Percentage of IWG participants that agreed topic was likely to constitute material information for companies in the industry.

¹ The IWG score for the “Business Ethics & Bidding Integrity” disclosure topic is the average of the scores for the “Business Ethics” and “Bidding & Consulting Integrity” IWG issues. Elements of these IWG issues were merged per stakeholder feedback to create a single disclosure topic as presented in this Brief.
REFERENCES


3 Data from Bloomberg Professional service, accessed on January 27, 2016, using the ICS <GO> command. The data represents global revenues of companies listed on U.S. exchanges and traded over the counter in the Engineering & Construction Services industry, using Levels 3 and 4 of the Bloomberg Industry Classification.


13 Data from Bloomberg Professional service, accessed on February 26, 2015, using the ICS <GO> command. The data represents median gross and net margins of companies listed on U.S. exchanges and traded over the counter in the Engineering & Construction Services industry, using Levels 3 and 4 of the Bloomberg Industry Classification.


15 Ibid.


28 Ibid.


30 Ibid., p. 25.


44 Ibid., p. 19.


55 Ibid.


57 Seaman and DeLascio, “Professional Liability and Global Warming Claims.”

58 SASB internal calculations using BLS Data representing worker fatalities and injuries based on NAICS classification.


67 Bechtel, Corporate Sustainability Report, p. 22.

69 Authors calculation based on company’s total revenue in Fluor Corp., FY2014 Form 10-K for the Period Ending December 31, 2014 (filed February 18, 2015), p. 35; author’s calculations based on company’s total employees in ibid., p. 11.


75 KBR Inc., FY2015-Q1 Form 10-Q for the Quarter Ending March 31, 2015 (filed April 29, 2015.) p. 43


78 Ibid.


86 Ibid.


94 Ibid., pp. 36–38.


104 “Calkins, “KBR, Halliburton Agree to $579 Million Fine for Nigeria Bribes.”
117 Ibid., p. 44.
118 AECOM, 2013 Corporate Sustainability Report, p. 35.