



**Accounting for a
Sustainable Future™**

AEROSPACE & DEFENSE

Research Brief

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AEROSPACE & DEFENSE

Research Brief

SASB's Industry Brief provides evidence for the material sustainability issues in the Aerospace & Defense 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

- [Aerospace & Defense Sustainability Accounting Standard](#)
- [Industry Working Group Participants](#)
- [SASB Conceptual Framework](#)

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SUSTAINABILITY DISCLOSURE TOPICS

ENVIRONMENT

- Energy Management
- Hazardous Waste Management

SOCIAL CAPITAL

- Data Security
- Product Safety

BUSINESS MODEL AND INNOVATION

- Fuel Economy & Emissions in Use-phase

LEADERSHIP AND GOVERNANCE

- Business Ethics
- Supply Chain Management & Materials Sourcing

However, there has been an emergence of new global threats, such as climate change, resource constraints, and safety and security issues arising from state and non-state actors. Together with greater customer and public concern about the environmental and health impacts of industrial production and scrutiny of business ethics, these threats are intensifying regulatory action and the need for improved business practices related to companies' sustainability performance around the world. In a time of changing geopolitical environments, decreasing government spending, and pricing pressures, companies in this industry therefore need to continue to innovate and optimize product and cost choices to focus on meeting market demands while reducing environmental and social externalities.

INTRODUCTION

Aerospace and defense companies are part of a high-tech industry that produces components and equipment that enable air and space transport and advanced military defense systems. The largest customers for these products are often government entities; in the U.S. these include the Department of Defense and the National Aeronautics and Space Administration (NASA), in addition to the commercial airline industry. Product innovations in this industry have helped develop unmanned aerial systems, improve threat detection, and achieve greater fuel efficiencies for aircraft, marine, and terrestrial vehicles.

Management (or mismanagement) of material sustainability issues 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 aerospace and defense 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 capital that the industry relies on for value creation. Specifically, performance on the following sustainability issues will drive

competitiveness within the Aerospace & Defense industry:

- Managing energy use and hazardous waste generation during the production process;
- Managing data security issues;
- Ensuring product safety;
- Improving fuel economy of products and reducing emissions during their use;
- Maintaining high standards of business ethics; and
- Securing sources for key input materials and reducing associated externalities.

INDUSTRY SUMMARY

Companies in the Aerospace & Defense industry fall into two main segments: (1) those manufacturing or assembling commercial aircraft and aircraft parts and (2) defense primes, which includes companies manufacturing military aircraft, space vehicles, missile systems, ammunition, small arms, naval ships and other commercial and military vehicles.¹

Aerospace and defense companies operate globally and serve both international and domestic customers. Depending on which subset of the industry a company operates in, it may have different customers. Commercial

aircraft and parts manufacturers sell mainly to commercial airlines, as well as U.S. and foreign governments. Defense primes serve a customer base of various agencies of different governments and related businesses with operations around the world.¹ The defense prime category also includes firearms manufacturers such as Smith & Wesson, which sells to law enforcement agencies, businesses, distributors, retailers, and consumers.²

Companies in this industry earn revenue from product and service sales as well as consulting contracts. Defense primes such as Lockheed Martin often act as major government contractors, or prime contractors, on U.S. government programs, and are engaged in fixed-cost as well as time-and-materials contracts.³ Commercial aircraft manufacturers such as Boeing earn revenue primarily through sales to commercial airlines and air cargo operators both domestically and abroad. These companies may also earn revenue through manufacturing military aircraft and other related products.⁴

The global Aerospace & Defense industry revenue was approximately \$663 billion in 2014. Aircraft and parts manufacturing accounted for around 70 percent of the total industry revenue, with defense primes accounting for the rest.⁵ Reported net income margins for fiscal year 2013 for the five representative companies listed in Appendix I

¹ Industry composition is based on the mapping of the Sustainable Industry Classification System (SICS™) to the

Bloomberg Industry Classification System (BICS). A list of representative companies appears in Appendix I.

ranged from around 5.3 percent for Boeing to 9.1 percent for United Technologies.⁶ For the aerospace segment of the industry in the U.S., purchases of materials and components account for about half of a company's revenues. Wages and benefits accounted for about 15 percent of the industry's revenues, due to the need for highly skilled employees. Utilities and rent are also significant compared to some other industries, accounting for about five percent of revenues.⁷ The cost breakdown is similar for the defense segment in the U.S., although wage costs can be higher in some sub-segments.^{8; 9}

According to J.P. Morgan analysts, there are a number of key investment points to consider for this industry, including (among other things) cash generation, outside disruptions, and oil prices.¹⁰ One of the drivers of profits and cash flow is the speed with which a company can bring a new product to unit profitability. For example, extended safety considerations or setbacks could delay the launch of new products and lengthen the time during which those products are considered unit losses.¹¹

This industry is quite cyclical, and shocks from outside the industry (such as terrorist attacks, contagious disease, or economic shock) could derail the current up-cycle trend. Such macro factors affecting growth would lead to oversupply, cutting into profits. Interest rate increases could also affect the ability to finance projects.¹²

Decreases in oil prices lessen the incentive for customers to replace older commercial aircraft with more environmentally-efficient models. At the same time, however, lower oil prices can drive economic growth and therefore demand for new aircraft.¹³

The U.S. aerospace segment experienced relatively slow annual growth of two percent between 2009 and 2014. This growth rate is expected to be 3.8 percent over the next five years, driven by increasing customer demands to update obsolete fleets with more fuel-efficient aircraft as well as increasing passenger demands in the Middle East and Asia Pacific regions.^{14; 15}

The differential fuel consumption between a 1990s-vintage aircraft and one built today is approximately 15-20 percent.¹⁶ Given that airline industry median net profit margins in 2013 were only about 2.4 percent,¹⁷ this 15-20 percent is the difference between survival and failure for many airlines. This helps explain the high demand for fleet upgrades.

The defense segment is influenced by federal funding for defense. During the ten-year period following September 11, 2001, U.S. military spending accelerated and increased more than 150 percent.¹⁸ However, with the economic downturn beginning in 2008 and the reduction of armed conflict in Iraq and Afghanistan, this growth began to slow. As a result, growth in the segment has been negative.¹⁹ However, some industry analysts predict the market could

grow at a 10 percent Compound Annual Growth Rate (CAGR) through 2017, due in large part to continued demand from developing regions (including the Middle East) as a result of escalating regional geopolitical tensions.²⁰

The Aerospace & Defense industry presents two key barriers to entry. The first is the extreme technological complexity required to manufacture an aircraft or defense product. The physical constraints that aircraft experience during flight demand absolute safety and require a supply chain with expertise in a variety of technologies. The same can be said for the security, performance, and safety demands placed on defense vehicles and products. The result is that supply chains are complicated and fragmented, and are thus difficult for new entrants to assemble. The second barrier is the high development cost of aircraft and defense programs. The cost of developing the Boeing 787 was around \$15 billion. Companies like Boeing have the ability to spread such an investment out over a ten-year research and development (R&D) process, followed by a 20-to-30-year development and production process.²¹

The aerospace segment of the industry is highly concentrated and the commercial aircraft manufacturing business effectively operates as a duopoly between Boeing and Airbus, of which only Boeing is traded publicly in the U.S. Other smaller players include Embraer, Bombardier, and COMAC.²² Defense primes

also manufacture aircraft, but even considering all aircraft manufacturers, the aerospace segment is still heavily concentrated: In 2013, Boeing held a 40 percent market share in the U.S., United Technologies Corporation (UTC) had a 14 percent share, and Lockheed Martin Corporation had an eight percent share.²³ In arms manufacturing and military sales, the market is less concentrated, with the top three players, Lockheed Martin, Boeing, and Northrup Grumman, controlling a combined 40 percent share of the market.²⁴

LEGISLATIVE AND REGULATORY TRENDS IN THE AEROSPACE & DEFENSE 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.¹¹

The Aerospace & Defense industry is subject to multiple regulatory standards in the markets they serve, including safety, fuel economy, emissions control, and chemical use. In addition, the industry must comply with regulations related to government contracting and international trade.

In the U.S., several agencies within the federal government have jurisdiction over various aspects of the Aerospace & Defense industry. The Federal Aviation Administration (FAA) has authority to regulate and oversee all aspects of American civil aviation. The agency is divided into four areas: (1) Airports, (2) Air Traffic Control, (3) Aviation Safety, and (4) Commercial Space Transportation. In brief, FAA requirements cover (among other things) the quality of aircraft engines and parts, inspections and maintenance procedures for older aircraft, security measures, and other operational and environmental concerns.²⁵ FAA approval for parts and products includes scrutiny of the design, production, and maintenance processes.²⁶ These regulations are critical to passenger and operator safety.

Companies in this industry must also manage price and environmental expectations in order to meet or exceed government requests for proposals (RFPs), which seek to align contract

work with broader government goals. EPA violations could result in companies being ineligible to apply for certain government contracts.

In October 2009, President Obama issued U.S. Executive Order 13514, "Federal Leadership in Environmental, Energy, and Economic Performance." The order requires all federal agencies to create environmental targets and strategies for reducing negative environmental impacts. The order defines three focus areas for consideration in creating targets and strategies: "(i) reducing energy intensity in agency buildings; (ii) increasing agency use of renewable energy and implementing renewable energy generation projects on agency property; and (iii) reducing the use of fossil fuels."²⁷ Since government spending and priorities dictate a lot of the growth and opportunity for companies in this industry, it will be important for aerospace and defense companies to innovate their product portfolios and improve their own operations to meet the expanding needs of the government in these focus areas.

Regulations such as the U.S. Resource Conservation and Recovery Act (RCRA) provide frameworks for the collection, transport, recovery, and disposal of waste from manufacturing facilities. The Clean Air Act (CAA) regulates air emissions from operations and allows the Environmental Protection Agency (EPA) to create and enforce limits on air

¹¹ 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.

pollutants including sulfur, nitrogen, and other ozone-depleting and toxic materials.²⁸ Finally, the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, commonly referred to as Superfund, establishes legal responsibility for the environmental remediation of contaminated sites.²⁹ These environmental regulations serve not only to guide the direct operations of companies in this industry, but also to guide client goals and demand for products with fewer environmental externalities.

The defense segment of the industry is also governed by key legislative controls that guide the business ethics, governance, and exports of companies. The U.S. Department of State's Office of Defense Trade Controls administers the Arms Export Control Act, the International Traffic in Arms Regulations (ITAR), and the U.S. Munitions List. The Bureau of Industry and Security administers the Export Administration Act, which controls exported products that have civilian and military strategic uses.³⁰

Finally, the Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010 and 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" that the company manufactures 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 (3TG is commonly used in the Aerospace & Defense industry, among other industries). Companies that are exposed must subsequently determine and report on specific sources.³¹ The rules, which required companies to make their first filings effectively by June 2, 2014, have been upheld by the U.S. District Court for the District of Columbia, despite a legal challenge from trade associations.³² These reforms are important for companies to consider when making procurement decisions within their supply chains.

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 Aerospace & Defense industry:

- **Environmental impact of production:** The use of energy and hazardous materials in the manufacturing processes of aerospace and defense products creates environmental externalities such as greenhouse gas (GHG) emissions and soil and water pollution, and can lead to human health and ecological impacts. Increasing regulatory focus on such concerns can drive higher or more volatile electricity prices as well as costs of waste management and environmental remediation. Poor environmental performance could also result in difficulty obtaining or maintaining government contracts for companies in this industry, as these increasingly take into account environmental considerations.
- **Fuel efficiency of products:** Airline clients face low profit margins and high fuel costs, and the U.S. military has prioritized efficiency as a means to improve tactics and address climate change. Both these factors will continue to drive demand for more fuel-efficient products that also lower GHG emissions.
- **Impacts of product technology and governance procedures for national security and civilian safety:** Rapid technological advances have attracted cyber threats, which have an impact on both national security and airline safety. Governance procedures related

to business ethics and supply chain management can also drive corporate performance on issues related to corruption, bribery, and the sourcing of sensitive and critical materials.

As described above, the regulatory and legislative environment surrounding the Aerospace & Defense industry emphasizes the importance of sustainability management and performance. Specifically, recent trends suggest a regulatory emphasis on environmental protection during production and use phases, protection of civilian safety, data security, and business ethics, 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 Aerospace & Defense 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 of 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.

Aerospace and defense operations depend upon energy as a key input into production. Production processes also use raw materials that may include toxic and hazardous substances, which can create environmental externalities. The industry's GHG emissions during manufacturing are relatively low, and thus are not likely to present a material risk. However, as energy resources become limited or exhibit price volatility and legislation seeks to address externalities, companies need to manage risks around energy use and hazardous waste generation and innovate to reduce the environmental impacts of their operations and protect shareholder value.

Energy Management

Manufacturing processes in the Aerospace & Defense industry require a considerable amount of energy, particularly in the form of purchased electricity. Companies' use of process energy results in operational costs, which can be significant.

Fossil fuel and electrical energy consumption contributes to environmental impacts, including climate change and pollution, which have the potential to indirectly affect aerospace and defense 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.

Furthermore, energy efficiency is increasingly becoming a factor in procurement decisions by U.S. federal agencies and, therefore, in the market share of aerospace and defense companies. As discussed earlier, President Obama's October 2009 Executive Order 13514 requires all federal agencies to create environmental targets and strategies for reducing negative environmental impacts. The order outlines three focus areas for consideration in creating targets and strategies: "(i) reducing energy intensity in agency buildings; (ii) increasing agency use of renewable energy and implementing renewable energy generation projects on agency property; and (iii) reducing the use of fossil fuels."³³ Given that the U.S. government, including the Department of Defense (DoD), is one of the largest Aerospace & Defense industry customers, companies with smaller environmental footprints could be better positioned to win new contracts and expand existing ones due to specific recommendations in the Order, described in the Evidence section.

Therefore, it is becoming increasingly important for companies in the industry to manage their overall energy efficiency, their reliance on different types of energy and the associated

risks, and their access to alternative energy sources. 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

Overall energy costs are a key component of manufacturing costs for companies in the Aerospace & Defense industry. According to data from the 2011 U.S. Census Bureau Annual Survey of Manufacturers (ASM), the facilities representing the Aerospace & Defense industry accounted for approximately 2.4 percent of the manufacturing sector's total purchased electricity consumption.³⁴ Purchased electricity costs accounted for approximately 1.4 percent of the total cost of materials for the industry and 1.2 percent of its value added. The industry's purchased electricity costs of nearly \$51.9 billion are nearly 200 times greater than its purchased fuel costs.³⁵

Additionally, according to 2010 data from the EIA's Manufacturing Energy Consumption Survey (MECS), both the aerospace products segment and aircraft manufacturing segment paid an average price for purchased energy (including fuel) of \$14.9 per million Btu in 2010. This price is significantly higher than the average for all manufacturing industries, which was around \$9.1 per million Btu, suggesting

more expensive energy sources for the Aerospace & Defense industry in the U.S.³⁶

As net income margins tend to be low in the industry, cost savings from effective energy management, particularly in terms of purchased electricity, can be an important competitive factor.

Aerospace and defense companies use energy in the building and manufacturing of their products. U.S. Executive Order 13514 outlines recommendations for requiring contractors to register with a centrally located tracking system to report their GHG emissions inventory. Such an inventory could require companies to describe their efforts to mitigate GHG emissions, and federal government purchasing preferences could reward companies with smaller GHG footprints.³⁷ Industry-wide data sets from the U.S. Energy Information Administration (EIA), CDP, and other sources indicate that Scope 2 emissions represent the bulk of energy usage and GHG emissions for this industry.³⁸ Thus, reducing energy usage, particularly from purchased electricity, and implementing more energy-efficient processes could help companies in this industry reduce their overall GHG footprint.

The DoD is responsible for 80 percent of the total energy use of federal agencies and is responsible for reducing not only direct emissions, but also indirect emissions, through responsible procurement standards that reduce emissions throughout its supply chain. The DoD

also makes up 60 percent of Lockheed Martin's business.³⁹ In an effort to align with, and go beyond, Executive Order 13514, Lockheed Martin announced its Go Green 2020 targets in 2012. The goals include reducing facility energy use by 20 percent and cutting carbon emissions by 35 percent by 2020.⁴⁰

Companies are recognizing the importance of energy costs as a material risk in their Form 10-K filings. For example, United Technologies Corporation recognized in its Form 10-K filing for fiscal year (F) 2014 that "changes in climate change concerns, or in the regulation of such concerns, including greenhouse gas emissions, could subject us to additional costs and restrictions, including compliance costs and increased energy and raw materials costs."⁴¹

SASB's analysis of the frequency with which this topic is discussed in various source documents, including company SEC filings, (see column on SASB's Heat Map in Appendix IIA) indicates that overall the topic is in the top quartile of topics for this industry. Furthermore, 81 percent of experts in SASB's industry working group indicated the topic is likely to constitute material information for companies in the industry.

Value Impact

The generation of waste impacts operational efficiency and regulatory risks for aerospace and defense companies. Waste treatment or disposal results in ongoing operating expenses related to waste handling. Mishandling of

highly-regulated hazardous wastes can lead to fines and contingent liabilities from legal actions, while regulatory agencies may require additional capital expenditures to reach compliance. Frequent fines or unexpected abatement costs can also result in a higher cost of capital.

Conversely, waste management can create operational efficiencies for companies, improving long-term cost structure and profitability.

The quantity of hazardous waste generated and the percent recycled insight into a company's operational efficiency and exposure to legal and regulatory actions, and capital expenditures related to abatement. Past performance on waste management can be a proxy for future risk, looking at the number and aggregate quantity of releases and spills and percent recovered.

Hazardous Waste Management

The manufacturing of aircraft and defense equipment generates significant amounts of hazardous waste compared to other industries, including metals, spent acids, caustics, solid catalysts, wastewater treatment sludge, and residues from tank-cleaning operations. This poses operational and regulatory challenges for the industry. The Resource Conservation and Recovery Act (RCRA) in the U.S. regulates disposal and storage of hazardous and solid

waste to protect against impact on human health and the environment.

In addition, hazardous waste generation increases the risk of long-term liability in the form of environmental cleanup and mitigation expenses, including those required under the EPA's RCRA and CERCLA programs. Although many of these current liabilities stem from a legacy of decades of poor waste management practices, current waste management practices can result in ongoing costs and the possibility of future spills and mitigation requirements. Perhaps most significantly, however, violations of environmental laws as a result of hazardous waste generation and improper handling of such waste could result in a loss of government contracts for companies in the industry.

To mitigate environmental impacts, companies in the industry have made efforts to reduce hazardous waste. In addition to mitigation of regulatory risks, hazardous waste management, particularly waste reduction, can result in lower disposal and treatment costs. 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 hazardous waste, percentage recycled; and
- Number and aggregate quantity of reportable spills, quantity recovered.

Evidence

The EPA ranks the 50 largest generators of hazardous waste by primary NAICS code, and companies in the Aerospace & Defense industry rank high on this list. In 2011, the Aerospace Product and Parts Manufacturing segment (NAICS 3364) ranked number 16 and generated 82,022 tons of hazardous waste.⁴² Spirit Aerosystems mentions in its FY 2014 Form 10-K that its operations involve the use of large amounts of hazardous substances and regulated materials and generate many types of wastes, including hexavalent chromium.⁴³

Seven out of the top 10 U.S.-listed companies, by revenue, mention environmental liabilities as a material risk in their Form 10-K filings for fiscal year 2013.⁴⁴ For example, Raytheon states, in the Risk Factors section of its Form 10-K, that “our operations expose us to the risk of material environmental liabilities.” The disclosure further highlights the fact that criminal violations of U.S. federal environmental statutes could result in a facility being placed on the General Services Administration’s (GSA) “Excluded Parties List.” Inclusion in the Excluded Parties List bars a facility from performing any U.S. government contract, which highlights the impact this issue can have on existing market share, given the heavy reliance this industry has on government contracts. Environmental statutes that would subject a facility to scrutiny on this matter include the federal Clean Air Act and the Clean Water Act. Raytheon points out, “we incur, and

expect to continue to incur, capital and operating costs to comply with these laws and regulations.”⁴⁵

A number of other aerospace and defense companies have been involved in poor hazardous waste management practices that have led to large fines, environmental remediation, and environmental and human health-related litigation. For example, Northrop Grumman notes in its FY 2013 10-K filing that it was one of several defendants involved in litigation brought by the Orange County Water District for allegedly contributing to volatile organic chemical contamination of the county’s shallow groundwater. Northrop Grumman estimated the range of reasonably possible future costs for environmental remediation to be between \$319 million and \$806 million.⁴⁶

United Technology Corporation’s Form 10-K for FY 2014 discloses that the company has 710 locations where it may have remediation liability, and the company has resolved its liability at 322 locations. The company has also been identified as a potentially responsible party at 124 Superfund sites. The filing states that “the number of Superfund sites, in and of itself, does not represent a relevant measure of liability because the nature and extent of environmental concerns vary from site to site and our share of responsibility varies from sole responsibility to very little responsibility ... At December 31, 2013 and 2012, we had \$936 million and \$847 million reserved for environmental remediation, respectively.”⁴⁷ This

disclosure demonstrates the scale of costs and the complexity of managing this issue.

Waste disposal, especially for hazardous materials, can also represent significant operating costs, although such costs are lower compared to the substantial environmental liabilities mentioned above. According to data from the 2005 Pollution Abatement Costs and Expenditures (PACE) survey, the Aerospace & Defense industry had combined operating costs for solid waste pollution abatement of \$71 million; that figure accounts for nearly 1.3 percent of the total for all manufacturing industries. Capital expenditures for solid waste pollution abatement were \$7.1 million.^{48; 49}

Companies that proactively reduce environmental impacts from hazardous waste will be better protected from future risks and regulations. Lockheed Martin states in its Form 10-K filing for FY 2013: "California and the U.S. EPA are each evaluating the need to regulate hexavalent chromium in drinking water, distinct from the current standards which regulate total chromium ... With respect to either contaminant, if substantially lower standards are adopted, in either California or at the federal level, we expect a material increase in our estimates for environmental liabilities and the related assets for the portion of the increased costs that are probable of future recovery in the pricing of our products and services for the U.S. Government."⁵⁰

Proper hazardous waste management can therefore insulate companies in this industry from regulatory recourse and potential loss of contracts, while also maximizing cost efficiencies.

Value Impact

The generation of waste impacts operational efficiency and regulatory risks for aerospace and defense companies. Waste treatment or disposal results in ongoing operating expenses related to waste handling. Mishandling of highly-regulated hazardous wastes can lead to fines and contingent liabilities from legal actions, while regulatory agencies may require additional capital expenditures to reach compliance. Frequent fines or unexpected abatement costs can also result in a higher cost of capital. Companies that frequently violate hazardous waste management regulations may also be included in the General Service Administration's "Excluded Parties List" and may be barred from participating in government contracts which may in turn affect revenues.

Conversely, waste management can create operational efficiencies for companies, improving long-term cost structure and profitability.

The quantity of hazardous waste generated and the percent recycled insight into a company's operational efficiency and exposure to legal and regulatory actions, and capital expenditures related to abatement. Past

performance on waste management can be a proxy for future risk, looking at the number and aggregate quantity of releases and spills and percent recovered.

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. It includes issues around access to products and services, affordability, responsible business practices in marketing, and customer privacy.

In this industry, social capital issues revolve around data security and its impact on national security. Data security is an increasing concern as technology in the industry rapidly advances and global cyber threats accelerate. Companies positioned to deal with cyber-attacks and client concerns about data security can protect shareholder value over the long term.

Data Security

President Obama has highlighted cybersecurity as one of the most serious economic and national security concerns in the U.S. The government has outlined several initiatives to strengthen the country's response to cyber threats.⁵¹ Companies in the Aerospace &

Defense industry have access to highly classified information and play a critical role in the execution and protection of military strategy. As such, companies in this industry are prime targets for hackers motivated to learn U.S. military secrets. Rogue elements could also exploit product vulnerabilities to obtain sensitive information or influence operations of the industry's clients when these products are operating in the field. A security breach can therefore be costly for a company, its clients, and the public when government operations are compromised. This issue also applies to aircraft manufacturers, as technological advances and the increasing use of electronic components may make aircraft susceptible to cyber-attacks.

Aerospace and defense companies need to ensure that policies and processes are in place to manage these risks and that they implement state-of-the-art security systems both in their own operations and in their products that will enable them to tackle cybersecurity threats to their own and their customers' operations. As hackers get more sophisticated, companies' security systems and processes will also need to evolve at the same pace. Furthermore, companies that have policies and programs in place to deal with the consequences of cybersecurity breaches effectively will be able to provide some assurance to customers and protect their reputation.

Company performance in this area can therefore 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 data security breaches and percentage involving customers' confidential information; and
- Discussion of approach to managing data security risks within (a) company operations and (b) products.

Evidence

The U.S. government and governments worldwide are increasing emphasis on cyberspace operations as well as the countering of cyber-attacks, with the growing frequency and complexity of cyber threats. For example, in its Quadrennial Defense Review for 2014, the DoD outlined its aim for investing in new and expanded cyber capabilities, which would counter cyber-attacks against the U.S.⁵² This would require multi-stakeholder participation, including from industry.

President Obama's budget proposal for FY 2016 includes \$14 billion for cybersecurity, to deploy more intrusion detection and prevention capabilities, share greater data with the private sector and partner countries, and improve the government's ability to respond to cyber-attacks. Such government spending is expected to benefit defense companies like Lockheed Martin, Raytheon, General Dynamics, and others that provide cybersecurity, encryption, and analysis services for government agencies. However, the government focus on

cybersecurity has also exposed vulnerabilities in existing weapons systems that companies will need to address. For example, according to the Pentagon's chief weapons tester, nearly every U.S. weapons program had "significant vulnerabilities" to cyber-attacks. These included misconfigured, unpatched, and outdated software.⁵³

The Global State of Information Security Survey 2014, compiled by PwC, highlighted the increasing importance of managing data security, particularly for aerospace and defense companies. According to PwC, information security risks for the industry have advanced dramatically with the increasing use of technology, and security strategies have struggled to keep up. In a sign of the rising importance of the issue, information security budgets at aerospace and defense companies have risen 67 percent since 2009, reaching an average of \$8.7 million in 2013.⁵⁴

Hackers are the most common perpetrators of data security incidents, accounting for an estimated 35 percent of attacks. The remaining attacks come from competitors (14 percent), organized crime (14 percent), activists (10 percent), terrorists (10 percent), foreign organizations (nine percent), and foreign nation-states (eight percent).⁵⁵

The 2013 Cost of Cyber Crime Study by the Ponemon Institute reveals that between the years of 2010-2013, the defense industry incurred the highest average annualized costs

associated with cybersecurity of all the industries surveyed, with average annual costs estimated at \$20.3 million. The industry also had the second-highest costs for FY2013, at \$23.3 million. Only the financial services industry incurred higher costs, at \$23.6 million. To put these numbers in perspective, the three sectors with the highest cybersecurity costs—defense, energy & utilities, and financial services—all paid more than \$19 million in FY2013, while the fourth-highest sector, technology, paid \$10.8 million.⁵⁶

In March 2011, the RSA Security Division of EMC Corporation disclosed that it had experienced a security breach in which data related to the company's "SecurID" electronic keys were stolen. SecurID keys are used by several major defense contractors, as well as the Pentagon, as an added layer of security beyond a password. The networks of these defense contractors include sensitive information on future weapons systems and military technology used in current battles in Afghanistan and Iraq. Two months after the RSA breach, the stolen SecurID information was used to wage a cyber-attack on Lockheed Martin.⁵⁷ Hackers used the RSA information, along with passwords stolen from Lockheed Martin employees, to gain access to secure information. Lockheed issued a statement saying that the company was able to respond quickly and had blocked the attack before critical data had been accessed.⁵⁸ Incidents such as these indicate the extreme risks that companies in the industry face with respect to

data security, and the need for scrutiny of products manufactured and used by the industry to ensure data protection.

Proper data security management minimizes a company's risk of exposure to, or damage from, cyber-attacks. Lockheed Martin was able to act swiftly and protect its classified information through its sophisticated cybersecurity framework, called Cyber Kill Chain. The system addresses both the prevention of entry into Lockheed's systems and the detection of intruders in the event they gain access with valid credentials.⁵⁹

Lockheed also notes in its Form 10-K disclosure for FY 2013, "The threats we face vary from attacks common to most industries to more advanced and persistent, highly organized adversaries who target us because we protect national security information. If we are unable to protect sensitive information, our customers or governmental authorities could question the adequacy of our threat mitigation and detection processes and procedures ... Occurrence of any of these events could adversely affect our internal operations, the services we provide to our customers, our future financial results, our reputation or our stock price; or such events could result in the loss of competitive advantages derived from our research and development efforts or other intellectual property, early obsolescence of our products and services or contractual penalties."⁶⁰

As discussed earlier, data security threats also provide opportunities for defense manufacturers to develop and market more secure systems. Raytheon was able to expand its market-leading position as the only provider of protected Advanced Extremely High Frequency satellite terminals for secure communications. Raytheon secured a \$134 million Air Force program contract to develop the Global Aircrew Strategic Network Terminal wherein its satellite terminals will protect the U.S. military's most sensitive data.⁶¹ Companies that can show advanced work on data security and maintain customer trust will likely continue to expand their market share and opportunities for future contracts.

The March 2014 disappearance of Malaysia Airlines flight 370 has raised questions about cyber vulnerability in aircraft. While it is unlikely that the flight was taken over via cyber-attack, there is a potential loophole in newer onboard network systems that the FAA and Boeing are working to resolve. The FAA has issued special conditions for Boeing to address problems with its 777 aircraft, which are the result of a new system configuration in which the more sophisticated passenger-services computers are no longer isolated from the systems hosting the critical aircraft systems and data. The FAA stated that the new network configurations in the 777 "may enable the exploitation of network security vulnerabilities to increased risks, potentially resulting in unsafe conditions for the airplanes and occupants."⁶² The corrective action highlights the tension

between advancing technological innovation and ensuring cybersecurity.

Value Impact

Ensuring data security in operations and products is essential for aerospace and defense companies to maintain and expand market share. Significant disruptions or security breaches can erode customer confidence and lead loss in market share and revenue. At the same time, companies have opportunity to grow their market share and capture new market opportunities through technologies and services that protect governments against cyber threats.

Additionally, companies may face significant costs associated with fixing the consequences of a breach and preventing future occurrences of cyber-attacks or other data breaches. This could result in increased operating expenses, as well as regulatory penalties and contingent liabilities. Data security in operations and product may require significant investments in research and development CapEx in the short to medium term, lowering profitability and cash flows. Companies at greater risk for breaches—particularly high-impact incidents—due to improper data-management policies or systems could face higher costs of capital.

With the rapidly advancing use of technology and data in the industry, and emerging and evolving cyber threats, the importance of data security will increase in the near to medium term.

The number of data security breaches is a lagging indicator of how well aerospace and defense companies have been managing this issue. It can also serve as a proxy for an assessment of the magnitude of long-term impacts on customer retention.

Discussion of the management approach to managing data security risks for company operations and products provides a forward-looking view of a company's exposure to data breaches and how it is likely to perform in the future.

Product Safety

Aerospace and defense products expose operators and civilians to dramatic risk through low-probability but high-impact product malfunctions.

The purchasers of aircraft demand planes that demonstrate the highest possible safety standards. Passenger safety is paramount to the airline industry, given the nature of air travel and the extreme situations in which safety incidents can occur. The global rate of fatal accidents has decreased over the last few decades to about one fatal accident per 1.3 million flights in 2011.⁶³ However, the consumer expectation is one hundred percent passenger safety. Twenty-four percent of fatal airline accidents are due to mechanical failure.⁶⁴ These accidents can be attributed to faulty manufacturing or poor maintenance practices.

Besides civilian safety, the safety of personnel operating military equipment, aircraft, and vehicles is also essential in sensitive military operations.

Poor maintenance practices might include the use of unapproved or counterfeit parts. While profit is often the primary incentive for counterfeiting, there are also unique conditions that make this industry more susceptible to it, including a long product lifecycle and diminishing sources for manufacturing and materials (see also the Supply Chain Management & Materials Sourcing issue below).⁶⁵

Through proper design to meet and exceed regulatory requirements, use of approved parts, and ongoing customer engagement involving maintenance and accident investigations, companies in this industry can position themselves for top performance on this issue. 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):

- Number of recalls and total units recalled;
- Number of Airworthiness Directives received and total units affected; and
- Amount of legal and regulatory fines and settlements associated with product safety.

Evidence

The Aerospace & Defense industry has a unique focus on product reliability and safety. These qualities are combined in operations and technology systems used in products. The product design and testing process is extremely important, as demonstrated by the level of rigor exercised by industry participants. In the case of Boeing aircraft, airplane structures are designed for 150 percent of the greatest load they might encounter during commercial service. This overdesigning allows the pilot to safely exceed the designed capabilities of the aircraft during an emergency. During testing procedures, airplanes are subjected to three lifetimes worth of wear and tear. This enables Boeing to create proper safety and maintenance procedures for customers and solve any issues before the airplane goes into service.⁶⁶

Aviation crashes are not always attributed to a design flaw, but with any major crash or incident, the airline and the aircraft manufacturer are heavily scrutinized and often subject to legal proceedings. The 2013 crash of Asiana Airlines Flight 214 while landing at San Francisco International Airport took three lives and called into question the pilot's flying skills and the teamwork in the cockpit. Survivors of the crash sued both Asiana and Boeing for poor pilot training and aircraft design.⁶⁷

More than 80 passengers on the flight sued Boeing for their injuries, claiming they resulted from an inadequate airspeed warning system

and poor training by the aircraft manufacturer. Furthermore, according to the National Transportation Safety Board, only two of the eight emergency slides on Asiana Airlines Flight 214 properly deployed during the incident, and slide malfunctions pinned flight attendants inside the cabin and delayed passenger evacuations.⁶⁸ In addition, two months prior to the crash, the FAA had issued an Airworthiness Directive for slides on the same model Boeing 777, indicating that the slides were not properly deploying.⁶⁹ An Airworthiness Directive is a notification to owners and operators of certified aircraft that a known safety deficiency is present and must be corrected within a given timeframe. Companies that receive Airworthiness Directives have a higher potential risk for malfunctions or lawsuits until the problem is resolved. The Asiana Airlines Flight 214 incident also highlights the expectation of consumers and the public that aerospace companies should bear responsibility for passenger safety and intuitive operation of controls during an emergency situation.

Aerospace and defense products that have insufficient safety compliance or unapproved parts can have both short- and long-term effects on the industry. For example, relatives of the victims of a 1987 crash of a Boeing MD-82 at Madrid's Barajas Airport recently sued Boeing for €56 million due to technical failures that they allege are still present in 1,100 airplanes currently in operation.⁷⁰

Aircraft components must undergo a strict testing and approval process in order to be used in the industry. The FAA frequently releases unapproved parts notifications if a product has gone to market without FAA approval, thus signaling that there has not been a full review of the product's safety performance for its intended use. For example, in 2014, Dukes Aerospace Incorporated approved at least 80 aircraft components for return to service without ensuring the parts were fully compliant with FAA approved standards, and thus received an FAA airworthiness notice.⁷¹ Violating FAA standards could create reputational impacts on the company involved, and potential loss of market share.

Despite FAA oversight, in another recent safety-related incident, Boeing's 787 fleet was grounded in 2013 after a damaged battery case caught fire aboard a Japan Airlines 787.⁷² Defects within the failed battery cell had a ripple effect that forced an emergency landing due to smoke and fire. The fleet grounding was due in part to flaws in manufacturing, insufficient testing, and poor understanding of lithium-ion batteries.⁷³ It took place for more than 3 months and was the longest grounding of a large commercial aircraft by U.S. regulators since jets were introduced in the 1950's.⁷⁴ The 787 entered the market three and a half years behind schedule in 2011, due to numerous safety issues, including an in-flight electrical fire.⁷⁵

Product safety issues may also affect product liability insurance. Boeing noted in its Form 10-K for FY 2014 that the amount of insurance coverage it maintains may be inadequate to cover certain claims or liabilities, particularly those not shielded from liability within the U.S. under the Support Anti-Terrorism by Fostering Effective Technologies (SAFETY) Act provisions of the 2002 Homeland Security Act.⁷⁶

Value Impact

A major aircraft accident in which passengers are injured is a global news event and can have a significant impact on aerospace and defense companies and their clients. Safety issues, either from improper design or failures in manufacturing and testing processes, can lead to a decreased demand for products and significant impact on revenue. Accidents that are linked to product safety issues can result in regulatory action that bans certain products or components, and can lead to large extraordinary expenditures and contingent liabilities. Poor compliance with safety practices can lead to injury or death, litigation expenses, increased insurance premiums, fines, and recalls that can have costly ripple effects throughout a fleet or company. Ongoing safety issues can negatively affect cost of capital reflecting a higher risk premiums.

The number of recalls and airworthiness directives and the total number of unit affected characterize past-performance on product safety and how a company is likely to perform in the future. The amount of legal and

regulatory fines and settlements associated with product safety provide additional information on the probability and magnitude of the financial impact of product safety management.

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 innovation in the production process, as well as 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 Aerospace & Defense industry commercializes products and services that are essential for the military and the airline industry and is at the forefront of tactical and technological innovation. Oil price volatility, with periods of record-breaking high oil prices prior to the recent price decline, have threatened the airline industry’s already thin profit margins, and in turn, the Aerospace & Defense industry is feeling pressure to offer more efficient aircraft. Optimizing fuel

efficiency or developing products that are powered by alternative energy sources, including renewable energy, through technology innovation provides an opportunity to meet consumer demands and offer military clients greater energy independence.

Fuel Economy & Emissions in Use-phase

Customer demand for energy-efficient and cutting-edge technologies that drive sustainability in the Aerospace & Defense industry is strong and growing. As the designers and manufacturers of a large segment of the global transportation fleet, companies in this industry have a unique opportunity to support many industries and government agencies striving to meet GHG and fuel-management goals and imperatives.

Aerospace and defense-related transportation accounts for a significant share of global GHG emissions. Through combustion of petroleum-based fuels, motor vehicles, ships, and aircraft cumulatively generate significant, direct GHG emissions and contribute to global climate change. Vehicle, ship, and aircraft usage is also associated with air pollutants that threaten human health and the environment. In this context, emissions of GHGs, nitrogen oxides, sulfur oxides, volatile organic compounds (VOC), and particulate matter (PM) are increasingly of concern to consumers and regulators. While these impacts are farther

downstream from aerospace and defense companies (most of the emissions occur at the customer use phase rather than during product manufacturing), regulations and market opportunities are focusing on aerospace and defense manufacturers in order to address some of these issues, for example, by imposing fuel economy standards.

According to Deloitte's 2014 Aerospace and Defense Industry Outlook, customers are pushing this industry for greater energy efficiency.⁷⁷ The price of fuel is a key driver in the profitability of the airline industry. Increasing fuel prices mean higher costs for airlines, as they are typically not able to pass the full cost increase on to their passengers. Therefore, increasing oil prices have cut directly into airline profits in the past. Although oil prices decreased in 2013 and 2014, their volatility in the future will play a critical role in the stability of the airline industry.⁷⁸ In addition, the UN's International Civil Aviation Organization is aiming to create a global market-based solution to curb aviation emissions, which would add more costs to airlines that operate inefficient aircraft.⁷⁹

Regulations on fuel efficiency, as well as customers' demand for products with fewer environmental impacts and lower total ownership costs, are driving aerospace and defense manufacturers to reduce product use-phase emissions, increase the efficiency of their products, and develop products powered by alternative energy sources. The latter is also

relevant to enhance energy independence, as well as provide more reliable energy supply in combat situations.

Lockheed Martin makes the business case for managing product design and lifecycle with sustainability in mind: "Sustainability is increasingly an issue for our customers. Lockheed Martin works closely with customers early in the product lifecycle to make the most efficient design decisions while keeping product quality in mind. We also understand, and seek to mitigate, the strategic challenges posed by limited natural resources. By forging technological advances in the energy market and increasing the efficiency of our solutions, we can help enable secure, sustainable development in many parts of the world."⁸⁰ Companies that are able to meet current fuel-efficiency and emissions standards and position themselves for possible future regulatory and/or customer standards in different markets can strengthen their competitive position and market share while mitigating the risk of reduced demand for conventional products.

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):

- Revenue from alternative energy-related products; and

- Discussion of strategies and approach to address fuel economy and GHG emissions of products.

Evidence

As regulation is starting to address the large environmental footprint of the transportation sector, customers of aerospace and defense companies will increasingly demand products with lower emissions. The latest EPA data shows that for 2011, transportation accounted for 27 percent of U.S. GHG emissions, of which 6.1 percent came from commercial aircraft. More than 99 percent of these emissions were in the form of carbon dioxide.⁸¹ Additionally, because of the altitude at which the emissions occur, their effects on the climate can be magnified because they are unable to be absorbed by trees and plants, which are nature's carbon "scrubbers."⁸² Under the Clean Air Act, the EPA is currently evaluating whether aircraft emissions endanger society, and the results could lead to regulatory measures.⁸³ The EPA intends to propose its findings on this topic in late April 2015, and expects final determinations in spring 2016.⁸⁴

The fuel efficiency of aircraft has several drivers, including aircraft design, route selection, and load factor. Newer aircraft are more fuel efficient, and one report estimates that every 10 years, the aircraft being built are 10 to 15 percent more efficient.⁸⁵ However, existing aircraft can be retrofitted for efficiency. For example, adding winglets can increase fuel efficiency by 1.8 percent,⁸⁶ and replacing an

engine on an existing aircraft can improve efficiency by 15 percent.⁸⁷

Boeing is working with NASA on the development of the X-48C, an unmanned scale model of a heavy-lift blended-wing aircraft. The triangular, tailless design produces lift from the whole craft, not just the wings, and is lighter and simpler to manufacture. This translates into greater range, fuel economy, reliability, and lifecycle savings, as well as lower manufacturing costs. The company estimates that blended-wing-body designs could lead to substantial increases in energy efficiency for cargo aircraft, with fuel cost savings of 18 to 60 percent, compared to existing models.⁸⁸

The DoD, the largest customer in the defense segment of the industry, has highlighted climate change and energy security in its strategic planning announcements. The agency's 2014 Quadrennial Defense Review describes a long-term approach to managing climate adaptation, stating, "the impacts of climate change may increase the frequency, scale and complexity of future missions ... Our actions to increase energy and water security, including investments in energy efficiency, new technologies, and renewable energy sources, will increase the resilience of our installations and help mitigate these effects." The agency makes it clear that its demand for products from defense primes will prioritize product lifecycle management in order to fulfill the U.S. defense strategy.⁸⁹

The DoD is increasingly focused on energy efficiency, driven by two reinforcing factors. First, energy efficiency impacts the amount and frequency of fuel delivery to troops during military operations and can therefore minimize the military's exposure to vulnerable supply lines. Second, the benefit of energy efficiency is compounded by the extreme energy costs the military incurs when transporting fuel to operations in remote or dangerous locations. These two aspects are reflected in fuel logistics considerations for the DoD in its capability requirements and acquisition decision processes, which focus on Energy Key Performance Parameters as well as the Fully Burdened Cost of Energy, a measure of the cost of not just buying fuel but also transporting it to the battlefield and protecting it from enemy attacks.⁹⁰ The cost of petroleum in remote areas of Afghanistan can reach \$400 a gallon, and the human cost of the increased presence of armed forces to defend these convoys increases every day.⁹¹ This also highlights the benefits of developing alternative energy products, including those using renewable energy, that reduce reliance on such expensive and unreliable fuel supplies.

In its Sustainability Report, Lockheed Martin states that the "leading cause of battlefield casualties relates to the delivery of fuel and water to troops, and the largest consumer of fuel in the battlefield is generator systems." This indicates that the fuel and water efficiency of equipment is material to military operations in order to reduce unnecessary and dangerous

refueling missions. By offering resource-efficient or alternative energy products, defense contractors can save the lives of their customers and ensure higher mission success rates. As a result, the U.S military considers environmental criteria when evaluating contract bids. For example, in 2012, Lockheed Martin was awarded a new contract to design and develop a Solid Oxide Fuel Cell (SOFC) generator. The new product integrates solar panels in order to use up to 50 percent less energy in tactical situations.⁹²

The U.S. Navy has also seen greater reductions in operational fuel costs from the 2009 introduction of its first pilot hybrid ship, the *USS Makin Island*. This ship uses a hybrid electric drive train to increase efficiency (rather than changing the fuel type used) and it saved more than \$2 million during its maiden voyage from Mississippi to California.⁹³ The *Makin Island* is expected to save more than \$250 million in fuel over her lifetime.⁹⁴ Wider-scale deployments of similar ships could yield greater cost savings in the future.

Companies are recognizing the risks and opportunities associated with this issue in their regulatory filings. In its Form 10-K for FY 2014, United Technologies recognizes the risk that government procurement practices can have on its business due to growing restrictions on emissions and other factors.⁹⁵

Value Impact

Fuel efficiency and use-phase emissions can affect the demand for aerospace and defense products, as both private- and public-sector 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 in the short term. However, in the long term, these investments can result in revenue growth due to increased demand from customers.

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.

Revenue from alternative fuel and energy products and strategies to address fuel economy and GHG emissions of products provide an indication of how well aerospace and defense companies are positioned to serve increasing customer demand for fuel-efficient and low emission vehicles.

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 that are in potential conflict with the interest of broader stakeholder groups (government, community, customers, and employees) and, 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. Finally, it includes the risk of business complicity with human rights violations.

Aerospace and defense companies rely on complex supply chains for critical raw material and component inputs, magnifying some of these risks. There is also a high potential for violations of bribery laws around the world as

aerospace and defense companies regularly contract with governments and seek new growth opportunities. These factors will play an increasingly important role in shareholder value in this industry, as the supply chain and regulatory environment are constantly shifting.

Business Ethics

Aerospace and defense companies are exposed to risks of supply chain disruptions, input price increases, and regulatory compliance costs. Two instances, in particular, where this issue can become material are when rare earth or “conflict” minerals and metals are used in products, and when counterfeit or compromised products enter a company’s supply chain.

Given the importance of Product Safety and Data Security for this industry (see earlier sections), the presence of counterfeit parts in the aerospace and defense supply chain can pose a huge risk. Counterfeit components can lead to product malfunctions and compromised security and safety. The Defense Advanced Research Projects Agency (DARPA), an agency of the DoD, is currently developing a program called Supply Chain Hardware Integrity for Electronics Defense (SHIELD). The program is creating a tool to verify electrical components at any point in the defense supply chain and identify counterfeits. If SHIELD is successful, companies in this industry with counterfeit components in their supply chain may quickly be exposed, and proactive supply chain audits

and management will insulate companies from reputational and regulatory risk.

Separately, companies face pressure from legislation and actions by non-governmental organizations (NGOs) to track and eliminate the use of minerals that fund conflict in the Democratic Republic of Congo (DRC). At the same time, there are material sourcing risks related to rare earth minerals and metals due to a low substitution ratio, concentration of deposits in only a few countries, and geopolitical considerations. Aerospace and defense companies also face competition due to increasing global demand for these minerals in other sectors, which can result in significant price increases and supply chain risks.

Aerospace and defense companies with strong supply chain management and materials sourcing practices will be better positioned to address resource scarcity and manage the quality of their products and protect shareholder value. Innovations at the product-design phase to reduce dependence on conflict or critical materials will also contribute to reducing risks.

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):

- Amount of legal and regulatory fines and settlements associated with

incidents of corruption, bribery, and/or illicit international trade;

- Revenue from countries ranked in the “E” of “F” band of Transparency International’s Government Defence Anti-Corruption Index; and
- Description of processes to manage business ethics risks throughout the value chain.

Evidence

A number of top companies in the Aerospace & Defense industry have recognized that navigating the complex political and regulatory landscape can have negative impacts if improperly managed. Lockheed Martin states in its FY2013 Form 10-K filing that “While we have stringent policies in place to comply with such laws and regulations, failure by us, our employees or others working on our behalf to comply with these laws and regulations could result in administrative, civil or criminal liabilities, including suspension, proposed debarment or debarment from bidding for or performing government contracts or suspension of our export privileges, which could have a material adverse effect on us.”⁹⁶

Textron disclosed similar concerns for regulatory compliance issues, even with policies and procedures in place that are designed to facilitate compliance. Textron noted in its Form 10-K that “In many foreign countries, particularly in those with developing economies, it is common to engage in business practices that are prohibited by laws and

regulations applicable to us, such as the Foreign Corrupt Practices Act. ... A violation of such laws by any of our international representatives, consultants, joint ventures, business partners, subcontractors or suppliers, even if prohibited by our policies, could have an adverse effect on our business and reputation.”⁹⁷

According to the former secretary general of NATO, “Those defense companies that do take corruption risk seriously have the chance to be seen by their government clients as better companies with which to do business.”⁹⁸ Beyond policies and procedures, companies can gain a better understanding of their risks by assessing the countries and partners they do business with. Transparency International developed a Government Defence Anti-corruption Index which is a review of corruption vulnerability in Defense Ministries and Armed Forces worldwide.⁹⁹

In 2012, Pratt & Whitney Canada (P&WC), owned by United Technologies Corporation (UTC), pled guilty to knowingly violating the State Department’s International Traffic in Arms Regulations (ITAR).¹⁰⁰ Per ITAR’s regulations, the U.S. does not export U.S. defense articles or services to China. UTC’s violation is the result of an effort by China to develop an attack helicopter, which was masked by a program to develop a civilian helicopter, for which P&WC supplied engines and control software. At the request of the client, the software was modified in a way that enabled military

applications and violated requirements of the State Department. For exporting military-enabled software developed in the U.S., UTC faced total penalties of \$75 million, of which \$20 million must be dedicated to future compliance. The Office of Defense Trade Controls Compliance also imposed a partial debarment of P&WC from ITAR license privileges for at least one year.¹⁰¹

UTC also mentioned export compliance risks in its Form 10-K filing, noting that “Any failures to comply with these laws and regulations could result in civil or criminal penalties, fines, investigations, adverse publicity and restrictions on our ability to export our products, and repeat failures could carry more significant penalties. ... Any restrictions on the export of our products or product lines could have a material adverse effect on our competitive position, results of operations, cash flows or financial condition.”¹⁰²

The first large-scale undercover investigation for FCPA enforcement involved the defense industry. The operation was aided by FBI informant Richard Bistrong, who helped authorities collect audio and video evidence to prove that the defendants had engaged in a complicated scheme to pay a \$1.5 million bribe to the Gabonese defense minister in exchange for a piece of a \$15 million contract to outfit the Gabonese presidential guard. The result was the arrest of 22 executives of multiple mid-sized police- and military-equipment companies for violating the FCPA.

Mr. Bistrong was approached to be an informant in the case as a result of his own crimes. He was involved in bribery schemes while working for Armor Holdings (later bought by BAE Systems) in Nigeria and the Netherlands, where he bribed officials in order to win contracts from the United Nations. For his crimes, Bistrong spent time in prison and was fired from Armor Holdings, which paid more than \$15 million in fines.¹⁰³

Value Impact

The global nature of the aerospace and defense industry makes it prone to violations of anti-corruption and anti-bribery regulations. Violations of such laws can result in substantial fines, sanctions, and civil and criminal penalties, creating extraordinary expenses and contingent liabilities. Regulatory actions could also curtail operations in certain jurisdictions, and actual or alleged violations could damage a company's reputation and ability to do business, with impact on revenue and long-term growth prospects. Companies with a record of non-compliance with regulations could also face higher costs of capital due to a higher risk premium.

Legal and regulatory fines associated with bribery or corruption characterize past performance as a proxy for how well companies manage regulatory compliance and provide an understanding of the probability and magnitude of corruption or bribery incidents. The amount of revenue from countries with high-levels of corruption helps

assess a company's exposure to corruption risks. This can be complemented by understanding a company's process to manage business ethics throughout the value chain to assess its exposure to the risk of being associated with incidents of corruption from business partners.

Supply Chain Management & Materials Sourcing

Aerospace and defense companies are exposed to risks of supply chain disruptions, input price increases, and regulatory compliance costs. Two instances, in particular, where this issue can become material are when rare earth or "conflict" minerals and metals are used in products, and when counterfeit or compromised products enter a company's supply chain.

Given the safety expectations outlined in the Product Safety section of this brief, as well as the concepts discussed in the Data Security section, the presence of counterfeit parts in the aerospace and defense supply chain can pose a huge risk. Counterfeit components can lead to product malfunctions and compromised security and safety. The Defense Advanced Research Projects Agency (DARPA), an agency of the DoD, is currently developing a program called Supply Chain Hardware Integrity for Electronics Defense (SHIELD). The program is creating a tool to verify electrical components at any point in the defense supply chain and

identify counterfeits. If SHIELD is successful, companies in this industry with counterfeit components in their supply chain may quickly be exposed, and proactive supply chain audits and management will insulate companies from reputational and regulatory risk.

Companies face pressure from legislation and actions by non-governmental organizations (NGOs) to track and eliminate the use of minerals that fund conflict in the Democratic Republic of Congo (DRC). At the same time, there are material sourcing risks related to rare earth minerals and metals due to a low substitution ratio, concentration of deposits in only a few countries, and geopolitical considerations. Aerospace and defense companies also face competition due to increasing global demand for these minerals in other sectors, which can result in significant price increases and supply chain risks.

Aerospace and defense companies with strong materials sourcing practices and the ability to adapt to increasing resource scarcity will be better positioned to protect shareholder value. Innovations at the product-design phase to reduce dependence on some of these materials will also contribute to reducing risks.

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):

- Number of counterfeit parts detected, percentage avoided;
- 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

The Aerospace Industries Association (AIA) is urging action to reduce the risks associated with counterfeit parts in the aviation industry. According to the AIA, incidents of counterfeit parts more than doubled between 2005 and 2008.¹⁰⁴ Concerns over counterfeit parts in the U.S. were significant enough to be examined by the Senate Armed Services Committee as part of a 2012 report.¹⁰⁵ The investigation found counterfeit parts, usually from China, in at least seven aircraft, including Lockheed Martin's C-130J transport aircraft, Boeing's P-8A Poseidon transport aircraft, and L-3 Communication's 27J Spartan transport aircraft. Some of these planes have been deployed to Afghanistan. The report elaborated, "suspect electronic parts from China were installed on military systems and subsystems that were manufactured by Raytheon Co., L-3 Communications and Boeing," demonstrating that this problem affects major companies across the industry. While there are no links to injuries resulting from the parts, Michigan Senator Carl Levin

stated that the Senate Armed Services Committee "identified lots of places where, unless correction was made, there was real fear that those kind of disastrous consequences could take place." At the same time, the Pentagon was conducting 255 investigations into defective and substandard parts that may involve counterfeit products.¹⁰⁶

At the same time, aerospace and defense companies face potential disruptions in the sourcing of materials within their supply chain. Several critical components in aerospace and defense products depend on minerals that have the potential to fuel conflict, human rights violations, and illicit activities in regions where they are mined. The industry also depends on rare earth minerals, also used by several other industries, the global production of which is limited and the prices of which are subject to volatility.

Aerospace and defense companies represent a significant amount of the global use of "conflict minerals." Artisanal and small-scale mining in the DRC is responsible for much of the current global output of conflict minerals. While such mining is an important source of livelihood to the local population, it also is helping to finance armed conflict in the region and has significant ecological impacts. Several legislative and project-based efforts are underway globally to improve traceability and due diligence with respect to the supply of minerals from the DRC. These efforts have the potential to affect aerospace and defense

companies and their suppliers through the provision of incentives and resources for leadership in supply chain management. Companies are also motivated to manage the social impacts of their supply chains by the potential impact of consumer and NGO campaigns on their brand value.

In the U.S., the SEC estimates that costs to comply with the Conflict Minerals provision of the Dodd-Frank Act will total \$3 to \$4 billion in the first year and at least \$200 million each year afterward. Other estimates suggest compliance costs may be as high as \$16 billion.¹⁰⁷ However, the SEC expects that non-reporting companies that are part of reporting companies' supply chains will bear much of the cost of the final rule.¹⁰⁸ The new disclosure rule was expected to affect approximately 6,000 issuers and their 275,000 suppliers.¹⁰⁹ If a company does not comply in good faith, it can be exposed to legal liability; furthermore, it may face pressure from activists, NGOs and market forces to prove the supply chain is "conflict-free."¹¹⁰ According to Ernst & Young, the "electronics and communications" industry is among the industries that are most likely to be affected by the rule.¹¹¹

Spirit Aerosystems noted in its Form 10-K filing that the implementation of these rules could adversely affect the sourcing, supply and pricing of its product materials.¹¹² Spirit Aerosystems also mentioned that it could face reputational challenges if it is unable to verify the origins of all conflict minerals used in its

products, or if it cannot satisfy any customers who require that product components be certified as "conflict free."¹¹³ Furthermore, Spirit Aerosystems expressed concern that if it is unable to meet customer requirements then customers may choose to disqualify it as a supplier and it may have to write off inventory in the event that it cannot be sold.¹¹⁴

Apart from regulatory costs, global input prices for 3TG have shown volatility, which is sometimes directly related to the conflict in the DRC. A 31 percent increase in tin prices in 2008 coincided with a rebel offensive against the DRC's primary tin-trading center. The DRC also leads global production of tantalum, with various estimates suggesting it is responsible for eight to 20 percent of global production.¹¹⁵ Due to supply constraints and rising demand, the price of tantalum increased from \$110 million (kg) in 2007 to more than \$300 million per kg in 2012.¹¹⁶

Value Impact

Aerospace & Defense products demand the highest level of safety and security, and this extends to the supply chain of materials sourced. Incidents of counterfeit parts entering the supply chain can impact the safety and security of aerospace and defense products, both critical elements for government and private sector clients. Therefore, supply chain integrity is critical to maintain market share and maximize revenue

Similarly, 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 if they fail to verify or avoid these materials, resulting in further lost revenue and lower profitability over the medium to long term.

Reliance on critical or conflict minerals leaves companies open to potential supply chain disruptions and increased costs when shortages or price spikes occur. The increasing scarcity or unavailability of certain key materials used by aerospace and defense companies, as well as the price volatility of such materials, can increase companies' risk profile and cost of capital if these companies rely heavily on such materials and are unable to source them effectively. Increasing scarcity also suggests that the probability and magnitude of these impacts are likely to increase in the future. Companies that invest in R&D for alternative materials or equipment that avoids the use of rare earth or conflict minerals may be better positioned to manage price increases and supply constraints.

The number of counterfeit parts detected and the percentage avoided is an indicator of past performance on supply chain integrity and how a company is likely to perform in the future. 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.

SASB INDUSTRY WATCH LIST

The following section provides a brief description of sustainability issues that did not meet SASB's materiality threshold at present, but could present a material issue in the future.

Controversial Weapons: Defense product manufacturers must navigate sensitive social externalities that come with weapons use. Several categories of weapons have emerged as controversial and have resulted in treaties, conventions, and divestment strategies aimed at eliminating their use. The United Nations Convention on Certain Conventional Weapons (CCW) restricts or prohibits "the use of certain conventional weapons which may be deemed to be excessively injurious or to have indiscriminate effects." To date, 116 states have joined the convention, and major military powers. The weapons addressed by the convention include non-detectable fragments, landmines, booby traps, blinding lasers, certain applications of incendiary weapons, and explosive remnants of war.¹¹⁷

While there is no verification or enforcement mechanism included in the convention,¹¹⁸ defense companies and nation-states can experience significant reputational risk as a result of their involvement with controversial weapons. Actions against defense companies involved in the manufacturing of controversial weapons have included divestment and refusal to provide financial services.¹¹⁹ Following the creation of the CCW in 1983, several related treaties and conventions have been created related to cluster bombs, landmines, and chemical and biological weapons. Concern over these types of weapons stems from the damage caused to civilians during and long after times of war.

International public awareness of—and concern over—the production and use of cluster munitions and other weapons banned by international conventions has grown significantly in recent years.¹²⁰ Consequently, an increasing number of financial institutions are implementing policies and systems to protect themselves against the reputational and regulatory compliance risks of involvement in cluster munitions.¹²¹

Nevertheless, this issue is currently deemed to be an emerging issue because mainstream U.S. investors have not actively engaged with the topic and there is inadequate evidence of likely material impacts on the value of U.S.-listed defense companies. However, this may become an increasingly important issue if momentum for divestment from controversial weapons increases in the future, together with government action to restrict the use or production of such weapons or limit contracts with companies producing them.

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APPENDIX I: Five Representative Aerospace & Defense Companiesⁱⁱⁱ

COMPANY NAME (TICKER SYMBOL)
The Boeing Company (BA)
United Technologies Corporation (UTX)
Raytheon Company (RTN)
Lockheed Martin Corporation (LMT)
General Dynamics Corporation (GD)

ⁱⁱⁱ This list includes five companies representative of the Aerospace & Defense industry and its activities. This includes only companies for which the Aerospace & Defense 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 January 13, 2015.

APPENDIX IIA: Evidence for Sustainability Disclosure Topics

Sustainability Disclosure Topics	EVIDENCE OF INTEREST				EVIDENCE OF FINANCIAL IMPACT				FORWARD-LOOKING IMPACT		
	HM (1-100)	IWGs		EI	Revenues & Cost	Asset & Liabilities	Cost of Capital	EFI	Probability & Magnitude	Externalities	FLI
		%	Priority								
Energy Management	70*	81	5	High	•		•	Medium	•		Yes
Hazardous Waste Management	70*	50 ^{/1}	6	Medium	•	•	•	High			No
Data Security	40	81	2t	High	•	•	•	High	•	•	Yes
Product Safety	45	88	1	High	•	•	•	High			No
Fuel Economy & Emissions in Use-phase	90*	69	4	Medium	•		•	High	•		Yes
Business Ethics	80*	75	3	High	•	•	•	Medium			No
Supply Chain Management & Materials Sourcing	40	63	2t	Medium	•	•	•	High	•		Yes

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.

^{/1} : During the IWG phase the issue was called "Water & Waste Management in Manufacturing" and its scope included angles covered in this Brief's "Hazardous Waste Management" disclosure topic and angles on Water Management which are now not part of any disclosure topic.

APPENDIX IIB: Evidence of Financial Impact for Sustainability Disclosure Topics

Evidence of Financial Impact	REVENUE & EXPENSES							ASSETS & LIABILITIES				RISK PROFILE	
	Revenue			Operating Expenses		Non-operating Expenses		Assets		Liabilities		Cost of Capital	Industry Divestment Risk
	Market Share	New Markets	Pricing Power	Cost of Revenue	R&D	CapEx	Extra-ordinary Expenses	Tangible Assets	Intangible Assets	Contingent Liabilities & Provisions	Pension & Other Liabilities		
Energy Management	•			•		•						•	
Hazardous Waste Management	•			•		•	•			•		•	
Data Security	•				•	•	•		•			•	
Product Safety	•				•		•		•	•		•	
Fuel Economy & Emissions in Use-phase	•	•	•		•							•	
Business Ethics							•		•	•		•	
Supply Chain Management & Materials Sourcing	•			•	•		•		•			•	

MEDIUM IMPACT
 HIGH IMPACT

APPENDIX III: Sustainability Accounting Metrics | Aerospace & Defense

TOPIC	ACCOUNTING METRIC	CATEGORY	UNIT OF MEASURE	CODE
Energy Management	Total energy consumed, percentage grid electricity, percentage renewable	Quantitative	Gigajoules (GJ), Percentage (%)	RT0201-01
Hazardous Waste Management	Amount of hazardous waste, percentage recycled	Quantitative	Metric tons (t), Percentage (%)	RT0201-02
	Number and aggregate quantity of reportable spills, quantity recovered*	Quantitative	Number, Kilograms (kg)	RT0201-03
Data Security	Number of data security breaches and percentage involving confidential information**	Quantitative	Number, Percentage (%)	RT0201-04
	Discussion of approach to managing data security risks within (a) company operations and (b) products	Discussion and Analysis	n/a	RT0201-05
Product Safety	Number of recalls and total units recalled***	Quantitative	Number	RT0201-06
	Number of Airworthiness Directives received and total units affected****	Quantitative	Number	RT0201-07
	Amount of legal and regulatory fines and settlements associated with product safety*****	Quantitative	U.S. Dollars (\$)	RT0201-08
Fuel Economy & Emissions in Use-phase	Revenue from alternative energy-related products	Quantitative	U.S. Dollars (\$)	RT0201-09
	Discussion of strategies and approach to address fuel economy and greenhouse gas emissions of products	Discussion and Analysis	n/a	RT0201-10
Business Ethics	Amount of legal and regulatory fines and settlements associated with incidents of corruption, bribery, and/or illicit international trade*****	Quantitative	U.S. Dollars (\$)	RT0201-11
	Revenue from countries ranked in the "E" or "F" Band of Transparency International's Government Defence Anti-Corruption Index	Quantitative	U.S. Dollars (\$)	RT0201-12
	Description of processes to manage business ethics risks throughout the value chain	Discussion and Analysis	n/a	RT0201-13

* Note to RT0201-03—The registrant shall discuss its long-term activities to remediate spills that occurred in years prior to the reporting period but for which remediation activities are ongoing.

** Note to RT0201-04—Disclosure shall include a description of the corrective actions taken in response to specific incidents.

*** Note to RT0201-06—Disclosure shall include a discussion of notable recalls, such as those that affected a significant number of units or those related to a serious injury or fatality.

**** Note to RT0201-07—The registrant shall discuss notable Airworthiness Directives, such as those that resulted in an Emergency Airworthiness Directive, affected a significant number of products, or were associated with plane grounding(s) or accident(s).

***** Note to RT0201-08—Disclosure shall include a description of fines and settlements and corrective actions implemented in response to events.

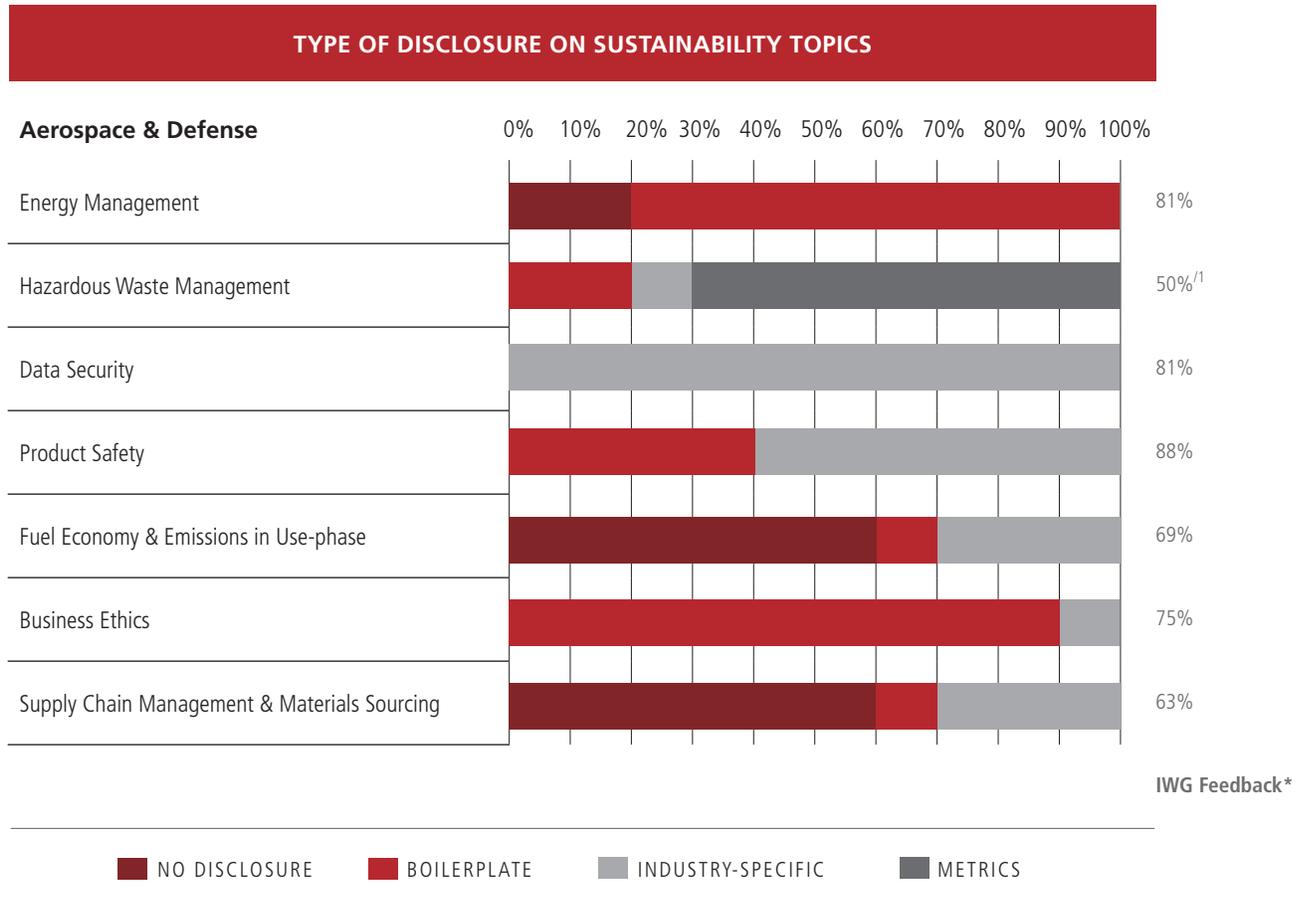
***** Note to RT0201-11—Disclosure shall include a description of fines and settlements and corrective actions implemented in response to events.

APPENDIX III:
Sustainability Accounting Metrics | Aerospace & Defense Continued

TOPIC	ACCOUNTING METRIC	CATEGORY	UNIT OF MEASURE	CODE
Supply Chain Management & Materials Sourcing	Number of counterfeit parts detected, percentage avoided	Quantitative	Number, Percentage (%)	RT0201-14
	Percentage of materials costs for products containing critical materials	Quantitative	Percentage (%) by COGS	RT0201-15
	Percentage of tungsten, tin, tantalum, and gold smelters within the supply chain that are verified conflict-free	Quantitative	Percentage (%)	RT0201-16
	Discussion of the management of risks associated with the use of critical materials and conflict minerals	Discussion and Analysis	n/a	RT0201-17

APPENDIX IV: Analysis of SEC Disclosures | AEROSPACE & DEFENSE

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



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

^{/1} During the IWG phase the issue was called "Water & Waste Management in Manufacturing" and its scope included angles covered in this Brief's "Hazardous Waste Management" disclosure topic and angles on Water Management which are now not part of any disclosure topic.

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