SASB’s Industry Brief provides evidence for the material sustainability issues in the Industrial Machinery & Goods 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 material sustainability issue (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 sustainability issues likely to be material for companies within a given industry. However, the final determination of materiality is the onus of the company.

**Related Documents**

- [Industrial Machinery & Goods Sustainability Accounting Standard](#)
- [Industry Working Group Participants](#)
- [SASB Conceptual Framework](#)

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INTRODUCTION

The Industrial Machinery & Goods industry is a foundation of the manufacturing sector, producing many of the machines used in energy and chemicals production, food and automotive manufacturing, and most finished goods. The industry’s technological advancement has driven manufacturing productivity and efficiency since the dawn of the industrial revolution.

The emergence of global challenges, such as climate change and resource constraints, are shaping the future of the industry. Together with greater public concern about the environmental and health impacts of industrial production, these threats are intensifying regulatory action and business needs for improved sustainability performance globally.

Industrial machines are commonly powered by fossil fuels that emit greenhouse gas (GHG) emissions and air pollution. Throughout the world, regulations are driving the adoption of machinery with improved fuel efficiency and lower air emissions. The industry has opportunities to address the growing need for fuel efficiency and reduced emissions.

Furthermore, the industry’s impact on the environment through raw material demand is likely to continue to grow. Initiatives to remanufacture and reuse industrial machinery can reduce the industry’s need for raw materials such as steel and rubber. The sourcing of critical raw materials through the industry’s vast supply chain likewise can result in adverse social impacts, underscoring the importance of strong supply chain management and transparency.

Management (or mismanagement) of material 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 Industrial Machinery & Goods companies 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

SUSTAINABILITY DISCLOSURE TOPICS

ENVIRONMENT
- Energy Management

HUMAN CAPITAL
- Employee Health & Safety

BUSINESS MODEL AND INNOVATION
- Fuel Economy & Emissions in Use-phase
- Remanufacturing Design & Services

LEADERSHIP AND GOVERNANCE
- Materials Sourcing
capital that the industry relies on for value creation.

Specifically, performance on the following sustainability issues will drive competitiveness within the Industrial Machinery & Goods industry:

- Managing energy consumption in order to improve operational efficiency and mitigate the impacts of rising energy prices;
- Ensuring employee health and safety in order to lessen regulatory risks and support a productive working environment;
- Developing products with reduced environmental and health impacts in the use phase;
- Designing for product remanufacturing to reduce raw materials expenses and conserve natural resources; and
- Ensuring strategies for supply chain management and sourcing of key inputs that reduce externalities while lowering risks to company value.

INDUSTRY SUMMARY

The Industrial Machinery & Goods industry manufactures machinery, transportation equipment, and goods. The machinery segment includes equipment used in construction, agriculture, metalworking, material handling, and factory automation. The transportation equipment segment includes ships, commercial vehicles, locomotives, and railroad rolling stock. The manufactured goods segment is comprised of companies that manufacture fabricated metal and hardware and rubber and plastic products used to produce final goods.¹

Machinery manufacturers build finished goods out of raw material inputs, primarily steel, cast iron, plastics, rubber, paints, and glass. Manufacturers also perform machining and casting of parts before final assembly.¹ The manufacturing and assembly processes typically require energy in the form of liquid fuel and electricity.²

Total revenue from Industrial Machinery & Goods companies listed on global exchanges and traded over-the-counter is approximately $2.06 trillion. Revenues are segmented into $1.08 trillion from machinery, $614 billion from transportation equipment, and $366 billion from manufactured goods.³ The U.S. is the world’s largest market for machinery, and its third-largest producer. The industry employed approximately 1.1 million people in the U.S. as of August 2012.⁴ Europe and East Asia are the other two major manufacturing centers. The industry sells internationally, and many larger U.S.-domiciled firms have manufacturing facilities outside of the U.S. The industry’s

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.
largest sales channel is business-to-business, as most products are used in other processes, including manufacturing, mining, energy production, transportation, or construction. Representative companies in the Industrial Machinery & Goods industry include American companies Caterpillar, Cummins, John Deere, AGCO, Paccar, and Parker-Hannifin. Major international companies include Komatsu, Hitachi, and Mitsubishi.

For U.S.-based companies, export markets are important drivers of revenue growth. Developing nations are increasing demand for machinery as economic activity and industrial production rise. The primary U.S. export markets include Australia, Brazil, Canada, and Mexico. Broadly, the Industrial Machinery & Goods industry has performed well since the 2007-2009 recession, in large part due to recovering residential construction in the U.S. and mining booms in Australia, Brazil, and China.

Typically, sales of industrial machinery are correlated with economic growth indicators, including private sector capital expenditures, government infrastructure spending, mining and construction activity, and exports. Accordingly, sales are highly cyclical. Due to the high cost of many of the industry’s products, customers may pay for large orders through bank loans; thus, its revenues are also interest-rate sensitive.

Company cost structure depends on the type of machinery produced. For example, manufacturing complex equipment such as mining machines is labor intensive, whereas the manufacturing of other types of equipment can largely be automated. Industrial machinery manufacturing is capital intensive, typically involving machining, welding, and assembly activities that require heavy equipment. Companies thus typically pay for capital equipment and materials by issuing debt. The Industrial Machinery & Goods industry’s average debt-to-equity ratio was nearly 133 percent in January 2015. Material purchase costs across the industry typically account for 55-70 percent of revenue, while wages and utilities generally make up less than 10 percent of revenue. The median gross margin of the Industrial Machinery & Goods industry was approximately 27.9 percent in fiscal year (FY) 2013, while the median net income margin was 4.8 percent. These margins reflect the industry’s relatively high capital, debt, and materials costs.

A few large international corporations dominate the industry. The four largest U.S.-based construction machinery companies accounted for roughly 39 percent of U.S. construction machinery revenues in 2013, while the top three agricultural machinery companies represented more than half of U.S. sales. The high capital requirements of manufacturing, combined with brand recognition, offer established companies a competitive advantage. Within the broader
industry, companies compete largely on product quality, technological innovation, customer service, and brand strength. The application of information technology to the industry’s products has contributed to advances in process control, automation, and fuel efficiency during the product use phase. Products are often accompanied by high-value services, including engineering and logistics.

The continued expansion of industrialized economies and population will likely drive demand for manufactured goods, industrial engines, agricultural machines, and construction equipment. A dynamic regulatory environment and product innovation underlie key sustainability trends within the Industrial Machinery & Goods industry. Strengthening regulatory standards and customer demand will likely drive continued improvement in product efficiency and reduced product engine air emissions, as well as the importance of remanufacturing industrial equipment.

Economic activity is the industry’s primary financial driver. Thus, financial analysis of the Industrial Machinery & Goods industry will include analysis of the cyclicality of investment in capital goods, which is due largely to prevailing interest rates and the strength of demand for commodities and construction.

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**LEGISLATIVE AND REGULATORY TRENDS IN THE INDUSTRIAL MACHINERY & GOODS 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 function 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.

At the federal level in the U.S., the Environmental Protection Agency (EPA) enforces environmental protection laws covering industrial machinery manufacturing. The industry’s air, water, and waste pollution from manufacturing is relatively minor, and thus not likely to present material financial risks to companies. However, increasingly stringent environmental regulation could affect the industry via increased reporting requirements or ongoing compliance costs for issues like air emissions and wastes. Under the EPA’s Greenhouse Gas Reporting Program (GHGRP), facilities emitting more than 25,000 metric tons of carbon dioxide equivalent (CO₂e) must

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8 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.
report total greenhouse gas (GHG) emissions. The GHGRP is designed to collect data to inform future policy decisions, including programs to reduce emissions.\textsuperscript{20} The Resource Conservation and Recovery Act (RCRA) directs the EPA to track hazardous wastes from “cradle to grave,” solid waste is included in its definition of hazardous wastes. The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, or “Superfund”) established regulations for funding the remediation of current and past discharges of CERCLA-listed hazardous wastes, as well as measures to mitigate hazardous waste disposal.\textsuperscript{21, 22} The EPA has the authority to levy fines against entities that do not comply with the above regulations, and the agency may also require violators to make necessary adjustments to processes or equipment in order to achieve compliance.

The principle regulatory drivers in the industry affect the design of its products, especially in regards to product air emissions and fuel efficiency. Thus, manufacturers must also consider their customers’ regulatory environment. In order to receive permission to sell their products, companies may have to ensure that they meet or exceed regulatory standards. These regulations may address improved fuel efficiency performance as well as lower air emissions, particularly in the case of mobile engines.\textsuperscript{23}

Many of the Industrial Machinery & Goods industry’s products are powered by diesel or other fossil fuels, such as fuel oil, natural gas, and coal. These fuels may generate emissions of compounds including sulfur and nitrogen oxides (SO\textsubscript{x} and NO\textsubscript{x}), mercury, hydrogen chloride, particulate matter, and various hydrocarbons.\textsuperscript{24, 25} In order to protect ambient air quality in the U.S., the EPA has established air emissions standards for stationary and mobile sources through the National Emissions Standards for Hazardous Air Pollutants (NESHAP) and New Source Performance Standards (NSPS). The NSPS is directed at new or modified emission sources. The EPA’s engine emission standards for stationary diesel engines, a common type of engine, are grouped into progressively more stringent tiers, implemented sequentially over several years. Tier 4 standards, introduced in 2011, require manufacturers to reduce PM and NO\textsubscript{x} levels to 50-96 percent below existing standards. Tier 4 standards apply only to new equipment, and improvements will be achieved through the use of ultra-low sulfur diesel fuel, engine technology, and after-treatment systems.\textsuperscript{26}

Under the CAA, the California Air Resources Board also has the authority to set engine emissions standards, which must be equally or more stringent than EPA standards.\textsuperscript{27} Some countries require compliance with air emission regulations as a prerequisite for sales of industrial machinery. In the U.S., the Clean Air Act (CAA) requires manufacturers who wish to sell any engine within the U.S. to comply with its emissions standards. Products are tested for compliance and certified before the...
permission to sell them is granted. The EPA regulates diesel engine emissions standards for off-road diesel engines, including those used in construction, farm, and utility equipment, and for on-road heavy vehicles, as well as mobile heavy-duty truck engines. For heavy-duty truck engines, fuel consumption and air emissions must both be lowered. Companies manufacturing mobile engines, including those used for marine, rail, and road transport, have responded to tighter emissions standards by making improvements in combustion efficiency, vapor recovery systems, computerized engine monitoring, and exhaust after treatment technologies.

Multiple countries outside of the U.S. have implemented progressive emissions standards for on-road, marine, locomotive, and stationary diesel engines. In the E.U., emissions from non-road engines are regulated under a program first implemented in 1999. Similar to the EPA’s Tier system, the E.U.’s program is divided into stages of progressively more stringent standards. The E.U. proposed Stage V emissions regulations on September 25, 2014. In China, the first emissions standards for off-road engines were adopted in 2007, and are based on the E.U. and U.S. standards. The International Maritime Organization (IMO), an agency of the United Nations, has established air emissions standards for large marine vessels and fixed oil drilling platforms in a program implemented under an IMO convention known as MARPOL Annex VI. Countries elect to adhere to the IMO standards. Annex VI regulates emissions of NOx and SOx, ozone-depleting substances, and also contains a mechanism to improve engine energy efficiency.

Over time, as engine-emissions regulations are expected to become more stringent across most markets, the industry will likely face continued pressure to improve engine performance through product innovation. Machinery driven by electricity and other less-polluting fuels does not currently face stringent air emissions performance standards. The industry may thus have opportunities to expand the development of alternative fuel-driven products.

Due to the industry’s use of critical and conflict materials in manufacturing and electrical components, regulations governing supply chain externalities are relevant. The Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010 and the subsequent rules adopted by the U.S. Securities and Exchange Commission (SEC), require companies to publicly disclose their use of “conflict minerals” if they are “necessary to the functionality or production of a product” or contracts to be manufactured. These minerals include tantalum, tin, gold, and tungsten (3TG) originating in the Democratic Republic of Congo (DRC) or adjoining countries. Specifically, the provision requires SEC-registered companies to determine if they have exposure to DRC-sourced 3TG, which are common in electrical products, among other
industries. Companies with exposure must subsequently determine the specific source and report it.\textsuperscript{37}

Industrial machinery companies are also required to adhere to employee health and safety standards. In the U.S., these standards are enforced by the Occupational Safety and Health Administration (OSHA) of the Department of Labor. Health and safety standards protect workers from a range of hazards including exposed machinery, moving equipment, vehicular and electrical hazards, cutting tools, and occupational noise exposure.\textsuperscript{38, 39}

**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 Industrial Machinery & Goods industry:

- **Use of energy resources:** Industrial machinery companies use fossil fuel and electrical energy in production. Increasingly stringent GHG regulations may raise energy costs in the near term. Improving energy efficiency and an increased use of alternative energy can help mitigate potential cost impact over the long term.

- **Product efficiency and externalities in the use phase:** Regulations are requiring more stringent emissions and fuel efficiency standards for industrial machinery, while customers are likewise demanding greater product energy efficiency due to the inherent cost benefits and the risk of rising energy prices. Through product innovation, therefore, companies have the potential to generate positive environmental benefits that can enhance their competitive advantage and the long-term profitability of the industry.

- **Resource scarcity:** Industrial machinery manufacturing is a materials-intensive process, impacted by growing raw materials scarcity and the importance of securing critical materials.

As described above, the regulatory and legislative environment surrounding the Industrial Machinery & Goods industry emphasizes the importance of sustainability management and performance. Specifically, recent trends suggest a regulatory emphasis on improved customer environmental
performance, 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 implications for companies in the Industrial Machinery & Goods 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.

Energy is a crucial production factor in the Industrial Machinery & Goods industry. Energy is consumed primarily in the form of electricity and fossil fuels. A company’s energy mix will vary depending on the type of product manufactured and energy requirements. The industry’s GHG emissions during manufacturing are relatively low, and thus are not likely to present a material risk. However, the importance of energy as a factor of production
and rising energy costs create operational risks for Industrial Machinery & Goods companies.

Energy Management

Energy is a critical input in industrial machinery production. Purchased electricity represents the largest share of energy expenditures in the industry, followed by purchased fuels. Industrial machinery companies’ use of process energy results in operational costs, which can be significant. A company’s energy mix will vary depending on the type of product being manufactured. For example, companies performing assembly manufacturing will typically consume more electricity as a share of the total energy mix than a company converting raw materials into finished products.

Fossil fuel and electrical energy consumption contributes to environmental impacts, including climate change and pollution, which have the potential to indirectly affect industrial machinery companies’ results of operations. Sustainability factors, such as increasing GHG emission regulation, incentives for energy efficiency and renewable energy, and risks associated with nuclear energy and its increasingly limited license to operate, are leading to an increase in the price and price volatility of conventional energy sources while making alternative sources cost-competitive. Therefore, it is becoming increasingly important for companies to manage their overall energy efficiency, their reliance on different types of energy and the associated risks, and their access to alternative energy sources.

By improving energy efficiency in the manufacturing process, and using alternative energy sources, industrial machinery companies can reduce their direct and indirect GHG impact as well as reduce their operating expenses.

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

- Total energy consumed, percentage grid electricity, percentage renewable.

Evidence

Energy is critical for value creation in the Industrial Machinery & Goods industry. The most common energy sources used in manufacturing are purchased electricity and a variety of fossil fuels including natural gas, bituminous coal, diesel, distillate fuel oil, propane, and liquefied petroleum gas. According to the United States Census Bureau’s Annual Survey of Manufacturers for 2011, the combined purchased electricity consumption of the Industrial Machinery & Goods industry is approximately 99 billion kWh of electricity for heat and power, which represented four percent of the total purchased electricity consumption of the broader Manufacturing sector. Electricity purchases amounted to approximately $7.5 billion, while fuel purchases...
were about $2.3 billion. Within the Industrial Machinery & Goods industry, purchased fuel costs represent an average of 0.73 percent of the value of shipments, and 1.51 percent of materials costs, while purchased electricity costs were an average of 0.54 percent of the value of shipments and 1.06 percent of the cost of materials. As the Industrial Machinery & Goods industry has median net income margins of 4.83 percent, initiatives aimed at reducing energy consumption may have a positive impact on profitability. The data indicate the importance of managing electricity and purchased fuels use as a means to reduce exposure to rising or volatile energy prices.

Energy generation and consumption typically results in GHG emissions, either indirectly through electricity production from fossil fuels, or directly via onsite burning of fossil fuels. The Industrial Machinery & Goods industry faces indirect regulatory risk from its energy use, as increasingly stringent GHG regulation could raise the cost of fossil and electrical energy. Companies address this risk in financial disclosure; for example, AGCO Corp. states that climate change regulation may generate impacts that “could be significant. The most direct impacts are likely to be an increase in energy costs, which would increase our operating costs (through increased utility and transportation costs)...”

In response to potential energy risks, top companies have increased energy efficiency and the use of renewable and alternative energy sources in manufacturing operations. Parker Hannifin cites energy use awareness, legislation, and increased costs as factors that have motivated internal manufacturing energy reduction. At Caterpillar, the percentage of total energy use generated from renewable or alternative sources rose from 13.8 percent in 2010 to 18.2 percent in 2012. This shift was in part due to an internal company effort to achieve 20 percent renewable or alternative energy consumption by 2020. This goal is motivated by a desire to lower operating costs through energy savings, and to reduce risks related to use of fossil fuels. Efforts to lower the company’s energy consumption can help lower operating costs. Caterpillar also improved energy efficiency significantly between 2006 and 2012 through the implementation of individual programs at manufacturing facilities. Over a six-year period, the ratio of revenue to energy use rose from $1,489 per gigajoule to $2,262 per gigajoule.

Furthermore, nearly 83 percent of the members of SASB’s Industry Working Group agreed that energy management was likely to be material to companies in the industry. Energy Management was also in the top quartile of issues analyzed by their frequency of appearance in financial disclosure, shareholder resolutions, and other published media.

**Value Impact**

Management of energy efficiency, energy independence and energy-mix (including renewable energy) is key to the profitability and
risk profile of companies in the Industrial Machinery industry.

Cost savings can be achieved through energy efficiency as well as energy source optimization. At the same time, efforts to improve energy efficiency or reduce dependence on specific types of energy can require additional capital expenditures. While the cost of energy consumption is already captured in financial results, overall energy consumption levels provide a sense of firms’ exposure to possible future increases in energy prices, resulting from energy providers internalizing the growing environmental and social impacts of energy generation and consumption.

As a portion of operating costs for Industrial Machinery companies come from purchased electricity and fuels, the volatility and price of energy costs can also influence decisions about on-site versus sourced electricity and diversification of energy sources. This can have an impact on companies’ long-term profitability and ultimately their risk profile and cost of capital.

The probability and magnitude of financial impacts could increase in the future as emerging governmental regulations on environmental impacts continue to drive energy cost increases and volatility.

The more purchased fuels and electricity a company uses from traditional sources of energy, the more vulnerable it is to rising prices of specific fossil energy sources and the indirect impact of costs from internalization of carbon prices by utilities. The use of independent energy sources (non-grid) also indicates a degree of control and a company’s ability to provide continuous energy for its facilities. The percentage energy from renewables indicates a firm’s ability to mitigate its environmental footprint, its exposure to energy cost increases, as well as its energy independence.

**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.

Industrial machinery manufacturing exposes workers to health and safety risks, and resultant financial impacts. Maintaining a
A healthy and productive workforce can improve labor productivity. It can also lower direct medical expenses or regulatory penalties. A company’s ability to protect employee health and safety, and to create a culture of safety at all levels of the organization, can directly influence the results of its operations.

Employee Health & Safety

Industrial machinery workers are exposed to physical hazards, which may cause worker injuries or fatalities. Workers face hazards caused by exposed machinery, the use of heavy equipment, vehicular hazards, exposed electrical systems, and the use of cutting tools.

While injury and fatality rates at top industrial machinery companies have declined in recent years, worker injuries or fatalities can lead to negative publicity, low worker morale, and increased healthcare and injury compensation costs. Additionally, in the U.S., OSHA has the authority to levy fines against companies for non-compliance with worker health and safety standards, as well as preventable accidents, and can require remedial action such as employee training. Company performance in this area can be analyzed in a cost-beneficial way internally and externally through the following direct or indirect performance metrics (see Appendix III for metrics with their full detail):

- (1) Total Recordable Injury Rate (TRIR),
- (2) Fatality Rate, and
- (3) Near Miss Frequency Rate.

Evidence

Machinery manufacturing carries inherent physical dangers. The majority of manufacturing in the industry occurs in the U.S. for U.S.-based companies; thus OSHA standards are particularly relevant. Preliminary 2013 data from the U.S. Bureau of Labor Statistics indicate that the Industrial Machinery & Goods industry experienced 75 fatalities in 2013. This represents 26 percent of the manufacturing sector’s total fatalities, greater than the sector average. Furthermore, the average rate of total recordable cases per 100,000 workers in the Industrial Machinery & Goods industry, was approximately 4.3 in 2013, greater than the broader manufacturing sector’s rate of 4.0. These statistics indicate that the industry may face elevated risk for fatal injury-related costs or increased regulation.

The broader financial implications of safety performance are well-established. The Industrial Machinery & Goods industry’s relatively high injury and fatality statistics suggest that it is at elevated risk for safety-related costs. According to the National Safety Council, each lost-time injury or illness costs a company an average of $37,000, while each fatality costs $1.4 million. The losses to a company can quickly accumulate with frequent accidents and fatalities. Furthermore, in a survey of CFOs conducted by Liberty Mutual Insurance, 60 percent of respondents reported that $1 of investment in injury prevention returned $2 or
more in savings, and more than 40 percent said that productivity is the chief benefit of strong workplace safety programs.52

Non-compliance with OSHA standards can result in regulatory penalties for companies, as well as additional operating costs to achieve compliance. In May 2011, OSHA cited a large industrial machinery manufacturer at a Mississippi facility for 33 violations. The agency proposed $487,000 in fines. Several of the citations were safety-related, including failure to provide machine guarding and correct electrical deficiencies, as well as inadequate employee safety training.53 The likelihood of OSHA penalties or other actions may increase over time as regulations become more stringent. OSHA has increased the number of inspections and citations for U.S. private companies in recent years; in 2013, nearly 39,000 inspections resulted in more than 78,000 citations for U.S. companies.54

Safety statistics show gradual improvement in incident rates at major industrial machinery companies. For example, Caterpillar’s lost time incident rate (LTIR), which measures the frequency of injuries that result in lost work days per 100 full time employees, fell from 0.48 in 2008 to 0.29 in 2013. Similarly, the company’s total recordable incident rate (TRIR), which measures recordable incidents per 100 full time employees, fell from 1.66 to 0.78 over the same time period. Tyco International reports that its LTIR fell from 1.32 in 2008 to 0.59 in 2013, and its TRIR fell from 2.29 to 1.07. John Deere similarly reports a LTIR that fell from 0.24 to 0.14, and Eaton Corp.’s TRIR fell from 1.72 to 0.80.55 While these statistics indicate improving safety performance at these companies, the industry-wide statistics suggest that some companies have higher injury rates, and thus may face greater costs associated with health and safety.

Top industrial machinery companies can garner cost savings through safety improvement programs and investments. For example, Cummins held a three-month competition among its employees to promote ergonomics in its workforce. The contest resulted in more than 70 individual projects across the company, generating an estimated $1.7 million in avoided costs and lost productivity due to ergonomic injuries.56 CNH Industrial’s investment in improved health and safety procedures, safety inspections, and structural improvements has saved the company a total of seven million euros in reduced insurance premiums over 2012 and 2013.57

Members of SASB’s Industry Working Group suggested employee health and safety as an issue that was likely to be material due to inherent physical dangers in manufacturing. Furthermore, SASB’s assessed company financial disclosure, shareholder resolutions, and other published media for evidence of interest in health and safety in the industry. The topic was in the top quartile of all issues analyzed. Investor interest is an indication that
a topic could have material financial impacts on a company’s performance.

**Value Impact**

Injuries or fatalities can result in one-time costs, including healthcare expenses, regulatory penalties, and legal costs from personal injury litigation. These costs can lower profitability and lead to contingent liabilities. Frequent accidents resulting in injuries or fatalities may also lead to chronic impacts on company value that stem from lower employee morale and lost productivity, ultimately lowering intangible assets. Injuries may also increase a company’s health insurance costs over time, increasing operating costs.

The total recordable injury rate, fatality rate, and near miss frequency rate are indicative of a company’s safety environment and culture, and the likelihood that it will face costs associated with accidents or fatalities. Past incidents also provide an understanding of the magnitude of possible future 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.

Growing demand for products with reduced environmental externalities is a key growth driver in the Industrial Machinery and Goods Industry; these include products that provide customers with improved energy, resource, and water efficiency, and reduced air emissions.

Furthermore, the industry’s adoption of product remanufacturing can help reduce the use of raw materials required for original product manufacturing, and lower process energy consumption. This can contribute to improved performance on the Energy Management issue discussed above. This can benefit the environment and result in cost savings and revenue opportunities for industrial machinery companies.

**Fuel Economy & Emissions in Use-phase**

Transportation and industrial machinery, which are commonly powered by fossil fuels such as diesel, account for a significant share of global GHG emissions and other air emissions. GHG and harmful emissions from engines threaten human health and the environment. Emissions of GHG, nitrogen oxides (NOₓ), volatile organic
compounds, and particulate matter (PM) are increasingly a concern of customers and regulators.

The stringency and scope of regulations addressing use-phase emissions and the energy efficiency of industrial machinery are increasing. Additionally, higher energy prices are increasing customer demand for more efficient products. The Industrial Machinery & Goods industry thus faces regulatory risks and growth opportunities related to use-phase emissions and efficiency, as manufacturers must meet increasingly stringent regulatory emissions and fuel efficiency standards for a wide variety of engine-driven products.

Regulatory frameworks, such as the EPA’s Tier 4 standards and similar measures in the E.U. and Asia, continue to drive improved energy efficiency and reduced air emissions for on-road and off-road industrial engines, including trains and seagoing vessels. Companies in the industry have adapted to this trend, developing products with improved fuel efficiency, and lower PM, NOx, and GHGs. Furthermore, electric and hybrid trucks are expected to account for an increasing share of the market due to a progressive regulatory environment, volatile fuel prices, and improved technology. Continued innovation and development of such products is essential to drive revenue growth in the long term, while reducing regulatory risks.

Company performance in this area can be analyzed internally and externally through the following direct or indirect performance metrics (see Appendix III for metrics with their full detail):

- Sales-weighted fleet fuel efficiency for medium- and heavy-duty vehicles;
- Sales-weighted fuel efficiency for non-road equipment;
- Sales-weighted fuel efficiency for stationary generators; and
- Sales-weighted emissions of (a) NOx and (b) PM for: (1) marine diesel engines, (2) locomotive diesel engines, and (3) other non-road diesel engines.

Evidence:

The Industrial Machinery & Goods industry can enable economy-wide energy savings and emissions reductions through the design of more energy-efficient engines and products. Industry products such as construction machinery, trucks, and stationary engines are powered primarily by liquid fossil fuels such as diesel. Fuel can be a significant cost for the industry’s customers. In the trucking industry, for example, fuel costs are approximately 35 percent of total operating costs. As a result, both the industry and its customers face risks and opportunities from regulatory trends.

As discussed in the Legislative and Regulatory Trends section of this report, regulation is largely responsible for the trend towards more efficient machinery. The EPA has raised performance standards for off-road engine air emissions and noncompliance can be costly,
resulting in mandatory recalls and monetary penalties. For example, between 2002 and 2006, a major U.S. manufacturer was ordered to recall approximately 590,000 engines that did not meet EPA emissions standards. The company was also ordered to pay a $2.55 million fine to the EPA. Similarly, in 2010 the EPA fined Cummins $2.1 million and directed the company to recall 405 engines that did not meet CAA exhaust emissions specifications. The company was required to permanently retire emissions credits equivalent to the excess emissions generated by the 405 non-compliant engines during the time that they were used.

Regulations and rising energy costs are driving customers to increase demand for more energy efficient products. According to data from the U.S. Energy Information Administration, the price of retail diesel fuel adjusted for inflation rose from $1.71 in 1995 to $2.89 in 2005, and stood at $3.8 in 2014. Company financial disclosure discusses the risks and opportunities related to product fuel efficiency and emissions. In its FY2013 Form 10-K, Cummins states that “our opportunities for long-term profitable growth will continue in the future as the result of the following four macroeconomic trends that will benefit our businesses: tightening emissions controls across the world…energy availability and cost issues…” In its FY2013 Form10-K statement, AGCO Corp. states that as GHG regulation advances, “increased energy costs for our customers could impact demand for our equipment.”

As of the first quarter of 2014, Caterpillar’s backlog of locomotives rose seven percent year on year due to a rise in pre-ordering of new, more efficient models in advance of expected emissions regulations in 2015.

Companies have focused their product development and research and development spending (R&D) on efforts to meet rising demand for more efficient products that also meet regulatory standards. In its FY2013 Form 10-K, industrial engine manufacturer Cummins reported that in, “013, 2012 and 2011, approximately $15 million, $101 million and $104 million, or 2 percent, 14 percent and 17 percent, respectively, of our research and development expenditures were directly related to compliance with 2013 EPA emission standards. For 2013, approximately $32 million, or 5 percent, of our research and development expenditures was directly related to compliance with 2017 EPA emission standards.” The company has developed turbochargers and powertrain systems that improve engine efficiency, and has also designed natural gas generators that may raise efficiency by 20 percent. Similarly, Caterpillar has a broad aim to reduce its customers’ GHG emissions, energy efficiency, and materials use by 20 percent; the company recognizes driving customer sustainability initiatives may result in a significant business opportunity. Additionally, machine manufacturer Parker Hannifin has an entire business unit focused on developing energy efficient systems and the conversion of conventional systems to run on renewable
energy. In like manner, Navistar has focused its R&D efforts on developing aerodynamic, heavy-duty vehicles in order to improve fuel economy. Innovations include optimized roof design, minimized bumper gap, and lowered hood. The company has a concept vehicle which demonstrates the potential for future improvements in fuel efficiency while meeting GHG and fuel economy standards.

Company financial disclosure suggests opportunity in more stringent emissions regulation. For example, in its 2013 Form 10-K, Cummins stated that as emissions regulations in emerging markets become more stringent, the company’s “experience in meeting the E.U. and EPA emissions standards leaves [it] well positioned to take advantage of opportunities in these markets as the need for emissions control capability grows.”

Hybrid and electric technologies are expected to contribute to emissions reductions in some industrial machinery applications. These technologies are becoming more common in the medium-to-heavy truck market, driven by emissions regulation, volatile fuel prices, improvements in battery technology, and government tax credits and other incentives. According to a report by Frost & Sullivan, North America, Europe, and China are expected to account for nearly 85 percent of the 90,000 unit global hybrid truck market by 2022. Electric trucks are expected to reach 44,800 units by 2022. Although these totals represent a small share of the global truck market, the expected growth from just 2,200 total units in 2013 is notable.

**Value Impact**

Fuel efficiency and use-phase emissions can affect the demand for industrial machinery goods, as customers place increasing importance on efficiency in their purchasing decisions. Companies that are able to develop products that deliver superior energy efficiency and lower emissions can gain competitive advantages, expanding market share, creating new markets, as well as increasing pricing power. Innovation may require additional spending on research and development, lowering profitability.

Conversely, non-compliance with product efficiency and emissions regulations can have direct financial implications, including lost revenues, product recall costs, and extraordinary expenses related to fines. Repeated product recalls could result in a higher cost of capital.

Increasingly stringent emissions and fuel efficiency regulation is likely to increase the probability and magnitude of financial impacts in the near-term.

The fuel efficiency and emissions intensity of products is indicative of a company’s revenue opportunity, as well as the potential for revenue loss and risk of fines if products do not meet regulatory or consumer standards.
Remanufacturing Design & Services

Industrial machines are manufactured using large quantities of steel, iron, aluminum, glass, plastics, and other materials. The extraction and production of these raw materials, as well as industrial machinery manufacturing, can generate environmental externalities, including air and water pollution. Remanufacturing of industrial machinery systems (called cores) provides a channel through which Industrial Machinery & Goods companies can reduce the need for the raw materials required to produce new machinery, lowering the potential environmental impact of materials production. Remanufactured products can create value from products otherwise destined for disposal or recycling; industrial machinery companies can achieve cost savings by reusing end-of-life parts to build remanufactured machines. Thus, by offering remanufactured products and services, industrial machinery companies can reduce demand for raw materials, reduce manufacturing costs, and create new sales channels.

Industrial machinery, which tends to be high-value, is typically in service for longer than other machines like automobiles. Therefore, initial design and the reuse and servicing of machines and parts play an important role in maintaining product life while reducing externalities in the supply chain and in manufacturing. Furthermore, remanufactured products are typically less expensive than new products, offering customers lower-cost alternatives. Remanufacturing, the process by which a machine is disassembled, reconditioned, and reassembled, is a method by which manufacturers can efficiently recover a machine’s value and materials, without the need to manufacture a new machine or components. It is typically less costly to produce a remanufactured product than it is to produce a new product, and the process also requires less energy and generates less waste, contributing to the environmental sustainability of the manufacturing process.

Initial product design helps determine the profitability of remanufacturing at end-of-life, as machines and components must be accessible and easily exchangeable. Design for remanufacturing also attempts to optimize the profitability of both new and remanufactured products. Maximum profitability can achieved when the product is sold initially and again when it is sold as a remanufactured product. During remanufacturing, machine components may either be reused or replaced with newly manufactured parts.

Manufacturers can thus implement remanufacturing concepts in the product design phase as well as offer remanufacturing services for their products. The former can promote the ease of remanufacturing, further lowering production costs by reducing purchased material costs, while the latter presents new revenue opportunities for the
industry. Company performance in this area can be analyzed in a cost-beneficial way internally and externally through the following direct or indirect performance metrics (see Appendix III for metrics with their full detail):

- Revenue from remanufactured products and remanufacturing services.

**Evidence**

Remanufacturing of industrial machinery is a growing market in the U.S. and internationally. According to the U.S. International Trade Commission, the country has the world’s largest market for heavy-duty and off-road equipment (HDOR). The market grew 50 percent between 2009 and 2011 to $6.8 billion, facilitated by an increase in spending of $163 million in that period to develop remanufacturing capabilities. However, the total market for HDOR remanufacturing only accounted for between three and four percent of the total HDOR market in the U.S. There are an estimated 200-300 heavy-duty machinery remanufacturing companies in the U.S., including original equipment manufacturers.

The types of machinery typically remanufactured include off-road equipment used in the construction, farming, mining, and oil and gas drilling industries. Commonly remanufactured components and parts include diesel engines and components, alternators, turbochargers, fuel pumps, transmission axles, and hydraulic and electrical parts. Machinery remanufacturing also uses an estimated 85 percent less process energy than original manufacturing, and can produce higher-margin products. In order to secure a supply of cores, companies like Caterpillar may pay for them in advance.

Original equipment manufacturers like Cummins and John Deere have actually designed some products for remanufacturing. Design and remanufacturing teams have increasingly focused on reducing component weight by using spray welding and laser cladding, which add minimum quantities of metal to worn parts in order to refurbish them. In previous methods, components were designed with excess material that could be machined away to produce the remanufactured component.

Top industrial machinery companies and hardware manufacturers are embracing remanufacturing as a growth opportunity that simultaneously lowers the environmental impact of their operations and products. In 2013, Caterpillar announced that it is aiming to increase its remanufacturing revenues by 20 percent by 2020. The company increased the pounds of end-of-life materials taken back for remanufacturing from 122 million pounds in 2009 to 174 million pounds in 2013. Additionally, Caterpillar's remanufacturing business grew 68 percent during 2011, and 64 percent during both 2012, and 2013. By comparison, the company's overall sales growth during those years was approximately 41, 9.5, and -15 percent, respectively. The company
states on its sustainability website that by remanufacturing, it reduces “waste and minimize the need for raw material to produce new parts. Through remanufacturing, we make one of the greatest contributions to sustainable development—keeping nonrenewable resources in circulation for multiple lifetimes.”  

Similarly, John Deere uses a “design for environment” process that aims to minimize the use of virgin materials in every product.  

Value Impact

Remanufacturing services offer revenue and cost saving opportunities. By implementing product-remanufacturing services, companies can lower raw materials costs for original manufacturing. By investing (including R&D) in designing products for remanufacture, companies can improve remanufacturing operational efficiency and can lower their cost structure over time. However, implementing remanufacturing capabilities may require capital investments in the short term. Though these investments lower cash flow in the short term, they can result in long-term revenue opportunities through increased market share, as remanufactured products offer a lower-cost alternative. Remanufactured product can also open new sales channels for environmentally conscious customers.

The revenue from remanufactured products suggests the relative size of a company’s remanufacturing line of business compared to new product sales. It provides an indication of how companies are leveraging the cost saving and revenue opportunities associated with remanufacturing.

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.

Industrial machinery companies rely on complex and geographically diverse supply chains for critical raw material inputs. Materials sourcing carries reputational, regulatory, and operational risks due to the enactment of conflict mineral regulation in the U.S. and increasing scarcity and geopolitical risks related to critical materials production.

Materials Sourcing

The sourcing of critical and conflict minerals is an important governance issue for the Industrial Machinery & Goods industry.
Companies rely on critical materials as factors of production, and face conflict mineral disclosure requirements imposed by the Dodd-Frank Act.

Industrial machinery companies maintain large and complex supply chains, making it difficult to verify the source of raw materials, which could result in adverse reputational impacts. Conflict minerals – tin, tantalum, tungsten, and gold – are often embedded in electronic equipment used as components in industrial machinery.82 At the same time, there are material sourcing risks related to critical materials, including rare earth metals, due to the concentration of deposits in countries with geopolitical concerns. Companies also face competition from increasing global demand for these minerals from other sectors, including Transportation, Renewable Energy and Technology, which, along with supply constraints, can result in significant price increases and supply chain risks.

Critical and conflict materials are used in a range of industrial machinery products, including engines, cutting tools, batteries, and the electrical systems that control many industrial machines. Tungsten, one of the most widely used materials, is used to create composite materials for drilling, machining, and cutting equipment, including oil and gas drills and mining equipment, as well as a wide variety of electrical products such as lighting filaments, electrodes, electrical contacts, and wiring.83 Furthermore, magnets built from rare earth elements such as neodymium are used in heating, ventilation, and air conditioning pumps as well as hand tools.84

The industry faces reputational and operational risks related to materials sourcing. Company performance in this area can be analyzed in a cost-beneficial way internally and externally through the following direct or indirect performance metrics (see Appendix III for metrics with their full detail):

- Percentage of materials costs for products containing critical materials;
- Percentage of tungsten, tin, tantalum, and gold smelters within the supply chain that are verified conflict-free; and
- Discussion of the management of risks associated with the use of critical materials and conflict minerals.

Evidence

Critical materials are those which are essential to the function of a product and whose production is concentrated in few locations. For industrial machinery companies, critical materials will vary based on the product, but may include tungsten, tantalum, neodymium, and tin.85 Conflict materials are specifically defined as tin, tantalum, and tungsten or their ores, which are mined in countries adjoining the Democratic Republic of the Congo (termed Covered Countries) and are necessary to the functionality or manufacture of a product.86
China currently produces a significant portion of critical materials, including approximately 86 percent of the world’s tungsten. China restricted the export of rare earth elements in 2010, attributing the decision to environmental concerns. This led to a fivefold increase in the price of these materials in international markets while Chinese companies were able to obtain the same materials at lower costs. Electrical components in industrial machinery are especially prone to sourcing risks due to the prevalence of critical and conflict minerals within them. Recent Yale University research shows that of the 62 metals or metalloids commonly used in electronic hardware, none had alternatives that performed equally well, whereas 12 had no alternatives at all. Between 2010 and 2011, the price of many critical materials—including tungsten—more than doubled due to export restrictions and increasing worldwide demand.

The recent SEC mandate under Dodd-Frank Section 1502 makes it mandatory for all SEC issuers to disclose the source and use of these conflict minerals throughout a company’s supply chain. The SEC estimates the cost of compliance for more than 6,000 companies is $3 to $4 billion in the first year and $207 to $609 million each subsequent year. The first conflict mineral disclosure was submitted in April 2014.

Company financial disclosure addresses the potential business implications of sourcing conflict minerals. Regarding the conflict mineral disclosure rule, AGCO Corp. states that, “Complying with these requirements will require us to incur additional costs, including the costs to determine the sources of any conflict minerals used in our products and to modify our processes or products, if required... In addition, we may face reputational and regulatory risks if the information that we receive from our suppliers is inaccurate or inadequate, or our process in obtaining that information does not fulfill the SEC’s requirements.”

Despite the new SEC rule, companies may not be able to adequately determine their conflict mineral sourcing risks. Caterpillar found that nearly 38,000 of its suppliers were “known or suspected to provide components and materials for our 3TG Products...,” however the majority of suppliers surveyed provided inadequate or incomplete responses to the company’s information request. Following its Dodd-Frank Act due diligence investigation, John Deere determined that it had likely sourced minerals from the Covered Countries. Notably, the company found that the risk of conflict minerals appearing in its electronic components was greater than in the company’s products overall. This suggests that the industry may have to increase scrutiny of its electronic parts supply chain in order to mitigate potential risks.

**Value Impact**

The sourcing of critical materials has the potential to result in increasing costs of key
inputs and lost revenue due to disruptions in production. Companies may face regulatory compliance costs and reputational risk associated with the sourcing of conflict minerals resulting in lost sales and lower profitability over the long term.

Reliance on critical or conflict materials leaves companies vulnerable to potential supply chain disruptions and increased costs when shortages or higher prices occur. This can lead to a higher cost of capital. Companies that can source alternative materials or equipment that avoids the use of critical or conflict materials may be better positioned to mitigate price increases and supply constraints, with a positive impact on the cost of capital.

Furthermore, research and development or capital expenditures may be required to develop products that use alternatives to critical or conflict materials.

The probability and magnitude of potential material impacts from materials sourcing are likely to increase over the medium term due to increasingly stringent supply chain regulation, combined with diminishing supplies and rising demand for critical materials.

The percentage of a company’s products that contain critical materials indicates a company’s exposure to the risk of supply disruption and price volatility. The percentage of tungsten, tin, tantalum, and gold smelters within the supply chain that are verified conflict-free indicates the extent of a company’s exposure to conflict minerals, in terms of both supply and regulatory risk.
REFERENCES

3 Data from Bloomberg Professional service accessed on February 25, 2015, using the ICS <GO> command. The data represents global revenues of companies listed on global exchanges and traded over-the-counter from the Industrial Machinery & Goods industry, using Levels 3 and 4 of the Bloomberg Industry Classification System.
5 Jeremy Edwards, “Construction Machinery Manufacturing in the U.S.”
6 Data from Bloomberg Professional service accessed on January 13, 2015, using the ICS <GO> command. The data represents global revenues of companies listed on global exchanges and traded over-the-counter from the Industrial Machinery & Goods industry, using Levels 3 and 4 of the Bloomberg Industry Classification System.
7 Jeremy Edwards, “Construction Machinery Manufacturing in the U.S.”
9 Jeremy Edwards, “Construction Machinery Manufacturing in the U.S.”
10 Antal Neville, “Tractors & Agricultural Machinery Manufacturing in the U.S.”
11 Data from Bloomberg Professional service accessed on January 13, 2015, using the ICS <GO> command. The data represents global debt-to-equity ratios of companies listed on global exchanges and traded over-the-counter from the Industrial Machinery & Goods industry, using Levels 3 and 4 of the Bloomberg Industry Classification System.
12 Jeremy Edwards, “Construction Machinery Manufacturing in the U.S.”
13 Antal Neville, “Tractors & Agricultural Machinery Manufacturing in the U.S.”
14 Author’s calculation based on data from Bloomberg Professional service, accessed on January 13, 2015, using Equity Screen (EQS) for U.S.-listed companies (including those traded primarily OTC) that generate at least 20 percent of revenue from their Industrial Machinery & Goods segment and for which Industrial Machinery & Goods is a primary SICS industry.
15 Jeremy Edwards, “Construction Machinery Manufacturing in the U.S.”
16 Antal Neville, “Tractors & Agricultural Machinery Manufacturing in the U.S.”
17 Jeremy Edwards, “Construction Machinery Manufacturing in the U.S.”
18 Antal Neville, “Tractors & Agricultural Machinery Manufacturing in the U.S.”
28 Ibid.


CNH Industrial, FY2013 Sustainability Report, p. 61.


Ibid.
Ibid.


### APPENDIX I:
Five Representative Industrial Machinery & Goods Companies

<table>
<thead>
<tr>
<th>COMPANY NAME (TICKER SYMBOL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caterpillar, Inc. (CAT)</td>
</tr>
<tr>
<td>Deere &amp; Co. (DE)</td>
</tr>
<tr>
<td>Cummins, Inc. (CMI)</td>
</tr>
<tr>
<td>CNH Industrial NV (CNH)</td>
</tr>
<tr>
<td>Paccar, Inc. (PCAR)</td>
</tr>
</tbody>
</table>

This list includes five companies representative of the Industrial Machinery industry and its activities. This includes only companies for which the Industrial Machinery 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 22, 2015.
**APPENDIX IIA:**
Evidence for Sustainability Disclosure Topics

<table>
<thead>
<tr>
<th>Sustainability Disclosure Topics</th>
<th>EVIDENCE OF INTEREST</th>
<th>EVIDENCE OF FINANCIAL IMPACT</th>
<th>FORWARD-LOOKING IMPACT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>HM (1-100)</td>
<td>IWGs</td>
<td>%</td>
</tr>
<tr>
<td>Energy Management</td>
<td>75 *</td>
<td>83</td>
<td>2</td>
</tr>
<tr>
<td>Employee Health &amp; Safety</td>
<td>45 *</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Fuel Economy &amp; Emissions in Use-Phase</td>
<td>100 *</td>
<td>78</td>
<td>1</td>
</tr>
<tr>
<td>Remanufacturing Design &amp; Services</td>
<td>55 *</td>
<td>48†</td>
<td>3</td>
</tr>
<tr>
<td>Materials Sourcing</td>
<td>25</td>
<td>-</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 to likely 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. One 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.

- *: During the IWG phase, the topic was called “Waste Management” and its scope included both recycling of hazardous and non-hazardous waste.
## APPENDIX IIB:
Evidence of Financial Impact for Sustainability Disclosure Topics

<table>
<thead>
<tr>
<th>Evidence of Financial Impact</th>
<th>REVENUE &amp; EXPENSES</th>
<th>ASSETS &amp; LIABILITIES</th>
<th>RISK PROFILE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Revenue</td>
<td>Operating Expenses</td>
<td>Non-operating Expenses</td>
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<tr>
<td></td>
<td>Market Share</td>
<td>New Markets</td>
<td>Pricing Power</td>
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<tr>
<td>Energy Management</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employee Health &amp; Safety</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fuel Economy &amp; Emissions in Use-Phase</td>
<td>•</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Remanufacturing Design &amp; Services</td>
<td>•</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Materials Sourcing</td>
<td>•</td>
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</tbody>
</table>

[MEDIUM IMPACT] [HIGH IMPACT]
### APPENDIX III:
Sustainability Accounting Metrics | Industrial Machinery & Goods

<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>Energy Management</td>
<td>Total energy consumed, percentage grid electricity, percentage renewable</td>
<td>Quantitative</td>
<td>Gigajoules (GJ), Percentage (%)</td>
<td>RT0203-01</td>
</tr>
<tr>
<td>Employee Health &amp; Safety</td>
<td>(1) Total Recordable Injury Rate (TRIR), (2) Fatality Rate, and (3) Near Miss Frequency Rate</td>
<td>Quantitative</td>
<td>Rate</td>
<td>RT0203-02</td>
</tr>
<tr>
<td>Fuel Economy &amp; Use-phase Emissions</td>
<td>Sales-weighted fleet fuel efficiency for medium- and heavy-duty vehicles</td>
<td>Quantitative</td>
<td>Gallons per 1,000 Ton-miles</td>
<td>RT0203-03</td>
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<tr>
<td></td>
<td>Sales-weighted fuel efficiency for non-road equipment</td>
<td>Quantitative</td>
<td>Gallons per hour</td>
<td>RT0203-04</td>
</tr>
<tr>
<td></td>
<td>Sales-weighted fuel efficiency for stationary generators</td>
<td>Quantitative</td>
<td>Watt/gallon</td>
<td>RT0203-05</td>
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<tr>
<td></td>
<td>Sales-weighted emissions of (a) NOx and (b) PM for: (1) marine diesel engines, (2) locomotive diesel engines, and (3) other non-road diesel engines</td>
<td>Quantitative</td>
<td>Grams per kilowatt-hour</td>
<td>RT0203-06</td>
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<tr>
<td>Remanufacturing in Design &amp; Services</td>
<td>Revenue from remanufactured products and remanufacturing services*</td>
<td>Quantitative</td>
<td>U.S. Dollars ($)</td>
<td>RT0203-07</td>
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<tr>
<td>Materials Sourcing</td>
<td>Percentage of materials costs for products containing critical materials</td>
<td>Quantitative</td>
<td>Percentage (%) by COGS</td>
<td>RT0203-08</td>
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<tr>
<td></td>
<td>Percentage of tungsten, tin, tantalum, and gold smelters within the supply chain that are verified conflict-free</td>
<td>Quantitative</td>
<td>Percentage (%)</td>
<td>RT0203-09</td>
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<td>Discussion of the management of risks associated with the use of critical materials and conflict minerals</td>
<td>Discussion and Analysis</td>
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</table>

*Note to RT0203-07 – Disclosure shall include a discussion of efforts to obtain end-of-life products and parts for remanufacture.
APPENDIX IV: Analysis of SEC Disclosures | INDUSTRIAL MACHINERY & GOODS

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

<table>
<thead>
<tr>
<th>TYPE OF DISCLOSURE ON SUSTAINABILITY TOPICS</th>
<th>NO DISCLOSURE</th>
<th>BOILERPLATE</th>
<th>INDUSTRY-SPECIFIC</th>
<th>METRICS</th>
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</thead>
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<td>Industrial Machinery &amp; Goods</td>
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<tr>
<td>Energy Management</td>
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<tr>
<td>Employee Health &amp; Safety</td>
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<td>Fuel Economy &amp; Emissions in Use-phase</td>
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<td>78%</td>
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<tr>
<td>Remanufacturing Design &amp; Services</td>
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<td>48%</td>
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<tr>
<td>Materials Sourcing</td>
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<td>N/A</td>
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</tbody>
</table>

IWG Feedback*

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

/1 During the IWG phase, the topic was called "Waste Management" and its scope included both recycling of hazardous and non-hazardous waste.