



Sector Report: Aerospace & Defence

Ready for takeoff?

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Executive Summary

Ready for takeoff?

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The Aerospace & Defence (A&D) industry is part of the industrial sector and can be considered a high-technology industry. It covers a diverse set of companies providing products and services to civil and military customers. The industry's operations and product offerings are associated with various sustainability impacts. The key ESG issues we have identified include Bribery and Corruption, Product Quality and Safety, Energy Use and GHG emissions, Supply Chain, Human Capital and Sustainable Products and Services. The fundamental perspectives for the industry are rather mixed. While aircraft manufacturers benefit from continued growth in global demand fueled by emerging market prosperity, defence companies are dependent on government expenditures and have come under some pressure lately due to budget cuts in the US and Europe. Going forward, competitive advantage in the industry will also be driven by companies' ability to manage their key ESG exposures. In this report we discuss whether the industry overall and whether individual companies in particular appear to be "ready for takeoff".

High barriers of entry, diverse product offerings

The Aerospace & Defence industry consists of a diverse set of companies, including large conglomerates developing and manufacturing a wide range of A&D products and niche players supplying specific technologies or products. The barriers to entering this industry are high. Limited access to specialised technologies, high development costs and government support make it difficult for new companies tapping the market. The commercial aerospace market comprises a few prime contractors producing aircrafts and engines as well as numerous companies supplying subcomponents. In contrast, the defence market has a much more diverse character, ranging from companies developing complex software to those simply producing metal ammunition cases, for example. Commercial aircraft manufacturers depend on highly cyclical demand from the airlines industry, while defence companies rely heavily on government military spending.

Various sustainability impacts

The Aerospace & Defence industry affects climate change not only through its operations but also through its product offerings. Due to increasing fuel prices, a stricter regulatory environment and stakeholder pressure, companies have started to consider environmental impacts within product design. Thus, A&D companies face customer pressure to develop energy-efficient products and identify alternative fuel options.

With regards to social issues, the retention and recruitment of highly skilled employees is a challenge in light of talent shortages, especially in developed markets. Manufacturers must also be observant of robust product quality and safety practices, since even minor issues can pose material risks. Expensive delays to product launches can result in the loss of customer and investor trust, while product issues can also entail – in extreme cases – severe impacts like fatalities.

A&D and climate change

Challenge of talent shortages and product quality issues

Political contributions and lobbying

Governance concerns are mainly related to transparency surrounding corporate political contributions and lobbying and breaches of arms trade regulations, as well as bribery and corruption. Specifically, involvement in the latter presents significant business risks due to potential blacklisting or exclusion from investments.

Key issues – High exposure, room for improvement

The industry's operations and product offerings are associated with various sustainability impacts on its stakeholders and the environment. In this report, Sustainalytics focuses on six key ESG issues that have the most significant impact from a sustainability and/or a business perspective for the Aerospace & Defence industry.



Baseline: moderate

Outlook: neutral

Bribery and Corruption

The Aerospace & Defence industry is highly exposed to bribery and corruption due to its close business relationships with governments, its competition for a limited number of high-value contracts and massive secrecy surrounding military procurement. Several severe controversies illustrate this high exposure to bribery and corruption cases. Overall, the industry shows a high level of preparedness, since policies and programmes on bribery and corruption are relatively widespread in the industry. However, several companies have been involved in bribery- and corruption-related controversies in recent years. Therefore, we consider the overall performance with regards to this key ESG issue as moderate and anticipate a stable performance in the future. In general, we expect that this key ESG issue will remain material in the coming years.



Baseline: weak

Outlook: positive

Product Quality and Safety

Product quality and safety is crucial for Aerospace & Defence companies to maintain investor and customer trust. This is especially important since companies in the industry often compete for a limited number of high-value contracts and face an immense product innovation pressure. Prominent quality and safety incidents in recent years and a lack of disclosure regarding robust quality and management systems show there is room for improvement. We expect that product quality and safety will gain further importance as a key ESG issue for the industry. Hence, we anticipate that the A&D industry's performance with respect to this issue will improve in the coming years.



Baseline: moderate

Outlook: neutral

Human Capital

Adequate human capital management is considered crucial for Aerospace & Defence companies to maintain good relationships with employees, compete in the global race for talents, avoid labour conflicts and mitigate operations-related risks such as strikes or lawsuits. Many companies in the industry have room for improvement with respect to the implementation of employee policies and programmes. However, compared to other manufacturing industries, Aerospace & Defence companies have been less involved in employee-related controversies. Therefore, we consider the current industry performance as moderate with a neutral outlook. At the same time, we expect that human capital will continue to gain further importance in the medium and long term since the race for global talents is gathering momentum.



Baseline: moderate

Outlook: positive

Supply Chain

Aerospace & Defence companies depend on a functioning supply chain, especially due to growing product innovation pressure. The integration of environmental standards in procurement decisions is likely to gain importance in the near future, e.g., in light of growing consumer expectations towards fuel efficiency improvements. Compared to other industries, A&D companies tracked by Sustainalytics have not been involved in severe controversies related to supply chain management in recent years. Nevertheless, there is room for improvement in terms of establishing social and environmental procurement policies and programmes for the industry as a whole. Only a few A&D companies demonstrate best practice, having implemented strong supply chain standards. Due to product innovation pressure to develop energy-efficient products and growing stakeholder expectations, we expect that A&D companies will increase their social and environmental systems for supply chain management.



Baseline: moderate

Outlook: positive

Energy Use and GHG Emission

As a manufacturing industry, Aerospace & Defence is confronted with rising energy prices, resulting in higher operational costs. However, regulatory pressure and stakeholder expectations towards lower operational carbon emissions also present a challenge to the industry. Our analysis shows that most companies (75 percent) in the industry have learned their lessons and implemented programmes to reduce their direct greenhouse gas (GHG) emissions; a remarkable increase compared to 2011. However, there is still room for improvement with respect to carbon emissions disclosure and performance. Nevertheless, we expect that the industry will reduce its carbon footprint and strengthen its programmes in the future. Energy prices and stakeholder demands regarding lower operations-related GHG emissions are likely to grow in the near future. In particular, regulators, customers and non-governmental organisations (NGOs) target the carbon footprint of manufacturing industries. Therefore, A&D companies are motivated to further reduce their carbon footprint. We expect that Energy Use and GHG Emissions will gain importance as a key ESG issue over the coming years.



Baseline: weak

Outlook: positive

Sustainable Products and Services

Aerospace & Defence companies have an impact on climate change, through both operational GHG emissions and product offerings. Several companies in the industry have started to address this environmental impact. Leading industry players are utilising life-cycle assessment strategies in product development and maintenance to bring more efficient products to market. In particular, aircraft manufacturers are expected to develop more energy-efficient products and explore alternative fuel options. Innovative industry leaders can benefit from new market opportunities, while industry laggards that do not meet consumer demands face significant business risks. Currently, there is room for improvement since products with a very clear sustainable dimension still account for a relatively low share of the A&D companies' portfolios. Therefore, we consider the current industry's performance as weak. However, we see a positive outlook and expect that Sustainable Products and Services will further gain significant importance as a key ESG issue.

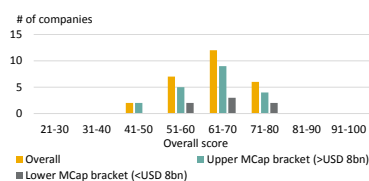
Industry leaders

Company	Country	Score
Bombardier, Inc.	Canada	78.2
MTU Aero Engines Holding AG	Germany	74.6
Airbus Group	Netherlands	74.4
Thales	France	70.9
Northrop Grumman Corporation	United States	70.7
Rolls Royce Holdings plc	United Kingdom	70.0
United Technologies Corp.	United States	69.2
Lockheed Martin Corporation	United States	68.8
Raytheon Co.	United States	67.6
Cobham plc	United Kingdom	67.5

Selective results of our bottom-up analysis

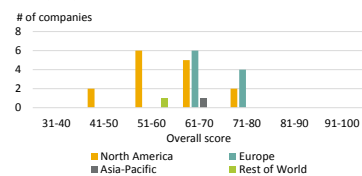
Industry leaders: As the best-performing company in the Aerospace & Defence industry, the Canadian Bombardier reveals an outstanding performance in terms of its social supply chain and human capital, reflecting a strong commitment to mitigate related risks. With a remarkable one-year rating increase of 17.3 points, MTU Aero Engines is the second-best company overall and the momentum leader. Best-in-class environmental standards and programmes, in combination with an immaculate environmental controversy record, assure the Airbus Group the third place.

Size breakdown



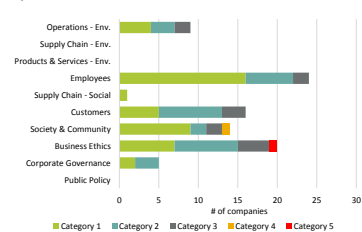
Size effect: In contrast to most other industries, the ESG performance of the A&D industry is size independent, and large companies do not systematically outperform smaller ones.

Geographic breakdown



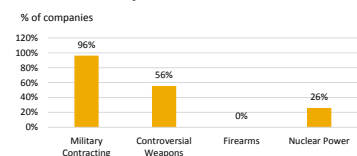
Momentum: Over the last three years, A&D companies consistently displayed positive momentum. The steadily increasing environmental performance of the A&D industry is especially noteworthy. While often criticised for its intensive environmental pollution, the industry increasingly recognises its duties and continuously strives to minimise its environmental footprint through appropriate standards and innovative products. To date, approximately 76 percent of the companies in this industry have started to address their heavy environmental impact with programmes to reduce their direct GHG emissions.

Qualitative Performance



Geographic particularities: Most A&D companies are based in North America, with a strong focus on the US (12 companies). Europe hosts ten A&D companies, and Asia-Pacific and Israel (Rest of World) have one A&D company each. In terms of regional performance characteristics, we find that European companies on average outperform their North American peers (total scores: 67 vs. 60 points).

Controversial product involvement



Differences between E, S and G: The bell-shaped distribution of ESG scores indicates that the A&D industry has developed minimum standards (in the range between 61 and 70 points) with which the majority of companies comply, while some strive to do better, and others still face problems to reach the threshold. This distribution characterises all three ESG subthemes.

Qualitative Performance (controversies): Due to the industry's high exposure to bribery and corruption risks and potential indirect involvement in human rights issues linked to the production of weapons delivered to areas of conflict, Business Ethics as well as Society and Community are subject to the most intense controversies and pose the highest risks to the company.

Controversial product involvement: Our analysis of the industry's involvement in ethically controversial products reveals that 14 out of the 27 listed A&D companies produce or sell controversial weapons. Furthermore, 26 percent reveal business relationships with the nuclear industry, though no company is directly involved in the production of nuclear bombs.

Industry Trends

Growth opportunities and dependencies

The Aerospace & Defence industry is characterised by growing consumer demand in emerging markets, product innovation pressure, a dependency on highly skilled employees and a strict regulatory environment. While aircraft manufacturers benefit from a growing demand especially attributed to the new wealth of emerging markets, defence companies are dependent on government expenditures and are lately under some pressure due to budget cuts in the US and Europe. Furthermore, Aerospace & Defence companies are confronted by a comprehensive regulatory framework covering such areas as governance, trade, procurement and environmental regulation. Here, the dual role played by government actors in their interactions with Aerospace & Defence firms becomes evident: companies depend on governments to be both customer and regulator. Thus, the industry is placed in an area of tensions and expected to meet the challenging demands of consumers, regulators and employees.

Demand side – Two different ballgames

Commercial airlines: Emerging Market growth and fuel efficiency

Global passenger travel demand quintupled over the past 30 years

The Aerospace & Defence industry features commercial airlines and defence departments/governments as its most relevant customer groups. The commercial airline industry has recovered from the global recession of 2008. According to the International Air Transport Association (IATA), 2012 was a record year for new aircraft delivery, with a total of 1,374 jets and turboprops delivered (IATA, 2013). Two notable developments sustain the demand for commercial aircraft: a growth in passenger numbers from emerging markets and continuously high fuel prices. Calculations performed by Deloitte estimate that global passenger travel demand increased by 396 percent, and load factors grew by 15.4 percent from 1981 to 2012 (Deloitte, 2014).

Demand for more fuel-efficient aircraft has significantly grown in recent years

The bulk of this growth is attributed to the new wealth of emerging markets, particularly to demand from India, China, the Middle East and the Asia-Pacific region. Indeed, Dubai-based Emirates is currently the largest customer of the A380, the world's largest-capacity passenger jet, and three of the four Boeing 777X launch customers are Middle East airlines: Etihad, Qatar and Emirates (Bloomberg, 2014 and PWC 2014). IATA estimates that air traffic will continue to grow in the coming years, at a rate of up to 5.3 percent annually until 2016. However, rising fuel costs continue to impact the commercial airline industry's prosperity. Deloitte predicts that fuel costs are expected to represent 31 percent of airlines' total operating costs in 2013 (Deloitte, 2014). Thus, customer demand for more fuel-efficient aircraft has significantly grown in recent years. The Boeing 737MAX and A32neo are both prime examples of aircraft with strong order activity for new, re-engined models promising fuel efficiency improvements of at least 15 percent.

World military expenditures have fallen by 1.9 percent in 2013

Defence departments: US budget cuts put industry under pressure

The second largest Aerospace & Defence customer group to consider comprises the defence departments of national governments. Defence companies are dependent on government expenditures and are lately under some pressure due to budget cuts in the US and Europe. The Stockholm International Peace Research Institute (SIPRI) assesses that world military expenditures have fallen by 1.9 percent in real terms over the course of 2013, a higher rate of decrease than the 0.4 percent decline in 2012. The US defence budget warrants a significant amount of attention and importance relative to its international peers. In 2013, it amounted to 37 percent of the total military expenditure of the 15 states with the highest recorded expenditures for that year. Correlatively, if the US is excluded from global calculations, the overall trend is a rise of 1.8 percent for 2013, despite decreases in Europe and elsewhere. In 2014, the US government announced its intention to cut military expenditures. Thus, defence companies, in particular those based in the US, will face a worsening budget environment. Larger companies are coping by aggressively downsizing and cost-cutting, while smaller companies are facing ever-growing challenges. Evidently, US budget sequestration continues to play a decisive role for the industry's prosperity.

US military strategy changes – implications for different product types

Recent developments in US foreign and national security policy/strategy are further driving changes in demand. After ceasing its engagements in Iraq and Afghanistan, the US initially shifted its focus to deterring nuclear threats in the Korean peninsula and Iran. In 2014, however, new geopolitical challenges have emerged with the rise of the Islamic State as well as Russia's aggressive role in the Ukraine conflict.

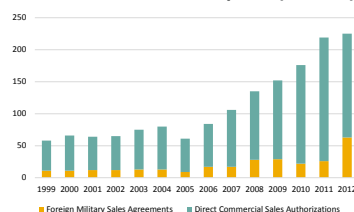
Spending on Unmanned Aircraft Systems likely to increase

Recent revisions of the national military strategy have also emphasised a "Pivot to the Pacific" plan (US DoD, 2013). As such, the US Pacific Command's capabilities will shift to submarines and fifth-generation fighter jets such as F-22s and F-35s, in addition to reconnaissance platforms (AIA, 2013). Consequently, defence companies should expect a smaller budget with a focus on next-generation intelligence, surveillance and reconnaissance (ISR) systems. Indeed, the Aerospace Industries Association (AIA) predicts that spending on Unmanned Aircraft Systems (UAS) will nearly double in the decade following 2013, from USD 6.6bn to USD 11.4bn annually, ultimately reaching USD 89bn during the ten-year period (SIPRI, 2013).

Emerging market demand – becoming more significant

US military focus is not the only variable gaining importance in Asian markets. In fact, regional players in Asia, South America and Africa increased their military spending over 2013 (AIA, 2013). Consequently, Aerospace & Defence firms are expected to respond to additional direct demand from the same regions now attracting Department of Defense (DoD) attention. These players include China, India, Brazil and other emerging economies that continue to increase defence expenditures in real terms and upgrade the sophistication of their defence industries. In recognition of this development, Obama's administration began Export Control Reform in 2013, deleting commercial satellites from the US Munitions list and initiating reviews of other commercial technologies (KPMG, 2013).

Growth of US defence exports (USD bn)



Source: PwC, 2014

Entry into foreign markets comes at the price of sometimes strict indigenous procurement guidelines

Entry into foreign markets comes at the price of sometimes strict indigenous procurement guidelines. One example is the Indian defence market, with a required domestic value creation share of 30 percent. The country's low-cost manufacturing and labour services are attractive but offset to some degree by a limit of 26 percent on foreign direct investment and a shortage of aeronautical engineers (McKinsey, 2013 and CWR, 2014). Some solutions have already emerged, such as the expansion of joint ventures and partnerships, as demonstrated by **Rolls-Royce** and Tata Consultancy Services or **BAE Systems** and HAL. International collaboration will be crucial to the future of defence firms going forwards.

A&D – A highly regulated industry

Problematic dual role of governments

A&D companies face a comprehensive regulatory framework

Aerospace & Defence companies are regularly confronted by a comprehensive regulatory framework covering such areas as governance, export and trade, procurement and environmental regulation. The business impact of these can be significant. Companies responsible for breaching trade regulations, for example, such as the United States Arms Export Control Act, the UK Arms Export Control Policy, the EU's Code of Conduct on Arms Export and the War Weapons Control Act in Germany, face significant financial and operational risks. Companies risk severe fines and loss of business if blacklisted from government contracts.

Focus on bribery and corruption

Another major layer of regulatory enforcement is focused on bribery and corruption. Here the dual role played by government actors in their interactions with Aerospace & Defence firms becomes evident: companies depend on governments to be both customer and regulator. This duality is one of several factors fueling a perception of the industry as vulnerable to fraud and exposed to bribery- and corruption-related risks. However, in a heavily competitive environment, companies have the opportunity to differentiate themselves as reliable and transparent market players.

Transparency initiatives

Driven by international conventions, investor scrutiny and public concern, defence companies are increasingly required to tightly monitor and report on their arms sales. Initiatives to promote greater transparency, for example, include the International Forum on Business Ethical Conduct for the Aerospace and Defence Industry (Ibpec). The forum provides a meeting point for industry collaboration on best practice and published its first Public Accountability Report in 2012. The report details members' commitments to uphold industry-specific "Global Principles", in addition to several pieces of applicable legislation, such as the US Foreign Corrupt Practices Act (FCPA), the UK Bribery Act, the Organisation for Economic Co-operation and Development (OECD) Anti-Bribery Convention, the Dodd-Frank Act and the United Nations Convention against Corruption (UNCAC).

High exposure to bribery and corruption risks

In short, Aerospace & Defence firms are obliged to conform to a highly regulated environment with regards to bribery and corruption. However, this same environment also provides opportunities for firms to signal commitment beyond regulatory necessity while simultaneously encouraging competitive advantage and higher industry standards.

Controversial weapons – Strengthening control mechanisms and increased transparency

Regulation based on ethical norms

Another dimension within the industry's regulatory setting is determined by the international norms that have been developed with regard to weapons considered to be ethically unacceptable. For these weapons the umbrella term and label "Controversial Weapons" is now widely used and well established. Controversial weapons encompass:

- Anti-personnel landmines;
- Biological and chemical weapons;
- Cluster weapons;
- Depleted uranium munitions;
- Nuclear weapons;
- White phosphorus weapons.

Major investors have established explicit policies excluding producers of controversial weapons

Failure to consider international conventions regarding controversial weapons could restrict companies' access to capital, given that some major investors, such as the Norwegian Government Pension Fund, have established explicit policies excluding producers of controversial weapons. In 2013, for instance, the fund excluded **Alliant Techsystems** and **Lockheed Martin** due to their involvement in the production of nuclear weapons. At present, Sustainalytics' research indicates that 14 out of the 27 listed A&D companies analysed in this sector report produce or sell controversial weapons. The issues around A&D companies' involvement in the production and sale of controversial weapons are discussed in more detail in one of the Spotlight sections of this report (see p. 16).

New regulation: Arms Trade Treaty (ATT) will enter into force in December 2014

Controversial use of conventional weapons

While the nature of controversial weapons has placed them under international scrutiny, conventional weapons are increasingly receiving similar attention in a human rights context. The numbers speak for themselves. Conventional weapons, particularly small arms like the AK-47, account for 90% of all civilian casualties (in absolute numbers: 400k) in armed conflicts (Global Issues, 2014), significantly outpacing controversial weapons. Recognising the need for more comprehensive regulation, on 24 September 2014 the international community ratified the United Nations Arms Trade Treaty (ATT). The ATT legally binds arms-exporting countries to report arms sales and transfers. As such, affected states are obliged to assess whether the weapons they sell can be used to further human rights abuses and violations of international humanitarian law. As a result, the degree of sophistication already present in national control measures is set to closely influence firms' reporting and transparency mechanisms. As of October 2014, the treaty has been signed by 121 states and ratified by 53. It will enter into force in December 2014.

What can investors do?

For investors, investing in A&D companies that have contributed to human rights violations by sending weapons to controversial end users is a reputational risk. Companies like **Elbit Systems** and **BAE Systems** have already been criticised for their roles in arming Israel. Furthermore, a growing number of countries have started implementing legislation prohibiting to some degree investments in anti-personnel mines and/or cluster weapons. What can investors do? Engaging with companies, of

course, is one option. In practice, this is, however, limited to arms-trade-related issues rather than to controversial products as such. Another option is divesting from controversial weapons producers, which is a growing trend going beyond regulatory compliance.

Regulatory regimes are only just beginning to address the issue

Drones and Human Rights

Other specialised product areas have claimed stakeholder attention of late. The use of unmanned aerial vehicles (UAVs), colloquially known as drones, has been subjected to significant public scrutiny and debate in various international and national bodies. Regulatory regimes are only just beginning to address the issues associated with their use. As of yet, the users, but not the producers, of drones have been exposed to legal action in light of human rights violations associated with drones. However, manufacturers such as **Northrop Grumman**, **Boeing** and **Lockheed Martin** may also eventually become targets in the future and face stricter regulatory frameworks. In the short term, the commercial sale of drones may be affected by new regulatory developments, such as selective US state laws prohibiting the use of drones in domestic airspace. The controversial issues around drones are discussed in more detail in one of the Spotlight sections of this report (see p. 19) and in a comprehensive study published in May this year (Sustainalytics, 2014).

Conflict minerals are used in several aerospace components

Non-industry-specific regulation

Conflict minerals

In July 2010, a statement on conflict minerals was added to Section 1502 of the Dodd-Frank Wall Street Reform and Consumer Protection Act. In 2014, all public companies listed in the US have to disclose whether they use conflict minerals (tantalum, tin, tungsten and gold) and whether these minerals originated from the Democratic Republic of Congo or adjoining countries. Conflict minerals are used in several aerospace components with various applications, such as metal wires, jet engines, capacitors or heating and welding applications. Thus, A&D companies are required to implement supply chain due-diligence systems.

GHG emissions regulations push energy efficiency of aircraft engines

GHG emissions

Furthermore, legislation pertaining to climate change and emissions holds particular influence over design, as the industry has yet to adopt a widespread, competitive replacement for kerosene-based jet fuel. Consequently, aircraft efficiency remains the most viable measure to comply with emissions laws and in turn holds significant clout over research and development allocations. Of note in this domain is the dynamic relationship between the commercial aerospace industry and the EU's Emission Trading Scheme (ETS). In 2008, the EU decided to include aviation under the ETS umbrella by 2012 (PWC, 2012). In the meantime, the EU has limited the scope of the ETS to flights within Europe until 2016, with exemptions for operators with low emissions (European Commission, 2014). The consequences of this uneven application could include distortions in market competitiveness, with advantages for operators omitted from the ETS. However, the results of such speculations are not concrete, nor do they describe clear repercussions for Aerospace & Defence companies.

Human Capital – Dealing with skilled labour shortages

Dependence on a highly qualified workforce

Aerospace & Defence companies depend on a highly qualified and skilled workforce to drive innovation and competitiveness. As such, industry concerns surrounding a projected lack of talent are significant. Companies like **Airbus** report that they could not fill vacancies in previous years due to a shortage of skilled workers. The talent pool in Europe is considered to have become especially small (The China Post, 2012). In the US market, the industry faces the challenge of balancing budget cuts with the need to guarantee future capacity for innovation. Aviation Week's 2013 workforce survey projected that more than 36 percent of responding companies had planned layoffs for the year, but their strategies remained committed to minimising the impact on technical workforces. A second cited strategy was juggling labour distributions to minimise costs by shifting workers from lagging defence operations to soaring commercial projects. Indeed, **Boeing**, one of the industry's largest companies, had already shifted 7,500 employees from defence to commercial operations by 2013 (Aviation Week, 2013).

Decreasing talent pool in Developed Markets

Furthermore, the consolidation of facilities and partnerships abroad has also raised questions about the future composition of the global Aerospace & Defence labour force. The Aerospace Industries Association (AIA) estimates that approximately one third of American bachelor degrees are in science or engineering, considered low compared to the ratio in Asian countries (63 percent in Japan, 59 percent in Singapore and 56 percent in China) (AIA, 2013). Thus, companies based in developed markets like the US need to map potential future workforce concentrations, as Aerospace & Defence firms are often limited by security constraints hindering their capacity to hire foreign nationals. AIA also approximates that more than 50 percent of Aerospace & Defence companies depend on a highly qualified and skilled workforce to drive innovation and competitiveness.

New challenges: balancing an inter-generational workforce

Aerospace & Defence companies also face the dilemma of maintaining an inter-generational workforce balance. Specifically, companies need to attract new graduates while simultaneously providing for employees of retirement age. In 2012, eight percent of the US Aerospace & Defence workforce was eligible to retire, but only one percent actually did. This dilemma puts new constraints on a firm's flexibility with regards to recruitment and retention strategies.

Product innovation – Growing pressure

Drivers: increasing competitiveness, restricted military budgets and rising commodity prices

Aerospace & Defence products often have very long life cycles. For instance, 43 percent of the US Air Force's active aircraft fleet is over 24 years old. Though this trend for long product life might at first seem to indicate low industry pressure for innovation compared to such industries as Automobiles and Technology Hardware, where products have significantly shorter lifespans, A&D innovation has traditionally required extended periods of time for product development. However, increasing competitiveness, restricted military budgets and rising commodity prices have resulted in constantly growing pressures for product innovation. In particular, innovation has been driven largely by greater efficiency demands from the industry's customers. Specifically, resource conservation and efficiency have become increasingly

synonymous with cost reduction and business success. The development of efficient products also drives competitiveness and sets the benchmark for industry standards. As such, commercial aerospace is expected to keep pace with International Civil Aviation Organization (ICAO) targets in fuel efficiency, including a call for 1.5 percent average annual efficiency gains until 2020 and cutting net emissions in half by 2050, compared to 2005 levels (IATA, 2013). Following demand, large market players such as **Boeing** and **Airbus** as well as their main suppliers (e.g. Rolls-Royce) have shifted gears to focus on engine improvements and lighter materials.

R&D on sustainable aviation fuel

The commercial aerospace industry has also continued to invest in research and development for biofuels. Again, both Airbus and Boeing have taken initiatives to signal their commitment to sustainable fuel. **Airbus** is a founding partner of the European Advanced Biofuels Flightpath, a consortium that believes a two million tonne target for the production and consumption of sustainable aviation fuels is attainable by 2020 (Airbus, 2014). For its part, **Boeing** is a founding member of the Sustainable Aviation Fuel Users Group and recently engaged stakeholders on the benefits of using halophytes to create biofuel. Halophytes are a group of plants characterised by their ability to grow in waters of high salinity as well as arid desert climates. Consequently, as research conducted in tandem with Honeywell and Etihad suggests, biofuels derived from these plants would not compete with crops for fresh water or arable land and thus may become invaluable sources of sustainable fuel (Energypost, 2014 and Boeing, 2014).

Customer pressure for green innovation

Defence departments have also identified energy efficiency and alternative energy resources as important research and development tracks. The US Department of Defense has stated that it considers climate change a challenge to security and geopolitical stability, yet it spends USD 15bn annually on fuel, a sum roughly equivalent to France's annual defence procurement spending. For its part, the US Air Force aims to obtain half of its domestic jet fuel from alternative sources by 2016. It has already approved its entire Boeing C-17 Globemaster III fleet for unrestricted flight operations with a biofuels blend (Boeing, 2014). Thus, Aerospace & Defence companies face customer pressure for green innovation and the development of more energy-efficient products.

Strong link to our key ESG issues

Taking sustainability and business impact perspectives into account

The current business context in which Aerospace & Defence companies operate is characterised by some of the key ESG issues Sustainalytics uses to evaluate companies in this industry. Several key ESG issues are directly linked to industry trends, like the comprehensive regulatory environment on Bribery and Corruption. This key ESG issue stands from a business impact perspective, since it can be attributed to regulatory, legal and reputational risks. Product Quality and Safety and Sustainable Products and Services are considered key issues due to customer expectations for innovative, safer products with a lower environmental impact. Companies failing to present themselves as industry leaders face reputational and legal risks and may miss future growth opportunities, especially regarding sustainable products.

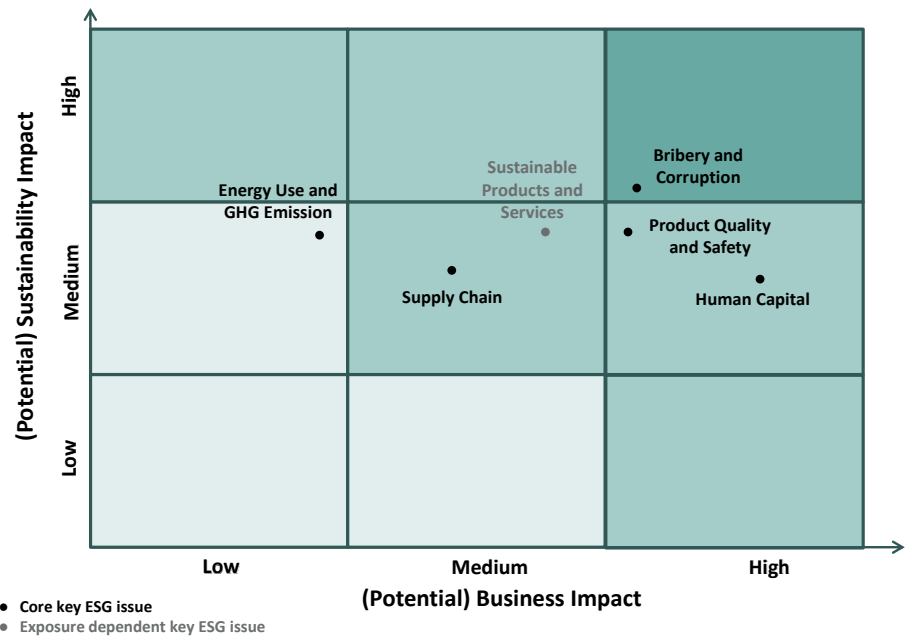
Hiring capability and extensive global supply chain

Furthermore, Human Capital is a key ESG issue, as poor labour relations management and related controversies pose operational and reputational risks, resulting in a lower hiring capability. From a sustainability impact perspective, Sustainability also looks at the key ESG issues Energy Use and GHG Emissions and the management of the Supply Chain. GHG Emissions are directly linked to energy costs. Companies managing to reduce their carbon footprint can therefore benefit from reduced operational costs. Since the Aerospace & Defence industry has an extensive global supply chain, the integration of social and environmental criteria in the management of suppliers is considered an important step to mitigate operations-related risks and promote best practices in the supply chain. The integration of environmental standards in procurement decisions is likely to impact future business, as consumer expectations towards fuel efficiency improvements of aircrafts have grown. Companies that do not adjust to this trend face business risks.

The following chart shows the positioning of the six most significant issues with regard to their Sustainability- and Business Impacts that we have identified for the Aerospace & Defence industry. All issues are discussed in detail in the “Key ESG Issues” chapter of this report (see p. 29).

Materiality Matrix Aerospace and Defence

Our Materiality Matrix summarises the Sustainability and Business impacts of the key ESG issues we’ve identified



Source: Sustainalytics

Spotlight

Controversial Weapons – A case for divestment?

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The A&D industry is a highly regulated industry in many respects, with international norms on “ethically unacceptable” weapons forming an important part of the industry’s regulatory framework. Failure to consider international conventions regarding controversial weapons could restrict companies’ access to capital, given that some major investors, such as the Norwegian Government Pension Fund, have established explicit policies excluding producers of controversial weapons. In 2013, for instance, the fund excluded Alliant Techsystems and Lockheed Martin due to their involvement in the production of nuclear weapons.

A&D lethal products – Exposure to an ethical dilemma

More than 20 years have elapsed since the idea of the “End of History” (Fukuyama, 1989) became a popular belief following the breakdown of the Soviet Union.¹ Nevertheless, warfare is still considered the “ultima ratio” of geopolitical strategies, and even more so in solving conflicts at a regional level. The Ukraine and Gaza conflicts in 2014 are perfect examples of this.

We distinguish between seven types of controversial weapons

The reality is that despite cuts in the US and some European military budgets, the market for the A&D industry’s lethal products is still a very lucrative one, and nothing indicates that this will change in the foreseeable future. Of course, it comes as no surprise that companies and investors who benefit financially from warfare are confronted with fundamental ethical resistance in modern society. At the political level, the societal debate has been echoed in international agreements; however, a “lowest common denominator” approach appears to be taken in the development of norms on the ethical acceptability of certain types of weapons. The weapons of most concern are those now widely referred to as “Controversial Weapons”, which encompass:

- Anti-personnel landmines;
- Biological and chemical weapons;
- Cluster weapons;
- Depleted uranium munitions;
- Nuclear weapons;
- White phosphorus weapons.

Indiscriminate and disproportionate impact on civilians

Why are these weapons, no more deadly than others, considered particularly controversial? In a nutshell, these weapons are controversial because of the indiscriminate and disproportionate impact they have on civilians.

UN conventions on controversial weapons – not all relevant countries are signatories

Relatedly, the regulatory environment for companies is determined by four United Nations conventions on controversial weapons: (1) the Anti-Personnel Mine Ban Convention; (2) the Biological Weapons Convention; (3) the Chemical Weapons Convention; and (4) the Cluster Munitions Convention. These conventions

comprehensively prohibit involvement in these four types of weapons in the countries that have signed the treaty. However, not all countries are party to all four conventions, with the notable exceptions of China, India, Russia and the United States, who failed to sign both the Anti-Personnel Mine Ban Convention and the Cluster Munitions Convention. Furthermore, the remaining three controversial weapons (depleted uranium munitions, nuclear weapons and white phosphorus) do not have an international convention regulating their production.²

Approximately 56% of the listed A&D companies are involved in the production of controversial weapons

At present, Sustainalytics' research indicates that 14 out of the 27 listed A&D companies analysed in this report produce or sell controversial weapons. The table below displays the ten largest companies by MCap as well as their individual involvement.³

Controversial weapons – Involvement of the ten largest A&D companies (by MCap)

Company	Country	Mcaps (USD m)	Type of Involvement
Boeing Co.	United States	95,761	Nuclear Weapons
Honeywell International Inc.	United States	73,986	Nuclear Weapons
Airbus Group	The Netherlands/ France	56,538	Nuclear Weapons
Lockheed Martin Corporation	United States	50,695	Nuclear Weapons
Rolls Royce Holdings plc	United Kingdom	37,727	Nuclear Weapons
General Dynamics Corp.	United States	35,477	Depleted Uranium White Phosphorus
Safran SA	France	30,380	Nuclear Weapons
Raytheon Co.	United States	30,089	Nuclear Weapons
Northrop Grumman Corporation	United States	25,590	Nuclear Weapons
BAE Systems Plc	United Kingdom	23,273	Nuclear Weapons White Phosphorus

Source: Sustainalytics, Capital IQ

Small arms account for 90% of all civilian casualties

Conventional weapons – “More ethical”?

While the nature of controversial weapons has placed them under international scrutiny, conventional weapons are increasingly receiving similar attention in a human rights context. The numbers speak for themselves: conventional weapons, particularly small arms like the AK-47, account for 90% of all civilian casualties (in absolute numbers: 400k) in armed conflicts, significantly outpacing controversial weapons (Global Issues, 2014).

Recognising the need for more comprehensive regulation

Events such as the violent oppression of civilians during the Arab Spring and insurgencies in Sub-Saharan Africa, have called into question the relative lack of restrictions on conventional arms sales. Although one can argue that nations need military forces and weapons to enforce peace, arms sales to oppressive or unstable regimes have often ended in using weapons to kill civilians. Recognising the need for more comprehensive regulation, on 24 September 2014, the international community ratified the United Nations Arms Trade Treaty (ATT).

The United Nations Arms Trade Treaty (ATT) enters into force in December 2014

The ATT legally binds arms-exporting countries to report arms sales and transfers. Affected states are obliged to assess whether the weapons they sell can be used to further human rights abuses and violations of international humanitarian law. The

agreed-upon constraints apply to seven major categories of conventional weapons: battle tanks; armoured combat vehicles; large-calibre artillery systems; combat aircraft; attack helicopters; warships and missiles; and missile launchers; in addition to small arms and light weapons (UN, 2013). The legislation also requires states to establish national transfer control legislation, inspectorates and practical enforcement measures. As a result, the degree of sophistication already present in national control measures is set to closely influence firms' reporting and transparency mechanisms. As of October 2014, the treaty has been signed by 121 states and ratified by 53. It will enter into force in December 2014.

Implications for investors – Engage or divest?

A growing number of countries have started prohibiting investments in anti-personnel mines and/or cluster weapons

With the enforcement of the ATT for conventional weapons, investments in defence companies could present regulatory risks for investors in the near future. This has already been witnessed with regard to controversial weapons. For example, a growing number of countries have started to implement legislation prohibiting, to some degree, investments in anti-personnel mines and/or cluster weapons. Countries such as Belgium, Ireland, Luxembourg, Italy, the Netherlands and Switzerland, have implemented this legislation to variant extents. Furthermore, investments in A&D companies that have contributed to human rights violations, by sending weapons to controversial end users, pose reputational risks. Companies like **Elbit Systems** and **BAE Systems** have already been criticised for their role in providing arms to Israel (Stop The War Coalition, 2014).

Going beyond regulatory compliance

What can investors do? Engaging with companies, of course, is one option. In practice, however, this is limited to arms-trade-related issues; rather than controversial products. Another option is divesting from controversial weapons producers, which is a growing trend beyond regulatory compliance. For example, as of 2013 the Norwegian Government Pension Fund has excluded US companies **Alliant Techsystems** and **Lockheed Martin** due to their involvement in the production of nuclear weapons. We expect an increasing number of similar cases going forward which will lead to increasing pressure on all investors to explain their investment attitudes.

Spotlight

Drones and Human Rights

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The use of unmanned aerial vehicles (UAVs) or unmanned combat air vehicles (UCAVs) has been subject to significant public scrutiny and debated by various international and national bodies and courts. The years 2012 and 2013 saw a flurry of drone-related court cases and widespread attention from the media, academics and NGOs. Despite the controversy surrounding drones and their use, their advantages are making them a mainstay in both the military and commercial sectors. The significant growth in the use of UAVs in recent years has created a market that, by the end of 2012, was valued at an estimated USD 7.5bn. Some executives in Israel's defence establishment reportedly estimate that this market may be worth USD 50bn by 2020 (O'Sullivan, 2012). This Spotlight is an abstract of our study "Drones and Human Rights: Emerging Issues for Investors" published in May 2014.

Military drone users and producers

Today, as many as 87 countries use some form of military UAV (Taylor, 2013). Despite the lack of transparency on the part of many countries, notably China, Iran and Russia, regarding their use of drones, the United States dominates the market and the global supply of military drones.

As of early 2014, there are an estimated 490 UAV manufacturers based in approximately 60 countries (UAV Global, 2014). Israel was one of the first countries to develop unmanned systems (circa late 1970s) and is now the world's largest exporter and second-largest manufacturer of UAVs, selling to countries in Latin America, Asia and Africa. It has two major UAV producers catering to the defence industry: **Elbit Systems Ltd.** and **Israel Aerospace Industries, Ltd.** (IAI).

The US – by far the largest producer of UAVs

In the US roughly a dozen top UAV manufacturers and many smaller producers, produce numerous styles of drones serving different markets and purposes. However, as the commercial drone market has only recently begun to expand, the Department of Defense (DoD) remains the largest buyer, spending USD 3.1bn on drones in 2012 (Boyle, 2012).

The agencies using drone technology the most are the CIA and the US Department of Defense (DoD). The two main American military drone contractors are **General Atomics** and **Northrop Grumman**, which in 2013 accounted for 20% and 19% of the global UAV market, respectively. Other US-based producers include **Lockheed Martin**, **AAI Corporation**, **SAIC**, **Textron** and **Boeing**. To date, only General Atomics' three drone models have been used offensively: the MQ-1 Predator, MQ-9 Reaper and MQ-1C Grey Eagle. Northrop Grumman's X-47B UCAV is currently being developed as part of the US Navy's Unmanned Carrier-Launched Surveillance and Strike (UCLASS) programme and is expected to enter service in 2019.

US Department of Defense remains the largest buyer

General Atomics and Northrop Grumman together accounted for almost 40% of the global market

In addition to the main contractors, the suppliers of engines, armament, sensors and communication and software are also involved in the production of drones and thus also exposed to respective risks.

Key components of drones and the companies involved

	MQ-9 Reaper	MQ-1 Predator	X-47B
	<i>The MQ-9 Reaper is an unmanned, armed, multi-mission, medium-altitude, long-endurance aircraft.</i>	<i>The MQ-1 Predator is an unmanned, armed, multi-mission, medium-altitude, long-endurance aircraft.</i>	<i>The X-47B is an unmanned combat air vehicle. It was developed as part of the US UCLASS programme to produce an armed, autonomous system.</i>
Main contractor	General Atomics Aeronautical Systems, Inc.	General Atomics Aeronautical Systems, Inc.	Northrop Grumman (NYSE:NOC)
Engines	Honeywell International Inc. (NYSE:HON)	BRP-Powertrain GmbH & Co KG	Pratt & Whitney
Armament	Lockheed Martin (NYSE:LMT), Raytheon (NYSE:RTN), Boeing (NYSE:BA)	Lockheed Martin (NYSE:LMT), Raytheon (NYSE:RTN)	The X-47B is not yet armed
Sensors and communication	L3-Communications (NYSE:LLL), Raytheon (NYSE:RTN)	L3-Communications (NYSE:LLL), Raytheon (NYSE:RTN)	Honeywell International Inc. (NYSE:HON)
Software developer	IBM (NYSE:IBM)	IBM (NYSE:IBM)	(Unknown)
Unit cost	USD 16.9 million	USD 4.03 million	USD 813 million (entire programme)

Source: Sustainalytics

Players in other regions

Europe

In Europe, demand for domestic drone programmes is growing, and in late 2013 **BAE Systems** (United Kingdom) revealed its semi-autonomousUCAV, Taranis, which will carry a variety of armaments, will employ stealth technology and is designed to fly intercontinental missions.

China

Also, China is playing an increasingly important role in the market, driven by its significantly lower cost compared to other countries. Major manufacturers in the country include **Aerospace Science & Industry Corp. (CASIC)**, **China Aerospace Science and Technology Corporation (CASC)** and **Aviation Industry Corporation of China (AVIC)**.

India, Pakistan, Iran

Other players are likely to enter the market, with potentially far-reaching geopolitical implications. India has been working with Israel to develop its own drones, and Pakistan is reportedly doing the same with assistance from China. In the Middle East, Iran's Air Defence Unit builds combat and surveillance drones.

Controversies around drones

For investors there are a number of risks related to developments in drone technology and the current uses of drones. In the military space, these risks relate to: (1) the growing possibilities for autonomous action in identifying, following and eliminating targets, and (2) the use of drones by states outside of recognised war zones.

Lethal Autonomous Robots (LARs)

Denigrating the value of life

The development of lethal autonomous drones raises ethical questions. "Killer robots", as some have called them, lack human judgment, which may serve to restrain the lethal use of force under some circumstances. UN Special Rapporteur Christof Heyns warned that "there is widespread concern that allowing LARs to kill people may denigrate the value of life itself. Tireless war machines, ready for deployment at the push of a button, pose the danger of permanent... armed conflict" (Heyns, 2013).

Mounting resistance of civil society against “killer robots”

Academics, NGOs and international organisations such as the International Committee for Robot Arms Control (ICRAC) have been vocal in their calls for regulation and even bans on this technology, calls that have intensified in recent years. Human Rights Watch, in a recent report on the issue, recommended that states adopt national laws and policies to prohibit the development, production and use of fully autonomous weapons (Human Rights Watch, 2012). ICRAC and more than 50 organisations in 24 countries, including Human Rights Watch, Article 36 and others, have formed a coalition called “The Campaign Against Killer Robots”, which calls for a similar peremptory ban on the development of autonomous weapons. In May 2013, Christof Heyns joined the ranks of parties calling for a moratorium on the “testing, production, assembly, transfer, acquisition, deployment and use” of LARs, until an international conference can develop rules for their use (Christof Heyns, 2013).

Only five countries called for a pre-emptive ban on fully autonomous weapons

In May 2014, the first attempt at a moratorium took place in an informal meeting, under the auspices of the UN Convention on Certain Conventional Weapons (CCW). During the week-long conference, diplomats from 87 countries, as well as experts from civil society, discussed the issue of fully autonomous weapons systems. The meeting provided a platform where experts attempted to define autonomy, discussing the necessary degree of human control and the human rights implications. While numerous countries, including Germany, France and the Netherlands, agreed that meaningful human oversight is needed, only five countries called for a pre-emptive ban on fully autonomous weapons, namely: Cuba, Ecuador, Egypt, the Vatican and Pakistan.

Up to about 4,700 people have been killed in Pakistan, Somalia and Yemen

Targeted killings in non-conflict territories

While the majority of drone strikes have been conducted within the context of conventional armed conflict, the US has publicly asserted the right to conduct lethal counter-terrorism operations outside of conflict zones. The Bureau of Investigative Journalism (TBIJ) has reported that, as of March 2014, up to about 4,700 people had been killed by drone strikes in Pakistan, Somalia and Yemen (The Bureau of Investigative Journalism, 2014).

In February 2014, the European Parliament adopted a resolution urging the Council of Europe to adopt a common EU position on the use of armed drones. In the resolution, the European Parliament concluded that “drone strikes outside a declared war by a State on the territory of another State without the consent of the latter or of the UN Security Council constitute a violation of international law and of the territorial integrity and sovereignty of that country” and expressed its “grave concern over the use of armed drones outside the international legal framework”.

In 2013 drone strikes accounted for 40% of all civilian casualties from air strikes

Following a request by Pakistan and two permanent members of the UN Security Council, the UN Human Rights Council launched an official inquiry into the use of drones in counter-terrorism operations in January 2013. The report, completed by Special Rapporteur Ben Emmerson in March 2014, noted that in 2013 drone strikes accounted for 40% of all civilian casualties from air strikes, and concluded that states responsible for drone strikes have a duty to conduct inquiries into all drone strikes where civilians have been, or appear to have been, killed. The same month, the UN

Human Rights Council adopted a resolution to study whether American drone strikes were in compliance with international law (Emmerson, 2014).

Risks for companies and investors

The human rights issues outlined above can pose reputational, regulatory and other risks for companies and may have material consequences for companies and investors.

Legal and regulatory risks

Companies have not yet been affected, but legal risks cannot be ruled out

To date, court cases addressing drone use have targeted only governments, both for using drones (as in the cases of the US and UK) and for failing to protect citizens from drones on their territory (as in the case of Pakistan). Companies that produce drones have not yet been affected, and, in the short term, it is unlikely that they will be exposed to legal action as a result of alleged human rights violations by the end users of drones. However, with an increasing number of legal venues that adjudicate business and human rights cases, the possibility that companies may eventually become the targets of human rights court cases relating to drone use cannot be ruled out.

The extent to which future legislation may impact companies will vary significantly

Calls for bans on fully autonomous weapons may eventually give rise to legislation on this issue at both national and international levels. Given the significant expenses involved in the development of fully autonomous systems, such bans have the potential to affect returns on research and development in the medium and long term. The extent to which future legislation may impact companies will vary significantly. Large defence companies like **Northrop Grumman**, **Boeing** and **Lockheed Martin** derive only a very minor portion of their revenues from drone sales.

Reputational Risks

Public criticism of how military drones are used is significant, both within the US and at the international level. A survey conducted by the Pew Research Center's Global Attitudes project found that "[i]n 17 out of 20 countries surveyed, more than half the population disapproved of U.S. drone attacks targeting extremist leaders and groups in nations such as Pakistan, Yemen and Somalia".

Increasingly, investors are being held accountable for the human rights impacts of their investments

The use of drones in ways that violate human rights, such as for targeted killings outside recognised war zones, exposes companies to public criticism and allegations of complicity in human rights violations, with corresponding reputational risks. Investors in companies involved in drone production may in turn be exposed to these risks through their investments. Increasingly, investors are being held accountable for the human rights impacts of their investments.⁴ In November 2012, UK-based NGO Reprieve called on several large insurers and pension funds, including PensionDanmark, the Norwegian Government Pension Fund and insurers Legal & General, Old Mutual and Axa, to divest from firms producing combat drones.

Risks may also arise from the vulnerability of drones to hacking

Risks may also arise from the vulnerability of drones to hacking. In 2009, US defense officials told reporters that Iranian-backed militias used software to intercept video feeds of drones flying over Iraq, and in 2011 a virus was reported to have infected drone control systems at Creech Air Force base in Nevada (Joshua Foust, 2013). These

incidents raise concerns about not only the safety, security and reliability of unmanned aircraft but also the privacy and the security of data stored by drones.

Addressing risks

Human rights – the responsibility of companies and investors

Although the primary responsibility to protect human rights rests with states, frameworks such as the UN Global Compact and UN Guiding Principles on Business and Human Rights (the Ruggie Framework) also emphasise the responsibility that businesses have to respect human rights. This responsibility includes the duty to comply with international human rights norms as well as to avoid complicity in violating the human rights of others.

This responsibility is not limited to corporations but extends to investors, who have faced increasing exposure to allegations of involvement in human rights violations linked to their investments. In 2013, both the Dutch and Danish National Contact Points for the OECD Guidelines pointed out the responsibility of investors to conduct human rights due diligence with respect to their investments, even where they are minority shareholders.

Best practice for investors

The human rights issues surrounding drone use are largely the result of actions by states and third parties, giving rise to the possibility of corporate complicity in human rights violations. While many investors have policies excluding producers of cluster bombs and land mines, both of which are banned by UN treaties, few have taken serious steps to assess the human rights implications of investments in drone producers. To limit their exposure to human rights and reputational risks, investors are encouraged to:

- Remain aware of risks and keep abreast of legal and regulatory developments;
- Formulate a stance on drones, defining high-risk uses and high-risk end users;
- Engage with companies to address the regulatory and human rights-related risks to which they are exposed.

Identify risks and engage with companies

As part of human rights due diligence, investors are encouraged to identify a number of points that will enable them to ascertain the extent to which drone producers may be linked to human rights violations. This includes efforts to identify the countries to which a company has sold drones, where they are being used, what steps a company is taking to assess the possible adverse human rights impacts of drone sales and what policies they have in place to define responsible behaviour with respect to drone use in accordance with international law.

Investors are also encouraged to engage with drone producers to raise awareness of human rights risks involved in the production and sale of drones and improve company preparedness in dealing with these issues, mitigating their exposure to complicity in human rights violations.

Bottom-Up Analysis

Interpreting the numbers

Universes we look at: Developed Markets and Emerging Markets

On the following pages, we provide an overview of company performance within the industry “Aerospace & Defence” (A&D), according to the GICS classification. We focus on listed equities in Developed Markets (DM).

Structure of our evaluation: three ESG themes and four management dimensions

Our evaluation is based on the classic three-pillar structure used in responsible investment analysis, consisting of the three main themes: Environment, Social and Governance. The number of indicators to assess each theme, as well as their respective weights, are industry specific, reflecting their materiality for the analysed companies and for relevant stakeholders. Furthermore, these indicators represent four different management dimensions in our ESG analysis: Disclosure; Preparedness (policies, programmes, etc.); Quantitative Performance (employee turnover rates, environmental emissions figures, etc.); and Qualitative Performance (controversies). For the Aerospace & Defence industry, we work with a total of 62 indicators.

Aerospace & Defence – Industry-specific weight matrix*

Theme	Weight / # Indicators	Dimension			
		Disclosure	Preparedness	Quantitative Performance	Qualitative Performance
Environment	35%	4.6%	36.9%	20.0%	38.6%
	18	2	8	5	3
Social	35%	0.0%	38.6%	24.3%	37.1%
	22	0	11	7	4
Governance	30%	11.7%	54.2%	0.0%	34.2%
	22	5	14	0	3

* Representing the weight of themes within the overall rating and for the dimensions associated with the themes

Source: Sustainalytics

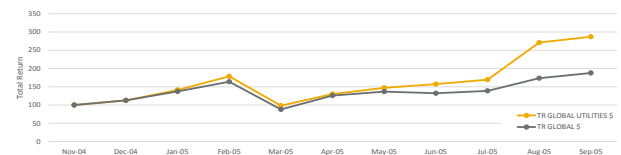
How ESG scores are computed and aggregated

The raw scores we allocate at the indicator level range from 0-100 points. They are then multiplied by their appropriate weights, summed up and recalibrated to arrive at scores at the different aggregation levels, including the individual ESG theme scores and the overall ESG score. Based on their scores, companies are allocated to five distinct performance groups: Industry Leader; Outperformer; Average Performer; Underperformer; and Industry Laggard, according to their relative position within the industry and assuming a normal distribution of scores. For a more detailed description of our methodology, please see the Appendix.

Results Overview

Universe analysed: **DM Aerospace & Defence**
 Number of constituents: **27**
 Total Sustainalytics coverage: **39 companies**
 Updated: **22 October 2014**
 Source company data: **Capital IQ**

Stock market performance



Source: Thomson Reuters Datastream

Industry leaders

- 78** Overall ESG score
Bombardier, Inc.
- 87** Environment score
Airbus Group
- 82** Social score
Bombardier, Inc.
- 82** Governance score
Northrop Grumman Corporation

The Canadian aircraft and train manufacturer **Bombardier** is the industry leader and therefore the most sustainable company in the Aerospace & Defence industry. The company reveals an outstanding social supply chain and human capital performance, reflecting a strong commitment to mitigate related risks.

Best-in-class environmental standards and programmes, in combination with an immaculate environmental controversy record, assure the **Airbus Group** the first place in the environmental subtheme.

Finally, the **Northrop Grumman Corporation** applies the most pronounced governance and disclosure standards.

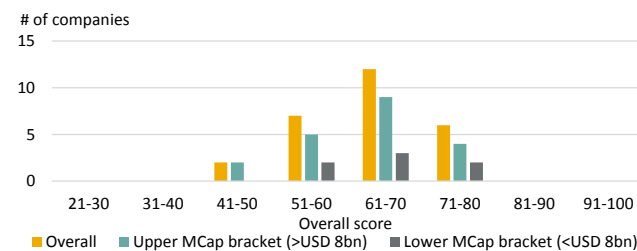
Overall ESG Score and Size

Top 5 companies upper MCap bracket (>USD 8bn)	Country	MCap (USD m)	Score
Airbus Group	Netherlands	56,538	74.4
Thales	France	13,554	70.9
Northrop Grumman Corporation	United States	25,590	70.7
Rolls Royce Holdings plc	United Kingdom	37,727	70.0
United Technologies Corp.	United States	103,220	69.2

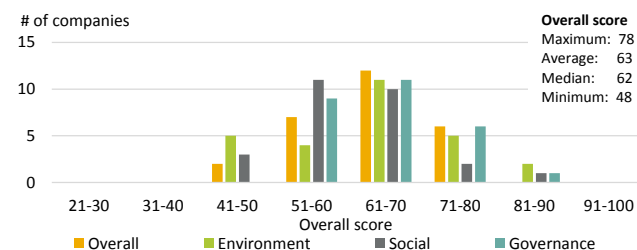
Top 5 companies lower MCap bracket (<USD 8bn)	Country	MCap (USD m)	Score
Bombardier, Inc.	Canada	6,403	78.2
MTU Aero Engines Holding AG	Germany	4,407	74.6
Cobham plc	United Kingdom	5,388	67.5
Finmeccanica SpA	Italy	5,416	62.8
Meggitt plc	United Kingdom	7,041	61.7

Distribution of Scores

Distribution by MCap bracket



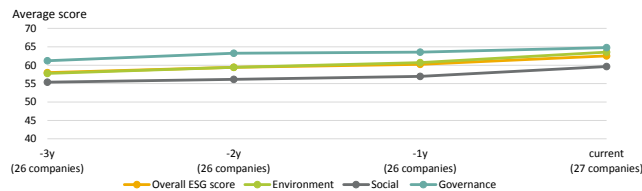
Distribution by ESG theme



In contrast to most other industries, the ESG performance of the A&D industry is size independent, and large companies do not systematically outperform smaller ones. The average ESG performance of the lower MCap companies is 65 points, slightly higher than the average of 62 points for the upper MCap companies. Furthermore, as shown in the table above, **Bombardier** and **MTU Aero Engines** have a relatively low MCap but are the two overall best-performing companies in the industry.

Another particularity of the A&D industry is its bell-shaped distribution of ESG scores, indicating that the industry has developed minimum standards in the range between 61 and 70 points with which the majority of companies comply, while some strive to do better, and others still face problems to reach the threshold. The bell-shaped distribution of scores is persistent among the three ESG subthemes.

Momentum ESG Scores



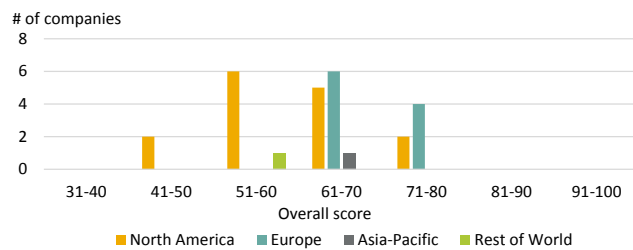
Momentum Leaders (highest yoy performance)	Score: current	-1y	change
MTU Aero Engines Holding AG	74.6	57.4	17.3
Singapore Technologies Engineering Ltd.	61.7	54.6	7.1
Northrop Grumman Corporation	70.7	65.2	5.5
Zodiac Aerospace SA	61.2	56.3	4.9
United Technologies Corp.	69.2	64.4	4.7

Momentum Laggards (lowest yoy performance)	Score: current	-1y	change
Boeing Co.	59.5	63.1	-3.6
Rockwell Collins Inc.	66.7	67.6	-0.9
TransDigm Group Incorporated	47.8	48.2	-0.5
Precision Castparts Corp.	50.4	50.8	-0.4
Honeywell International Inc.	55.6	55.5	0.1

Over the last three years, DM A&D companies consistently displayed positive momentum. Of particular importance in this regard is the steadily increasing environmental performance of the A&D industry. While often criticised for its intensive environmental pollution, the industry increasingly recognises its duties and continuously strives to minimise its environmental footprint through appropriate standards and innovative products.

Especially noteworthy is the upgrade of **MTU Aero Engines**, which improved its rating within one year by 17.3 points to 74.6 points, becoming the second-best DM company. The company strengthened its ESG performance by implementing programmes in the areas of human capital management, anti-corruption and product quality management.

Rating Distribution by Region



Most DM A&D companies are based in North America (15 companies), with a strong focus on the US (12 companies). Europe hosts an additional ten A&D companies, and finally, Asia-Pacific and Israel (Rest of World) have one A&D company each.

In terms of geographical performance characteristics, the figure on the left reveals a remarkable difference between North American and European companies, with the latter clearly outperforming the former (67 vs. 60 points). The main driver for this gap is the relatively low environmental score of North American companies, which is especially pronounced when it comes to their quantitative performance.

Disclosure, Preparedness, Performance – Industry leaders

88

Disclosure

Northrop Grumman Corporation

69

Preparedness

Bombardier, Inc.

75

Quantitative Performance

Bombardier, Inc.

In addition to dividing sustainability scores into three ESG themes, Sustainalytics also considers four dimensions: Disclosure; Preparedness; Quantitative Performance; and Qualitative Performance. These dimensions assess a company's ability to address different kinds of ESG-related risks and opportunities.

Northrop Grumman Corporation is the most transparent company in the A&D sector, providing detailed information about its governance structures and carbon emissions. The Canadian **Bombardier** is the best-prepared company to meet sustainability-related risks and opportunities, due to its strong policies and management systems. Its leading role is reflected also in its strong quantitative performance of 75 points, nine points higher than the second-best company **Airbus**, with a score of 66 points.

Qualitative Performance – Most controversial companies

5

Category 5 - severe

Finmeccanica SpA – Business Ethics

4

Category 4 - major

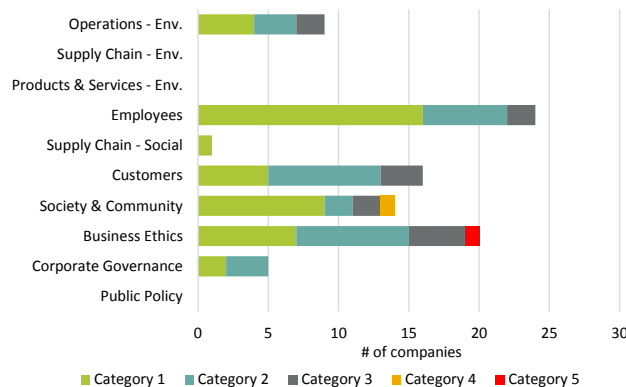
Elbit Systems Ltd. – Human Rights Violations

The most controversial events analysed by Sustainalytics are awarded a Category 5 status. Such events are characterised by egregious mismanagement posing severe risks to the company as well as investors. A Category 4 is assessed as less severe than a Category 5 controversy, in terms of the way the company deals with the controversial issue (management) or what the issue entails for the near future (outlook).

Finmeccanica and its subsidiaries have faced numerous investigations of bribery and corruption over the past three years, including fraud in connection with the sale of 12 helicopters to the Indian government.

Elbit has provided security cameras and unmanned aerial drones to the Israeli military, believed to be specifically tailored for the security wall separating Israel from the Palestinian Territories. Human rights non-governmental organisations (NGOs) criticised it as directly contributing to a range of human rights violations.

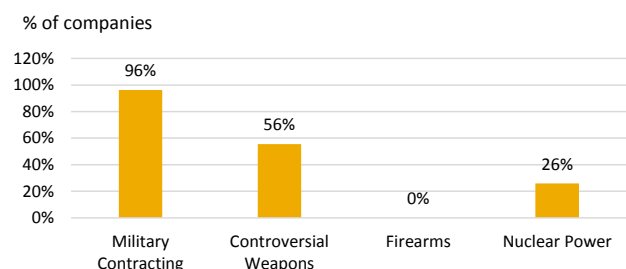
Qualitative Performance – Distribution of events



With respect to the distribution and severity of events, Business Ethics as well as Society and Community are subject to the most intense controversies and pose the highest risks to the company and investors. This is due to the industry’s high exposure to bribery and corruption risks and its potential indirect involvement in human rights issues linked to the production of weapons delivered to areas of conflict.

In addition, as the industry is highly labour intensive, it yields a multitude of health and safety as well as labour-related controversies (summarised under Employees), though they appear to be less severe. Of particular interest is the relatively low frequency of environment-related controversies (nine events), pointing once again to the acknowledged environmental responsibility of A&D companies.

Controversial products – Company involvement



The analysis of the sector’s involvement in ethically controversial products reveals that 14 out of the 27 analysed listed A&D companies produce or sell controversial weapons.

Finally, 26 percent of the companies reveal business relationships with the nuclear industry, though no company is directly involved in the production of nuclear bombs.

Company Portrait: Lockheed Martin Corporation



Outlook
Neutral

69

Overall ESG Score
Average Performer (8 out of 27)

2

Highest Controversy Level

Community Relations /
Emissions, Effluents and Waste /
Business Ethics / Weapons /
Corporate Governance

Domicile: United States
Industry: Aerospace & Defence
Sub-Industry: Aerospace & Defence
Ticker: NYSE:LMT
ISIN: US5398301094
Sedol: 2522096
Employees (FY 2013): approx. 115,000
MCap: USD 50,695m.

Company characteristics (current & momentum)	Score			Rank
	-3y	-1y	curr.	curr.
Overall ESG score	66	67	69	8
Environment	62	69	71	7
Social	63	55	67	5
Governance	73	76	69	9
Disclosure	41	64	63	5
Preparedness	51	56	54	9
Quantitative Perf.	39	39	59	3
Qualitative Perf.	100	94	91	22

Analyst View – More focus on opportunities

Lockheed Martin is an industry leader in terms of programmes to enhance energy conservation and efficiency of its operations and reduce GHG emissions. LM stands out for its use of green power, representing 24% of its energy mix. Reporting and disclosure on carbon emissions is aligned with best practice. Furthermore, LM provides smart grid solutions and has begun to commercialise efforts that generate thermal energy from oceans. Due to its involvement in the production of nuclear weapons, the Norwegian Government Pension Fund excluded LM in 2013.

The Company – One of the largest military contractors

Lockheed Martin is a security, defense, aerospace and advanced technology company with interests in the United States and internationally. LM operates in five segments: Aeronautics; Information Systems & Global Solutions; Missiles and Fire Control; Mission Systems and Training; and Space Systems. The company is one of the world's largest military contractors. The majority of its revenues in FY2013 came from the US Department of Defense (61%), while 17% came from international customers.

Carbon risk and opportunities – Well positioned

LM is an industry leader in terms of programmes to enhance energy conservation and efficiency of its operations. It has adopted targets of 25% reduction in energy use and 35% reduction of carbon emissions by 2020 compared to 2010, and it has implemented several measures to achieve these targets, resulting also in substantial cost savings. Despite the absence of a formal programme, LM stands out for its use of green power, representing 24% of its energy mix. Reporting and disclosure on carbon emissions is aligned with best practice. Moreover, LM provides smart grid solutions to optimise energy management, and is exploring and researching alternative sources of energy, such as waste products and oceans, but these solutions are still at a prototype stage.

Governance – Enormous exposure to bribery and corruption, but no evidence of significant misconduct

Similarly, LM seems adequately prepared to deal with governance-related issues, a sensitive topic for the industry. The company is involved in business ethics and corporate governance incidents, yet these are not connected to bribery and corruption cases or lobbying activities. LM has also adopted a strong policy on political involvement and contributions and provides transparent reporting. Nonetheless, in the last four years the company has spent more than USD 60m in lobbying and contributions in the US alone. As mentioned above, US Government customers account for a major proportion of the company's sales, and lobbying is instrumental to secure lucrative contracts in an era of budget cuts.

Analyst(s)

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Key ESG Issues

Corruption exposure and innovation pressure

The Aerospace & Defence (A&D) industry is part of the industrial sector and can be considered a high-technology industry. The industry consists of a diverse set of companies, including large conglomerates developing and manufacturing a wide range of A&D products as well as niche players supplying specific technologies or products. The industry’s operations and product offerings are associated with various sustainability impacts on its stakeholders and the environment. Based on systematic analysis of value chains and business models in the industry, we evaluated the materiality of these impacts and their repercussions on the financial viability of the industry constituents. Sustainalytics has identified six issues that we consider to be key based on the depth, breadth and duration of potential impacts.

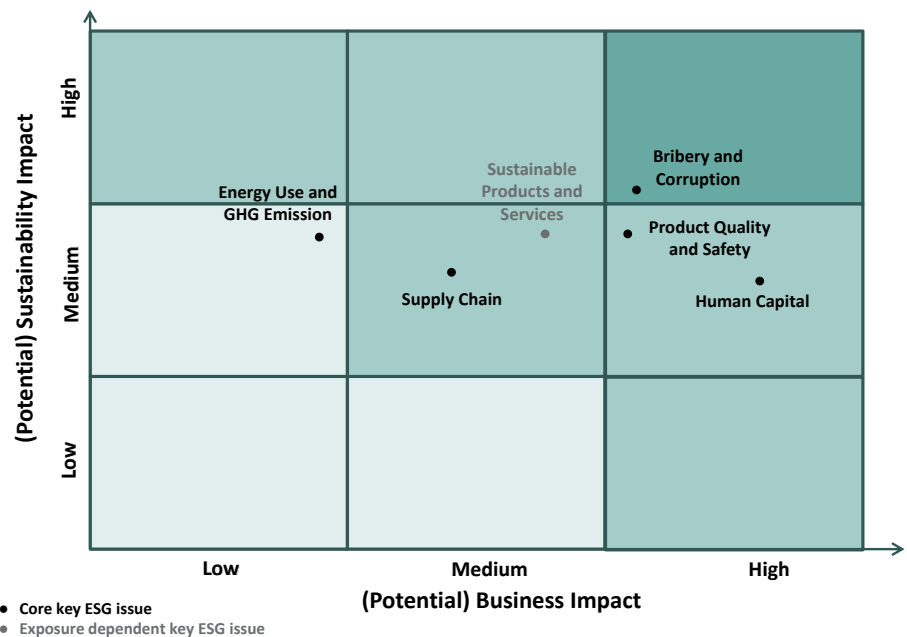
How material is the exposure vis-à-vis an issue?

Sustainalytics defines “key ESG issues” as those areas of exposure that are most material and hence determine the key management areas for a company. Obviously, the areas of exposure differ from industry to industry. Hence, Sustainalytics has generated a list of issues that are potentially relevant for a company based on a detailed and systematic analysis of the business models and the value creation chains within a given sector. The following chart shows the positioning of the six most significant issues that Sustainalytics has identified for the Aerospace & Defence industry. At the individual company level, the exposures shown in the chart can be higher or lower, based on company-specific factors like involvement in special business areas, location or size.

Defining the key areas of exposure

Materiality Matrix Aerospace and Defence

Six key ESG issues have been identified:
Five core issues and one exposure-dependent issue



Source: Sustainalytics

Exposure dependence

We distinguish between core issues and exposure-dependent issues. While the former are relevant for all companies within a given peer group, the latter apply only to those displaying firm-specific characteristics that make them exposed to the issue, e.g., the presence in a specific region. In the case of the A&D industry, the manufacturers of civil aircraft, for example, are particularly exposed to the key issue Sustainable Products and Services.

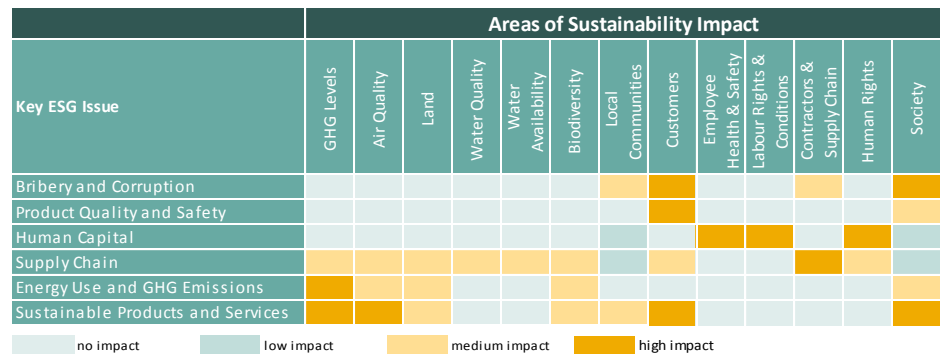
Sustainability and Business Impact

Close link between sustainability and business impact

In the Aerospace & Defence industry, there is a close link between **Sustainability Impact**, defined as the impact *of* a company on its stakeholders, and **Business Impact**, defined as an issue’s impact *on* a company. This is mainly due to the industry’s high exposure to Bribery and Corruption, customer expectations regarding Product Safety and Quality, a rising demand for innovative, energy-efficient Sustainable Products, operational costs related to Energy Use and GHG Emissions and operational risks associated with the management of Human Capital and the Supply Chain. The following chart gives an overview of the six key ESG issues of the industry and the related areas of sustainability impact. We consider 10 out of a total of 78 cases (12.8 percent) as areas of high potential impact and 18 as areas of medium impact (23.1 percent).

Key ESG issues and areas of Sustainability Impact

Human Capital, Bribery and Corruption and Sustainable Products and Services each display more than one high-impact area



Source: Sustainalytics

Business Impact: regulatory environment, litigation risks, client demand and reputation risks are considered as areas of potentially high impact

The chart on the next page provides an overview of the business impact related to the six key ESG issues in the Aerospace & Defence industry. On the business impact side, it becomes evident that the exposure of Aerospace & Defence companies is significantly driven by the regulatory environment, litigation risks, client demand and reputation risks. In nine cases across all six key issues, these are considered areas of potentially high impact. Bribery and Corruption and Product Quality and Safety are the key ESG issues associated with the most and the highest business risks.

Several lawsuits related to corruption incidents and product defects underpin this assessment. But Human Capital is also linked to medium and high business risks, since poor labour relations management may lead to loss of production or impede recruitment processes. We consider 12 out of a total of 48 cases (25 percent) as areas of high potential impact and 19 as areas of medium impact (40 percent).

Key ESG issues and areas of Business Impact

Bribery and Corruption and Product Quality and Safety both exhibit four high-impact areas

Key ESG Issue	Areas of Business Impact							
	Regulatory Environment	Litigation Risks	Reputation Risks	Client Demand	Asset Risks	Operational Risks	Employee Motivation	Hiring Capability
Bribery and Corruption	high impact	high impact	high impact	high impact	low impact	low impact	low impact	low impact
Product Quality and Safety	high impact	high impact	high impact	high impact	low impact	low impact	low impact	low impact
Human Capital	low impact	low impact	low impact	low impact	low impact	high impact	high impact	high impact
Supply Chain	low impact	low impact	low impact	low impact	low impact	low impact	low impact	low impact
Energy Use and GHG Emissions	low impact	low impact	low impact	low impact	low impact	low impact	low impact	low impact
Sustainable Products and Services	low impact	low impact	low impact	high impact	low impact	low impact	low impact	low impact

no impact low impact medium impact high impact

Source: Sustainalytics

A&D industry – Overview of the six key ESG issues

The six key issues we have identified are discussed in detail in the forthcoming sections. For all of them, we first analyse the exposure of the industry overall and of the factors that leverage or de-leverage exposure at the individual company level. We then turn to the evaluation of performance and management quality by looking at relevant indicators covering the four dimensions: Disclosure; Preparedness; Quantitative Performance; and Qualitative Performance. We conclude each section with an outlook.

Defining the key areas of exposure

The first issue examined is **Bribery and Corruption** (see p. 33). With a uniquely strong link to governments, A&D companies must be vigilant in avoiding bribery and corruption charges to maintain their ability to win government contracts. Corporate culture and reputation can also be severely damaged as a result of bribery or corruption cases. Also of material relevance are fines, legal costs and loss of licences to operate or tender for new business. Examples like the case of Finmeccanica illustrate the business risks associated with bribery and corruption.

Investor scrutiny over safety concerns

A company’s **Product Quality and Safety** performance (see p. 37) is crucial to maintaining a strong reputation among customers that will ensure future business. Safety issues can lead to a loss of customer trust and highly sensitive investor reactions. In 2013, for example, Boeing faced investor scrutiny and decreased market value due to investigations over safety concerns regarding its 787 Dreamliner.

Engineer strike affects safety review

We continue with the key issue of **Human Capital** (see p. 41). As the industry faces a shortage of skilled workers, A&D companies need to pay close attention to the way their labour relations impact operational efficiency. Strategic recruitment and retention programmes are key to success. In addition, companies need to be able to transfer these principles to Emerging Markets as operations and suppliers relocate.

Integration of environmental standards in procurement decisions

Since A&D companies usually have an extensive global **Supply Chain**, the integration of social and environmental criteria in the management of suppliers is considered an important step to mitigate operations-related risks and promote best practices (see p. 45). Especially, the integration of environmental standards in procurement decisions is likely to gain importance in the near future, e.g., in light of growing consumer expectations towards fuel efficiency improvements of products such as aircraft.

Energy costs linked with carbon emissions

Energy Use and GHG Emissions (see p. 49): As national GHG regulations and emission trading schemes emerge, the industry has a responsibility to report on relevant emissions and demonstrate that climate change risks are being managed. Companies that do not position themselves ahead of this regulatory curve may expose themselves and their shareholders to risks related to carbon pricing.

Alternative fuel as a growth market

The industry faces significant pressure to provide products with a lower environmental impact (**Sustainable Products and Services**, see p. 52). In particular, aircraft manufacturers are expected to develop more energy-efficient products and explore alternative fuel options. Innovative industry leaders can benefit from new market opportunities, while industry laggards face significant business risks.

Bribery and Corruption – High exposure by nature

The Aerospace & Defence industry is highly exposed to bribery and corruption, due to its close business relationships with governments, its competition for a limited number of high-value contracts and massive secrecy surrounding military procurement. Involvement in bribery and corruption presents significant business risks due to potential blacklisting or exclusion from investments. The industry has a high level of preparedness, since policies and programmes on bribery and corruption are relatively widespread. However, several companies have been involved in bribery- and corruption-related controversies in recent years.

High-value contracts, massive secrecy

The A&D industry is prone to cases of bribery and corruption, due to competition for a limited number of high-value contracts and massive secrecy surrounding military procurement. Transparency International (TI) describes the defence industry as one of the most secretive. In 2009, responding to stakeholder governance concerns, the Aerospace Industries Association of America (AIA) and AeroSpace & Defence Industries Association of Europe (ASD) jointly published the “Global Principles of Business Ethics for the Aerospace and Defence Industry”. These Principles provide guidance on issues that impact ethical business conduct; however, their explicit use is not widespread. The AIA and ASD thus established a taskforce to properly formalise the activities of the International Forum on Business Ethical Conduct for the Aerospace and Defence Industry (Ifbec), which maintains and develops the Principles. Companies endorsing the Principles commit to having comprehensive business conduct policies and company-wide “Integrity Programmes” in place.

Secretive industry: high exposure to bribery and corruption

ESG performance – Room for improvement

Sustainalytics’ research framework considers Bribery and Corruption by applying four Preparedness and one Qualitative Performance indicator when evaluating company performance.

Bribery and Corruption – Related Indicators

Related Indicators	Dimen- sion	Key indicator	# companies with ... score			Weight in issue
			high	medium	low	
G.1.1 Bribery & Corruption Policy	Prep		21	16	2	8%
G.1.1.1 Bribery & Corruption Programmes	Prep	●	13	14	12	24%
G.1.2 Whistleblower Programmes	Prep		7	26	6	24%
G.1.5 Business Ethics Incidents*	QualP	●	28	6	11	32%
G.3.2 Lobbying and Political Expenses	Prep		5	2	20	12%

* high: No controversies or Level 1 controversies; medium: Level 2 controversies; low: Level 3-5 controversies

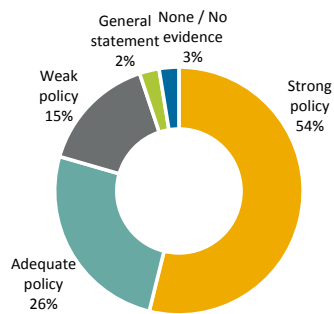
Source: Sustainalytics

Policies and Programmes

Formal policies on bribery and corruption are relatively widespread in the industry. Sustainalytics’ findings indicate that only three percent of companies researched do not have a policy, while more than half of assessed policies are considered to be strong.

Only three percent of companies researched do not have a policy

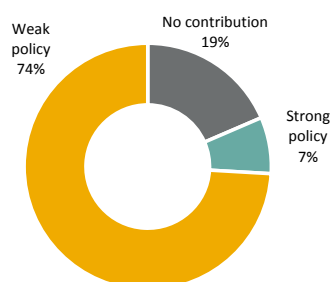
Bribery and Corruption Policy



Intensive lobbying is a common activity in the industry

Almost all companies in the industry spend money on political contributions and lobbying

Lobbying and Political Expenses



Best practices include annual training sessions, regular employee endorsements of the corporate code of conduct, implementation of internal monitoring systems to detect corruption and ethical committees that can be consulted by employees. For instance, **Cobham** has established a Business Ethics and Compliance Committee at the executive level that reviews and approves the annual ethics training plan and oversees ethics policies and investigations of concerns. Similarly, **Alliant Techsystems** has ethics committees in each group and subgroup of plant operations. These committees answer in turn to a corporate Ethics and Compliance Office, which monitors the whole company for potential cases of corruption. Other examples include **Boeing**, which conducts three mandatory educational refresher activities for its employees annually concerning its commitment to ethics and business conduct standards. Furthermore, reporting mechanisms and whistleblower programmes should be in place to allow employees to report potential violations of law or policy without fear of retaliation. Approximately 87 percent of the companies tracked by Sustainalytics have a whistleblower programme in place. However, there is still room for improvement, as only approximately 18 percent have systems in place that follow best practice.

Lobbying and Political Expenses

As previously noted, companies in the Aerospace & Defence industry are often uniquely dependent on national governments and regulations for procurement contracts, export licences, merger and acquisition approvals, certifications and favourable policy positions. As a result, intensive lobbying – often viewed as being negatively influential – is a common activity in the industry. According to organisations such as the Center for Responsive Politics (CRP), the industry maintains lobbying activities worth millions of dollars. Companies also direct funds to trade associations and political candidates who support their business objectives.

Lockheed Martin, Boeing, General Dynamics, Honeywell, Northrop Grumman and **Raytheon** are considered “big spenders” in the US by the CRP. Nevertheless, almost all companies in the industry spend money on political contributions and lobbying. Within the defence industry, the primary issue is securing government contracts and influencing government spending. Companies embracing transparency and disclosure should take steps to clarify their position on political issues and disclose the amount of money contributed to political campaigns and lobbying. Rules in the US require companies to report their lobbying and political contributions, whereas the European Parliament has established a Transparency Register as well as a lobbying code of conduct to which companies may voluntarily adhere. A best practice political involvement policy should include a clear statement regarding the company’s political contributions, activities and lobbying, as well as an overview of potential memberships in and support for non-governmental organisations and trade associations.

Currently, around seven percent of the Aerospace & Defence companies have adopted a strong policy, including **Lockheed Martin** and **Northrop Grumman** as well as European **Thales** and **Rolls Royce**. In particular, Lockheed Martin is considered a best practice example in terms of transparency. The company discloses a policy statement with regards to its political contributions and activities, including lobbying. It also

reports on its memberships in trade and industry associations and publishes quarterly reports of its lobbying expenditures, the names of the recipients and related campaigns.

However, there is room for improvement regarding the disclosure and implementation of related policies for the industry in general. Companies considered “big spenders”, like Boeing, General Dynamics and Raytheon, have thus far implemented only weak policies. Consequently, the industry still lacks transparency when it comes to its involvement in political decision-making processes.

Best Practice

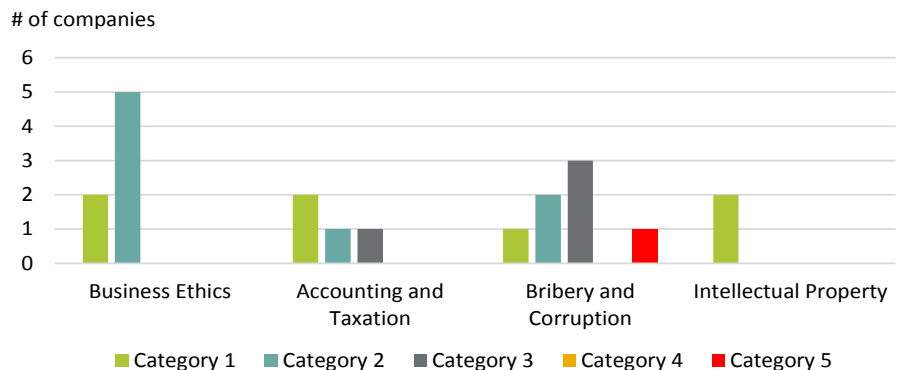
- Strong programmes to combat bribery and corruption, including training, ethics offices and a company-wide whistleblower programme;
- Engagement in industry initiatives to formalise and share best practices for combating corruption and advancing transparency;
- Policies on political contributions and the use of advisors, including lobbyists, as well as disclosure of lobbying expenditures.

Controversies – Overview

High level of preparedness is no guarantee for the mitigation of bribery and corruption cases

A high level of preparedness with strong or at minimum adequate programmes is no guarantee for the mitigation of bribery and corruption cases. For instance, **Rolls Royce** has faced investigations with regard to business ethics practices concerning activities in China, Indonesia and India, despite having established robust policies and programmes. In 2014, India’s defence ministry ordered an investigation over allegations of kickbacks paid by the company in order to win a contract reportedly worth USD 1.6bn to supply engines to state-run Hindustan Aeronautics. Investigations also took place in December 2012, when British authorities investigated Rolls Royce over bribery and corruption allegations regarding the company's overseas operations in Indonesia and China. **BAE Systems** and **Thales** have also faced recurrent and protracted investigations and legal action regarding their business ethics practices in recent years. One of the most severe bribery and corruption cases in the industry concerned the activities of the Italian **Finmeccanica**. Investigations carried out thus far indicate the existence of widespread, systemic and long-lasting irregularities.

Bribery- and Corruption-Related Controversies



Source: Sustainalytics

5

Category 5 – High

Finmeccanica

As of November 2014, investigations in India are still pending

Most severe controversies

Finmeccanica has been facing bribery allegations that span several legal jurisdictions. In the fall of 2011, Lorenzo Borgogni resigned following allegations that he was connected to illicit funds. In December 2011, the company's then-chief executive officer, sales manager and joint general manager all followed suit and resigned in light of seven proceedings mandated by Italian authorities. Borgogni then brought to light further allegations of corruption concerning the Indian government's EUR 560m purchase of 12 helicopters from a Finmeccanica subsidiary, AgustaWestland. In January 2013, Finmeccanica's chief executive officer, Giuseppe Orsi, was arrested, and Bruno Spagnolini, chief executive officer of AgustaWestland, was put under house arrest. Meanwhile, India's defence ministry announced it would freeze payments for the contract during the investigation.

The Indian government subsequently terminated its contract with AgustaWestland in January 2014 and barred Finmeccanica and five subsidiaries from participating in the 2014 DEFEXPO New Delhi Defence exhibition. However, in July 2014, Italian prosecutors decided to give up charges against the company and AgustaWestland. In September 2014, an Italian court recognised the decision and agreed to enforce the imposition of moderate fines. The case has the potential to tarnish the company's reputation and thus put it at risk of losing opportunities with international defence ministries.

Bribery and Corruption – Leaders and Laggards

Leaders	Country	MCap (USD m)	Score: BC	Overall
QinetiQ Group Plc	United Kingdom	2,398	96.9	80.8
Cobham plc	United Kingdom	5,388	88.0	67.5
Alliant Techsystems Inc.	United States	4,383	87.5	64.4
Kongsberg Gruppen ASA	Norway	2,913	84.4	64.3
Northrop Grumman Corporation	United States	25,590	83.7	70.7
Honeywell International Inc.	United States	73,986	76.0	55.6
Laggards	Country	MCap (USD m)	Score: BC	Overall
AviChina Industry & Technology Co. Ltd.	Hong Kong	3,296	33.3	47.1
Macdonald Dettwiler & Associates Ltd.	Canada	2,600	39.6	48.7
Finmeccanica SpA	Italy	5,416	42.0	62.8
Safran SA	France	30,380	43.6	61.8
Bharat Electronics Limited	India	1,241	43.7	57.0

Source: Sustainalytics, Capital IQ



Baseline: moderate

Outlook: neutral

Outlook – Remaining prone to Bribery and Corruption

The Aerospace & Defence industry is prone to bribery and corruption due to its close business relationships with governments, its competition for limited, high-value contracts and massive secrecy surrounding military procurement. Overall, the industry shows a high level of preparedness, since policies and programmes on bribery and corruption are relatively widespread in the industry. However, several companies have been involved in bribery- and corruption-related controversies in recent years. Therefore, we consider the overall performance with regards to this key ESG issue as moderate and foresee no significant changes going forward. In general, we expect that this key ESG issue will remain material in the future.

Product Quality and Safety – In or out

Product quality and safety is crucial for Aerospace & Defence companies. Since the companies in the industry often compete for limited, high-value contracts and face product innovation pressure, even minor product quality and safety issues pose significant material risks. Several quality and safety incidents in recent years and a lack of disclosure regarding robust quality and management systems show that there is room for improvement in the industry.

Securing the capacity to compete

Innovation, quality management and access to new markets

Given that product quality and safety is stringently regulated for A&D companies, compliance with related standards is imperative to accessing markets. In severe cases, a particular aircraft model may be grounded until a designated issue is addressed, leading to expensive repairs, loss of revenues and, in some instances, litigation. Investment in research and development is a major expenditure for A&D companies, but without the ability to deliver effectively on quality and safety standards, there is a risk that necessary investments will be withheld.

Timeliness is key

Timely execution and demonstration of quality and safety keeps development programme timelines on target and customer and shareholder expectations satisfied. For example, a manufacturer in the US must obtain a production certification from the Federal Aviation Administration (FAA) for the design of an aircraft or component before it can be approved. Authorities such as the FAA also monitor aircraft airworthiness and issue directives as necessary. Failure to meet these standards may cause delays in product launches, which can lead to significant cost overruns as well as customer and shareholder backlash in the form of lawsuits.

Helping to deliver credibility

Delivery of new and innovative technologies can provide an important edge in attracting customers, especially where they deliver quality and safety improvements. Innovation of new technologies can present challenges to delivering consistent quality and obtaining regulatory approvals, yet robust quality management processes may help overcome such challenges. They will also help to deliver credibility as companies expand operations into new markets.

International QMS standards

Potential gains in effectiveness and efficiency

Effective management of product quality and safety risks by A&D companies requires working with state-of-the-art quality management systems (QMS). These systems contribute to improve the management of product programmes and reduce long-term costs by facilitating regulatory compliance and potentially leading to gains in effectiveness and efficiency as operational processes are refined.

The International Aerospace Quality Group's quality standard for the Aerospace & Defence industry – AS 9100 (North America), JISQ 9100 (Japan) and EN 9100 (Europe) – was developed in 1999 to harmonise diverse international quality requirements across the industry. The standard was developed specifically for the aerospace industry as a supplement to the ISO 9001 standard and adds a series of requirements related to

aviation safety and regulatory compliance. It has been adopted by buyers such as the US Federal Aviation Administration (FAA) and the European Aviation Safety Agency (EASA), the US Department of Defense (DoD) and NASA. Related standards provide quality management requirements for other industry participants, such as 9110, which provides requirements for aviation maintenance organisations.

ESG performance – QMS’ scope remains unclear

One Preparedness and one Qualitative Performance indicator

Sustainalytics’ research framework considers Product Quality and Safety by applying one Preparedness and one Qualitative Performance indicator when evaluating company performance.

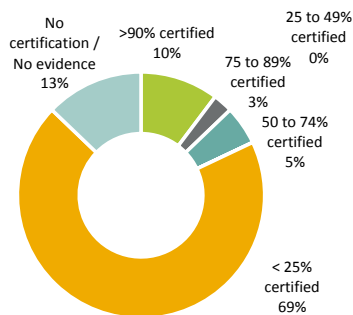
Product Quality and Safety – Related Indicators

Related Indicators	Dimension	Key indicator	# companies with ... score			Weight in issue
			high	medium	low	
S.3.2.1 QMS Certifications	Prep		5	2	32	50%
S.3.3 Customer Incidents*	QualP	●	29	7	3	50%

* high: No controversies or Level 1 controversies; medium: Level 2 controversies; low: Level 3-5 controversies

Source: Sustainalytics

QMS Certifications



While quality management is a major focus of the A&D industry, explicit corporate-level disclosure of certified quality management systems (QMS) is lacking. Only **Bharat Electronics, Bombardier, Embraer** and **Rolls Royce Holdings** clearly state that all of their global operations are covered by a certified QMS, while five companies do not demonstrate any evidence of QMS certification. For the majority of the companies covered, the scope of certifications remains unclear. This is partly because different QMS standards are relevant for various sites and divisions. **Boeing** discloses how it incorporates safety beginning at the design phase through to aftermarket services and also publishes a statistical summary of commercial jet airplane accidents. The company requires its suppliers to have a QMS based on ISO 9001 as supplemented by 9100. In spite of its clear commitment to quality, the company does not provide detailed disclosure of quality certifications it holds for its own operations. Although information published on **Airbus’** website indicates that certain sites received external certification to ISO 9001 or EN 9100, the company does not disclose consolidated figures concerning the overall percentage of its operations receiving external certification for their quality management systems.

Best Practice

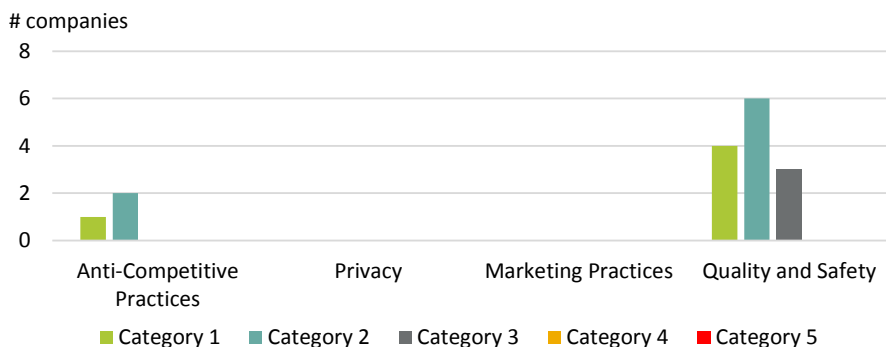
- Implement and disclose certified quality management systems (e.g., AS9100 and ISO9001) company-wide and processes to ensure strict adherence to quality principles, including regular training and executive oversight;
- Require suppliers to implement robust quality management systems and maintain industry standard certifications, such as ISO 9001, AS 9100 or AS 9110;
- Absence of significant product quality- and safety-related controversies linked to severe impact and material risks.

Controversies – Overview

Majority of cases related to product quality and safety issues

Customer controversies are relatively common in the industry. The majority of cases are related to product quality and safety issues. Several companies have been involved in moderate (category 2) and significant (category 3) cases in recent years. However, there are currently no category 4 nor category 5 assessments.

Customer Controversies



Source: Sustainalytics

4

Category 4 – High Boeing

Most severe controversies

In particular, **Boeing** has been involved in significant customer-related incidents, principally concerning product quality and safety. The most recent event occurred in summer 2013, when Boeing became the subject of investigations and lawsuits over fatalities resulting from crashes and malfunctions in the US, the UK and Afghanistan.

This involvement came just a few months after safety concerns arose regarding the company’s 787 Dreamliner operations in Japan and the US. Investigations were opened to examine the causes of a series of incidents in January 2013: two fuel leaks, a battery fire, a wiring problem, a brake computer glitch and a cracked cockpit window. Subsequently, the US authorities issued an exceptional directive ordering all US-based airlines to ground their Boeing 787s. It was later reported that the grounding of the Dreamliner fleet had cost Boeing an estimated USD 600m, halted deliveries of the aircraft and forced some airlines to lease alternative planes.

Previously, in April 2011, following an accident in which a hole opened in the roof of a Boeing 737, the company stated that many of its older 737 jets were prone to metal fatigue much sooner than expected. The recurrence of Boeing’s quality and safety incidents leave the company vulnerable to reputational and financial damage.

Product Quality and Safety – Leaders

Leaders	Country	MCap (USD m)	Score: PQS	Overall
Bharat Electronics Limited	India	1,241	100.0	57.0
Embraer SA	Brazil	5,974	99.5	83.0
MTU Aero Engines Holding AG	Germany	4,407	90.0	74.6
Rolls Royce Holdings plc	United Kingdom	37,727	90.0	70.0
QinetiQ Group Plc	United Kingdom	2,398	80.0	80.8

Source: Sustainalytics, Capital IQ

Product Quality and Safety – Laggards

Laggards	Country	MCap (USD m)	Score: PQS	Overall
Boeing Co.	United States	95,761	37.5	59.5
Honeywell International Inc.	United States	73,986	37.5	55.6
Cobham plc	United Kingdom	5,388	50.0	67.5
Kongsberg Gruppen ASA	Norway	2,913	50.0	64.3
Macdonald Dettwiler & Associates Ltd.	Canada	2,600	50.0	48.7
TransDigm Group Incorporated	United States	9,237	50.0	47.8
Ultra Electronics Holdings plc	United Kingdom	2,249	50.0	53.2

Source: Sustainalytics, Capital IQ

Surprisingly, two EM companies are at the top of the leaders list. Both **Embraer** and **Bharat Electronics** show a high level of preparedness (100% of operations ISO 9001-certified). While Embraer has been involved in only a minor (Category 1) customer incident, Bharat has not been involved in any controversy related to Product Quality and Safety.



Baseline: weak
Outlook: positive

Outlook – Increasing materiality, room for improvement

Product quality and safety is crucial for Aerospace & Defence companies to maintain investor and customer trust. This is especially important since companies in the industry often compete for limited, high-value contracts and face product innovation pressure. Prominent quality and safety incidents in recent years and a lack of disclosure regarding robust quality and management systems show there is room for improvement. We expect that Product quality and safety will gain further importance as a key ESG issue for the industry. Therefore, we anticipate that the A&D industry's performance will improve in the coming years.

Human Capital – Mitigating operational risks

Aerospace & Defence companies depend on a highly qualified and skilled workforce (especially engineers and IT specialists) to drive innovation and competitiveness. Thus, the industry has to address the shortage of skilled workers and balance budget cuts with the need to guarantee future capacity. Strong labour policies and programmes are considered crucial to achieve this goal, to avoid labour conflicts and mitigate operations-related risks. Overall, there is room for improvement with respect to labour relations management, as the majority of industry peers lacks adequate employee policies on issues such as freedom of association and anti-discrimination. Nevertheless, compared to other manufacturing industries, Aerospace & Defence companies have been less involved in severe employee-related controversies.

Labour disputes, operational efficiency and reputation

Intense competition and cost-cutting measures

Intense competition and cost-cutting measures have forced some companies to lay off workers and shift production to lower-cost facilities, sometimes triggering labour disputes. For instance, in 2013, 20,000 **Airbus** workers in Germany protested against restructuring plans announced by the company. Such controversies can result in operational and reputational risks. In 2013, for example, a **Boeing** engineer strike sparked significant media attention and posed risks with respect to the timely safety review of the 787 Dreamliner (The Globe and Mail, 2013). Consequently, strong labour policies and programmes are considered crucial to maintaining good relationships with employees to avoid labour conflicts and mitigate operations-related risks. Furthermore, a good reputation as a top employer is beneficial to attract and retain qualified employees, given the shortage of skilled labour within the industry.

ESG performance – Lack of policies, poor disclosure

Seven indicators taken into account

Sustainalytics' research framework considers Human Capital by applying three Preparedness, three Quantitative Performance and one Qualitative Performance indicator when evaluating company performance.

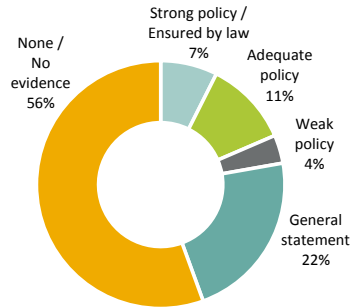
Human Capital – Related Indicators

Related Indicators	Dimen- sion	Key indicator	# companies with ... score			Weight in issue
			high	medium	low	
S.1.1 Freedom of Association Policy	Prep	●	2	3	22	8%
S.1.2 Discrimination Policy	Prep		4	17	18	4%
S.1.3 Diversity Programmes	Prep		2	14	23	4%
S.1.4 Collective Bargaining Agreements	QuantP		2	3	20	8%
S.1.5 Employee Turnover Rate	QuantP		3	4	20	8%
S.1.6 Top Employer Recognition	QuantP		2	3	22	8%
S.1.7 Employee Incidents*	QualP	●	32	6	1	58%

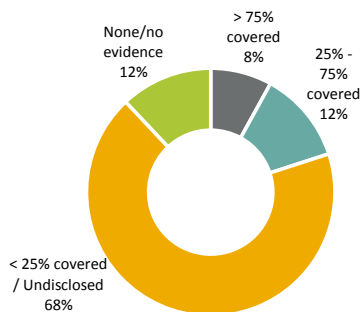
* high: No controversies or Level 1 controversies; medium: Level 2 controversies; low: Level 3-5 controversies

Source: Sustainalytics

Freedom of Association Policy



Collective Bargaining Agreements



Efforts to reduce the occurrence of accidents and fatalities

Boeing: Has the company's programme received company-wide certification?

Freedom of association, collective bargaining and discrimination

In general, the industry lacks adequate employee policies. According to Sustainalytics' research, only 22 percent of companies have adopted a policy on freedom of association. Among these companies, only **Airbus'** and **Boeing's** policies can be considered strong, as they include a company-wide commitment to ensure employee freedom of association with labour unions.

The industry's overall poor disclosure standards become evident when assessing the companies' reporting on collective bargaining agreements. Almost two thirds of the companies covered do not disclose related figures, nor do they provide evidence of employing a workforce covered by collective bargaining agreements. Only **MTU Aero Engines** and **Thales** report that at least 75 percent of their employees are paid according to collective bargaining agreements.

The Aerospace & Defence industry's performance with respect to anti-discrimination policies is slightly better. About half of the companies covered have adopted at minimum adequate policies to prevent discrimination among employees and ensure equal opportunity as well as diversity in terms of career development. However, companies based in emerging markets such as India, Hong Kong and South Korea are more likely to be considered laggards, as they tend to have no policy in place.

Health and safety

Employees of the Aerospace & Defence industry are exposed to health and safety risks, particularly the workforce of companies operating with hazardous materials. Therefore, programmes and certifications to improve health and safety performance are critical to demonstrating a company's commitment to maintaining strong employee relations and mitigating occupational health and safety incidents. Such programmes can foster trust and improve morale while simultaneously allowing employees to perform confidently and effectively.

Leading companies pursue the Occupational Safety and Health Administration's (OSHA's) Voluntary Protection Program or OHSAS 18001 as part of an effort to significantly reduce the occurrence of accidents and fatalities. Some companies have set long-term targets to reduce safety incidents to zero and continuously improve their short-term performance. For instance, **Bombardier**, **Embraer** and **Rolls Royce** have 100 percent of their sites certified to OHSAS 18001 standards in health and safety management.

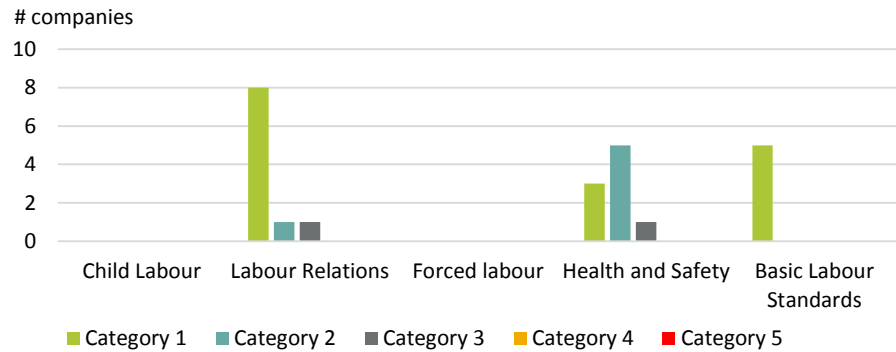
Boeing also has a strong programme in place to reduce health and safety incidents and has set a five-year target to improve its workplace safety performance. However, the company does not provide evidence that its programme has received company-wide certification according to best practice standards, such as OHSAS 18001. Furthermore, several workplace health and safety incidents have occurred at Boeing's sites, including fatal accidents.

Involvement in employee-related controversies less severe compared to other manufacturing industries

Controversies – Overview

Aerospace & Defence companies with poor labour relations management are exposed to controversies. Overall, the industry has been less involved in severe employee-related controversies compared to other manufacturing industries. As of October 2014, no A&D company is involved in a category 4 or 5 employee-related controversy. Nevertheless, there have been several category 1 to 3 controversies linked to Health and Safety and general labour relations issues.

Human Capital – Related Controversies



Source: Sustainalytics

3

Category 3 – Significant

Boeing

Most severe controversies

Boeing has been involved in incidents with respect to its employees' health and safety, having received multiple fines and faced multiple fatal incidents. Most recently, in April 2013, an occupational accident at one of the company's sites in the US resulted in the death of an employee. The case was subsequent to a multi-year fine by OSHA against the company, which included ten violations which were considered serious.

Best Practice

- Develop and disclose policies on freedom of association and collective bargaining agreements that provide open communication between management and employees;
- Explicitly prohibit all forms of discrimination according to internationally accepted standards, such as the conventions of the International Labour Organisation or the UN Declaration of Human Rights.

Human Capital – Leaders

Leaders	Country	MCap (USD m)	Score: HC	Overall
Embraer SA	Brazil	5,974	91.0	83.0
MTU Aero Engines Holding AG	Germany	4,407	87.1	74.6
Alliant Techsystems Inc.	United States	4,383	83.3	64.4
Aselsan Elektronik Sanayi ve Ticaret A.S.	Turkey	1,798	83.3	67.9
Airbus Group	Netherlands	56,538	82.1	74.4

Source: Sustainalytics, Capital IQ

Human Capital – Laggards

Laggards	Country	MCap (USD m)	Score: HC	Overall
BAE Systems plc	United Kingdom	23,273	51.7	62.1
Honeywell International Inc.	United States	73,986	51.9	55.6
Boeing Co.	United States	95,761	54.2	59.5
BE Aerospace Inc.	United States	8,424	58.3	48.0
Rolls Royce Holdings plc	United Kingdom	37,727	59.2	70.0

Source: Sustainalytics, Capital IQ



Baseline: moderate

Outlook: neutral

Outlook – Competing in the global race for talents

Adequate human capital management is considered crucial for Aerospace & Defence companies to maintain good relationships with employees, compete in the global race for talents, avoid labour conflicts and mitigate operations-related risks such as strikes or lawsuits. Many companies in the industry show room for improvement with respect to the implementation of employee policies and programmes. However, compared to other manufacturing industries, Aerospace & Defence companies have been less involved in employee-related controversies. Therefore, we consider the current industry performance as moderate with a neutral outlook. At the same time, we expect that human capital will continue to gain importance in the medium and long term, since the race for global talents is gathering momentum.

Supply Chain Management – Growing expectations

Aerospace & Defence companies have an extensive global supply chain covering developed and emerging markets. The integration of social and environmental criteria in the management of suppliers is considered an important step to mitigate operations-related risks and promote best practices in the supply chain. The integration of environmental standards in procurement decisions is especially likely to gain importance in the near future, e.g., in light of growing consumer expectations towards fuel efficiency improvements of products such as aircraft.

Integrating innovation, production and supply chain strategies

The example of Boeing's unconventional supply chain for the 787

For the A&D industry, management of the supply chain has more and more become a material factor not only for the production process but also for product development and innovation. The way the supply chain is designed and managed for even a single product is of such great importance that it can significantly create or destroy shareholder value. A prominent example is **Boeing's 787 Dreamliner**, which triggered high-flying expectations among customers and investors, due to the envisioned and then real product properties and qualities (significant improvements in comfort and operational efficiency, see Sustainable Products and Services chapter, p. 52) but also the innovative and unconventional setup of Boeing's production and supply chain strategy for this particular product (Tang/Zimmerman, 2009). The 787's supply chain was envisioned to:

- Keep manufacturing and assembly costs low;
- Reduce the 787's development time and costs significantly;
- Spread the financial risks of development to Boeing's suppliers.

Comparison of Boeing's strategy for its 737 and 787 programs

Component	737 Program	787 Program
Sourcing strategy	Outsourced 35-50%	Outsourced 70%
Supplier relationship	Traditional supplier relationship (purely contract based)	Strategic partners with tier-1 suppliers
Supplier responsibilities	Developed and produced parts for Boeing	Developed and produced sections for Boeing
Number of suppliers	Thousands	Approximately 50 tier-1 strategic partners
Supply contracts	Fixed-price contracts with delay penalty	Risk-sharing contracts
Assembly operations	30 days for Boeing to perform final assembly	3-day assembly for complete sections

Source: Tang/Zimmerman, 2009

Revolutionary approach for the A&D industry

The approach was revolutionary for the industry, which can best be seen by comparing it to the traditional supply chain model of Boeing's 737, in which Boeing plays the role of a final assembler using parts supplied by thousands of individual suppliers. The supply chain for the 787, on the other hand, is based on a tiered structure allowing Boeing to reduce the number of direct suppliers to just around 50 tier-1 strategic partners, which in turn integrate components delivered by tier-2 suppliers.

The principal setup was more or less copied from Toyota. It allowed the auto giant to reduce the development cycles of new cars substantially. So, why not apply the same principles to airplanes? It turned out later that the differences in bringing a new car or a new airplane to market are quite substantial in practice and had been tremendously underestimated.

Too many changes at different levels in parallel

Boeing's significant failures to meet delivery deadlines are a direct consequence of its decision to make too many changes at different levels in parallel. Additionally, the company's management has been strongly criticised for improperly managing the change process, leading to employee- and customer-related controversies and significant reputational damages. The example of Boeing shows that the decision how to engineer and manage a company's supply chain can materially affect stakeholders and create significant operational and reputational business risks for the company. The quality of managing supply chain risks (and opportunities), including all three ESG themes, can make the difference regarding the relative competitiveness of companies. This should be the lesson learned from the 787 story.

ESG performance – Lack of policies, poor disclosure

Six Preparedness and two Qualitative Performance indicators

While the way a supply chain is set up determines the exposure of a company with regard to this issue, we measure the quality with which a company manages its supply chain with the help of six Preparedness and two Qualitative Performance indicators. These form the basis for our evaluation of company performance.

Supply Chain Management – Related Indicators

Related Indicators	Dimen- sion	Key indicator	# companies with ... score			Weight in issue
			high	medium	low	
S.2.1 Scope of Social Supplier Standards	Prep	●	10	4	25	8%
S.2.1.3 Conflict Minerals Policy	Prep		1	0	36	8%
S.2.2 Supply Chain Monitoring	Prep		5	10	24	8%
S.2.3 Social Supply Chain Incidents*	QualP		39	0	0	17%
E.2.1 Green Procurement Policy	Prep	●	5	10	24	8%
E.2.1.1 Supplier Environmental Programmes	Prep		2	4	21	12%
E.2.1.2 Supplier Environmental Certifications	Prep		0	0	27	17%
E.2.2 Environmental Supply Chain Incidents*	QualP		39	0	0	21%

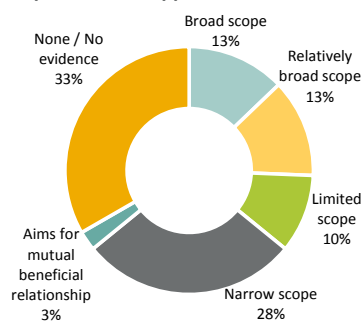
* high: No controversies or Level 1 controversies; medium: Level 2 controversies; low: Level 3-5 controversies

Source: Sustainalytics

Social Supplier Standards

The Aerospace & Defence industry has an extensive global supply chain throughout developed countries and emerging markets. For instance, the supplier network of aircraft manufacturers like Boeing includes approximately 21,000 suppliers. Thus, companies are regularly exposed to social and environmental issues within the supply chain. Nevertheless, one third of the companies analysed by Sustainalytics have not introduced social standards for their suppliers. Only a total of five A&D companies demonstrate best practice, having implemented supply chain standards with a very broad scope of criteria: **Bombardier, Kongsberg Gruppen, Northrop Grumman, Thales and Zodiac Aerospace**. These companies stand out for their comprehensive social standards addressing issues such as discrimination, health and safety, wages and benefits, freedom of association, working hours, bribery, community engagement and forced or child labour. Among these companies, Bombardier, Thales and Zodiac

Scope of Social Supplier Standards



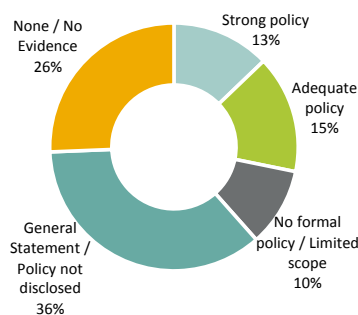
Aerospace have established advanced systems to monitor supplier compliance. For instance, **Thales'** suppliers are required to sign the company's Purchasing and Corporate Responsibility Charter and complete self-assessments. In addition, Thales audits its suppliers for compliance and provides relevant materials via an online portal. Correlatively, Thales has a Supplier Relationship Management System (SRM) to foster greater transparency in business dealings. Also, **Embraer** demonstrates best practice by requiring all of its suppliers to sign a socio-environmental responsibility agreement. Those suppliers that the company considers critical are also subject to specific evaluations and may undergo audits. The Brazilian company also discloses the number of suppliers that became the target of corrective action plans or whose business relationships were ended due to non-compliance.

Green Procurement

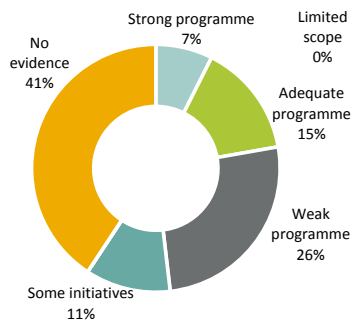
Apart from the integration of social standards into procurement decisions, Aerospace & Defence companies face stakeholder expectations for addressing environmental sourcing. Compared to other manufacturing industries like carmakers, there is room for significant improvement. According to Sustainalytics' research, around 26 percent of the companies in the industry do not consider environmental issues when purchasing goods and services from suppliers. Comparatively, in the automotive industry, the proportion amounts to only 10 percent. However, approximately 64 percent of Aerospace & Defence companies have implemented a policy on green procurement or at least launched activities to improve supplier-related performance. Nevertheless, the policies of only four companies are considered strong in addressing both product- and process-based selection criteria.

As was the case for social procurement, the French **Thales** and **Zodiac Aerospace** are again among the industry leaders, as they have established strong environmental purchase criteria. Thales' suppliers are required to sign the company's Purchasing and Corporate Responsibility Charter, which includes clauses to align suppliers with the company's environmental principles regarding procedures and products, particularly in terms of energy consumption and waste. Meanwhile, Zodiac expects its suppliers to comply with all environmental regulations, limit the use of hazardous substances and implement an environmental management system certified according to ISO 14001. Of additional note are the policies of **Airbus**, **Cobham** and **QinetiQ**, which include product- and process-based criteria.

Green Procurement Policy



Supplier Environmental Programmes



Next to strong green procurement standards, a programme to further increase the environmental performance of suppliers is considered best practice. In total, almost 50 percent of the companies in the industry have implemented such a programme. However, only two companies, **Thales** and **Bombardier**, have implemented a strong programme. Nevertheless, both companies fail to provide evidence that a majority of corporate suppliers have certified environmental management systems. Overall, only four companies report on supplier certification, which represents a relatively low proportion in comparison to industries such as Automobiles or Technology Hardware. For instance, almost half of the carmakers covered by Sustainalytics disclose supplier certification, and approximately 30 percent of the Technology Hardware companies purchase from certified suppliers.

Best Practice

- Comprehensive social standards for suppliers, along with a robust system to monitor supplier compliance;
- A clear policy on green procurement, which includes product- and process-based selection criteria, to improve supplier-related performance;
- Product selection criteria that favour suppliers certified to ISO 14001 or similar standards.

Supply Chain Management – Leaders and Laggards

Leaders	Country	MCap (USD m)	Score: SCM	Overall
Bombardier, Inc.	Canada	6,403	77.5	78.2
Thales	France	13,554	76.7	70.9
QinetiQ Group Plc	United Kingdom	2,398	71.2	80.8
Embraer SA	Brazil	5,974	70.8	83.0
United Technologies Corp.	United States	103,220	68.7	69.2
Laggards	Country	MCap (USD m)	Score: SCM	Overall
BE Aerospace Inc.	United States	8,424	37.5	48.0
TransDigm Group Incorporated	United States	9,237	37.5	47.8
AviChina Industry & Technology Co. Ltd.	Hong Kong	3,296	38.5	47.1
Bharat Electronics Limited	India	1,241	38.5	57.0
Macdonald Dettwiler & Associates Ltd.	Canada	2,600	38.5	48.7
Spirit AeroSystems Holdings Inc	United States	4,178	38.5	60.1
Triumph Group, Inc.	United States	3,393	38.5	50.8
Ultra Electronics Holdings plc	United Kingdom	2,249	38.5	53.2

Source: Sustainalytics, Capital IQ



Baseline: moderate

Outlook: positive

Outlook – Green procurement likely to gain importance

Aerospace & Defence companies depend on a functioning supply chain, especially due to growing product innovation pressure. The integration of environmental standards in procurement decisions is likely to gain importance in the near future. Compared to other industries, A&D companies tracked by Sustainalytics have not been involved in severe controversies related to the supply chain in recent years. Nevertheless, there is room for improvement in terms of establishing social and environmental procurement policies and programmes for the industry as a whole. Only a few A&D companies demonstrate best practice. Due to product innovation pressure to develop energy-efficient products and growing stakeholder expectations, however, we expect that A&D companies will further improve their social and environmental supply chain management systems.

Energy Use and GHG Emissions – On track

As a manufacturing industry, Aerospace & Defence is highly exposed to rising energy prices. And as the economic link between energy efficiency and operational cost solidifies, robust GHG monitoring and reporting practices can provide information that facilitates operational efficiencies. Also, regulatory pressure and stakeholder expectations towards lower operational carbon emissions present a challenge to the industry. Our analysis shows that most companies in the industry have learned their lessons and implemented programmes to reduce their direct GHG emissions. However, there is still room for improvement with respect to carbon emissions disclosure and performance.

ESG performance – Focus on programmes

Through its production activities and product offerings, the A&D industry contributes to global climate change. Industry response is driven by an increased understanding of the impact climate change can have on operational costs, regulatory changes, costs of resources (such as fuels) and consumer demand. Programmes to reduce operational GHG emissions and increase the use of renewable energy are considered important ways to address the industry’s climate change impact.

Sustainalytics’ research framework considers Energy Use and GHG Emissions by applying two Disclosure, two Preparedness, three Quantitative Performance and one Qualitative Performance indicator to the company research.

Rising stakeholder demands drive company responses

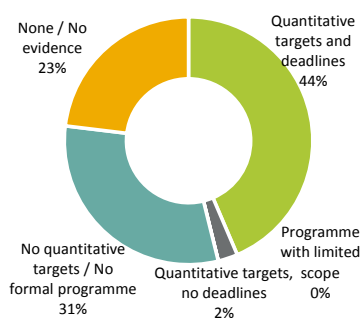
Energy Use and GHG Emissions – Related Indicators

Related Indicators	Dimension	Key indicator	# companies with ... score			Weight in issue
			high	medium	low	
E.1.5 CDP Participation	Disc		20	1	18	6%
E.1.6 Scope of GHG Reporting	Disc		13	7	7	6%
E.1.7 GHG Reduction Programmes	Prep	●	17	1	21	11%
E.1.8 Renewable Energy Programmes	Prep		2	1	9	6%
E.1.9 Carbon Intensity	QuantP		1	14	12	6%
E.1.10 Carbon Intensity Trend	QuantP		1	11	15	6%
E.1.11 Renewable Energy Use	QuantP		3	0	24	6%
E.1.12 Operations Incidents*	QualP	●	34	3	0	56%

* high: no controversies or Level 1 controversies; medium: Level 2 controversies; low: Level 3-5 controversies

Source: Sustainalytics

GHG Reduction Programmes



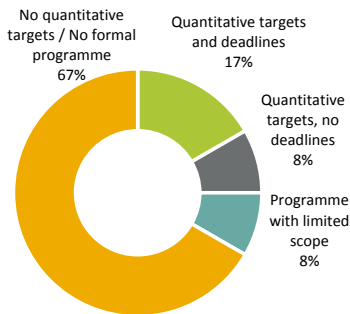
GHG reduction programmes

Approximately 76 percent of the companies in this industry have started to address their heavy environmental impact with programmes to reduce their direct GHG emissions. This represents a remarkable improvement compared to 2011, when 50 percent of the covered companies had programmes in place. To reduce their operational footprint, companies are exploring various energy efficiency initiatives. Approximately 60 percent of the companies in the industry with programmes have also set quantitative targets and deadlines to lower GHG emissions from their operations.

Companies with strong reduction targets

For instance, **Lockheed Martin** aims for a 35 percent reduction in carbon emissions and a 20 percent reduction in facility energy use by 2020, compared to its 2010 levels. In 2012, the company managed to exceed its previous reduction target, as it reached a 31 percent reduction in contrast to its 25 percent reduction target (base year: 2007). Carbon emissions have been cut by promoting energy conservation and efficiency measures in its facilities with lighting and equipment upgrades, operational assessments, “green” purchase requirements in its contracts with utility providers and the use of renewable energy technology. Additional large companies in the industry have set strong mid-term and long-term targets. **Rolls Royce** aims to reduce its carbon emissions by 17 percent by 2022, compared to 2012. **Airbus** has set even stronger targets. The company’s strategy includes a 50 percent reduction of its CO₂ emissions by 2020 with 2006 as the baseline.

Renewable Energy Programmes



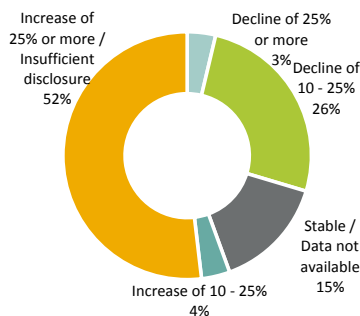
The implementation of programmes to increase the use of renewable energy can be considered a promising measure to reduce the operations-related carbon footprint. However, the clear majority of A&D companies do not have a formal programme in place. Only 17 percent of the companies tracked by Sustainalytics established programmes with quantitative targets with deadlines, such as **Airbus**, which has set a target to meet 20 percent of its energy needs with renewables by 2020 (compared to 2006 levels). Compared to other manufacturing industries, like Automobiles, the Aerospace & Defence industry needs to catch up regarding the use of renewable energies.

Overall lack of carbon data disclosure

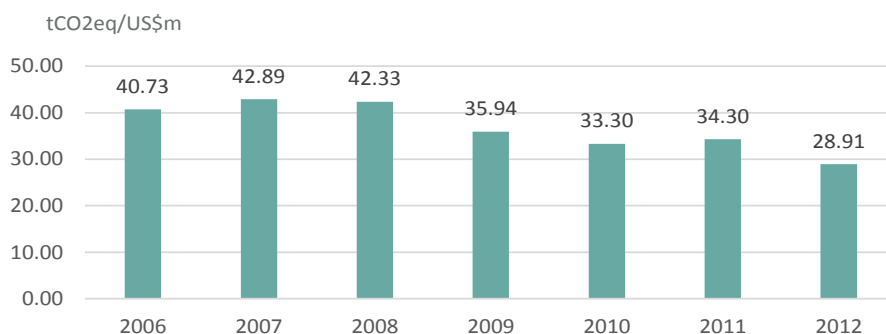
Carbon intensity

Despite the relatively high percentage of companies with at least adequate GHG reduction programmes, there is an overall lack of carbon data disclosure in the industry. The majority of companies do not provide sufficient disclosure to determine their carbon intensity, or they recorded an increase of GHG emissions of more than 25 percent in the last three years. **Boeing** is the only industry peer that achieved a decline of more than 25 percent. Also, **Airbus** can be considered an industry leader if we look at its carbon intensity trend. The company reduced its GHG emissions both in absolute and relative terms (by almost 19%). **Finmeccanica** is a laggard, since its emissions increased by more than ten percent in recent years.

Carbon Intensity Trend



Looking at the carbon footprint of the overall industry, we can confirm the impression of a generally positive trend. The chart below shows the weighted average emissions of CO₂ equivalents (scope 1: direct emissions and scope 2: from consumption of purchased energy) per USDm revenue. Compared to 2006, the carbon intensity of the industry dropped from an average of 40.7 to just 28.9 in 2012, a reduction of 29 percent. The industry seems to be well on track but now needs to keep the momentum in order to achieve its ambitious future goals.

Carbon Intensity (Scopes 1&2): Industry Average*

* number of companies varies across years; Honeywell and CEA Inc. excluded **Source:** Sustainalytics, company reports

Best Practice

- Disclosure of GHG emissions data and assessment of exposure to climate-related risks and opportunities;
- Implementation of robust GHG management programmes with reduction targets and deadlines;
- Implementation of a programme to increase the use of renewable energy.

Energy Use and GHG Emission – Leaders and Laggards

Leaders	Country	MCap (USD m)	Score: EG	Overall
QinetiQ Group Plc	United Kingdom	2,398	100.0	80.8
Raytheon Co.	United States	30,089	90.3	67.6
Airbus Group	Netherlands	56,538	88.9	74.4
Bombardier, Inc.	Canada	6,403	86.1	78.2
Rolls Royce Holdings plc	United Kingdom	37,727	86.1	70.0
Laggards	Country	MCap (USD m)	Score: EG	Overall
Honeywell International Inc.	United States	73,986	47.2	55.6
Precision Castparts Corp.	United States	38,104	55.0	50.4
General Dynamics Corp.	United States	35,477	57.8	54.9
CAE Inc.	Canada	3,438	58.3	52.6
Elbit Systems Ltd.	Israel	2,470	58.3	55.9
Singapore Technologies Engineering Ltd.	Singapore	9,319	58.3	61.7
TransDigm Group Incorporated	United States	9,237	58.3	47.8

Source: Sustainalytics, Capital IQ



Baseline: moderate

Outlook: positive

Outlook – Rising stakeholder pressure

Energy prices and stakeholder demands regarding lower operations-related GHG emissions are likely to grow in the near future. In particular, regulators, customers and NGOs target the carbon footprint of manufacturing industries. Overall, the industry has a moderate level of preparedness. Approximately 75 percent of companies established programmes to reduce their direct GHG emissions, which is remarkable compared to 2011. However, there is still room for improvement with respect to carbon emissions disclosure and performance. Nevertheless, we expect that the industry will reduce its carbon footprint, especially in light of stakeholder and regulatory pressure with respect to this key ESG issue.

Sustainable Products and Services – Efficiency is the name of the game

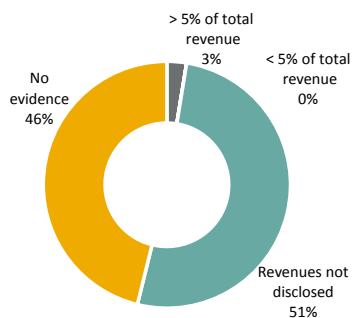
Aerospace & Defence companies have an impact on climate change, through both operational GHG emissions and product offerings. Several companies in the industry have started to address this environmental impact. Leading industry players are utilising life-cycle assessment strategies in product development and maintenance to bring more efficient products to market. Particularly, companies providing products to the commercial airline industry are expected to support industry-wide efficiency gains and address customer expectations for more fuel-efficient aircraft through engine improvements and the use of lighter materials.

Securing competitive advantage

The Aerospace & Defence industry affects climate change not only through its operations but through its product offerings. Increasing fuel prices, combined with a stricter regulatory environment and stakeholder pressure, have caused companies to start considering environmental impacts within product design. Leading companies are therefore utilising life-cycle assessment strategies in product development and maintenance to bring more efficient products to market.

Utilising life-cycle assessment strategies in product development and maintenance

Clean Technology Revenues



One example is alternative fuel. Although still in its infancy, demand for alternative fuels is expected to grow in coming years, and several manufacturers and airlines are already involved in development and testing. The ability to capitalise on these opportunities is a key driver in this competitive market. Environmental innovation represents an important point of differentiation among manufacturers, while simultaneously preparing companies for emerging regulations. Sustainalytics' research framework considers Sustainable Products and Services by applying one Quantitative Performance indicator to the company research.

Sustainable Products and Services – Related Indicators

Related Indicators	Dimen- sion	Key indicator	# companies with ... score			Weight in issue
			high	medium	low	
E.3.1.2 Clean Technology Revenues	QuantP	●	1	0	38	100%

Source: Sustainalytics

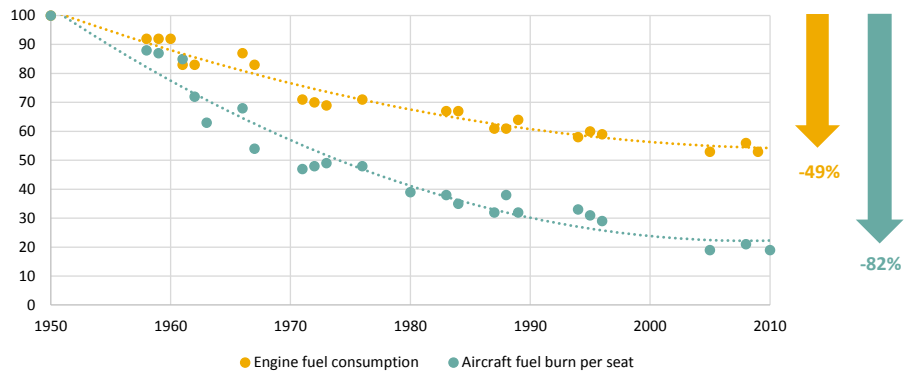
Collective commitment

Aviation industry: 50 percent reduction of GHG emissions by 2050

In 2010, the International Civil Aviation Organization (ICAO) adopted a collective commitment on behalf of the international commercial air transport industry. This was based on collaboration with industry stakeholders, such as the Air Transport Action Group, which includes **Airbus**, **Boeing**, **Bombardier**, **Embraer**, **Honeywell Aerospace**, **Pratt and Whitney** (United Technologies Corp.) and **Rolls-Royce**, amongst others. The resulting commitment calls for: an aspirational global fuel efficiency improvement rate of two percent per annum from 2021 to 2050; an average improvement in fuel efficiency of 1.5 percent per year from 2009 to 2020; and the reduction of GHG emissions by 50 percent by 2050, compared to 2005 levels.

Fuel efficiency gains since the modern jet age

Significant improvements in fuel efficiency over the last decades



Source: Air Transport Action Group, 2010

Boeing and Airbus well-positioned

Important steps have been taken

The largest commercial aircraft manufacturers, **Boeing** and **Airbus**, have positioned themselves well. Airbus has set targets and deadlines to reduce greenhouse gas emissions and other environmental impacts originating from its products. For example, the company states that it aims to reduce 75 percent of its CO₂ emissions and 90 percent of NO_x emissions by the year 2050. Boeing is also invested in the development of more energy-efficient aircraft. More than 75 percent of its research and development efforts are directed towards improvements in environmental performance. The company reports that its 787 Dreamliner is 20 percent more fuel efficient than other similarly sized planes, in addition to being more environmentally progressive throughout its life cycle. The airplane is manufactured using fewer hazardous materials, consumes less fuel and produces fewer emissions. These improvements are considered important steps in meeting short-term and medium-term expectations regarding GHG emission reduction targets.

Alternative fuels – An area of increasing industry focus

Companies have started to identify options to replace fossil fuels

However, questions remain as to whether these activities can adequately contribute to a more sustainable future for transportation in the long term. Thus, the development of alternative energy resources such as biofuel, solar power, wind power and geothermal power is also an area of increasing industry focus. In particular, the exploration into alternative aviation fuels is considered crucial and beneficial to addressing climate change and offsetting the risks of rising fuel costs and scarcity of supply. Companies in the industry have started to identify options to replace traditional fossil fuels, at least in part, with biofuels (synthetic fuels made from biomass).

Development of regional biofuel

UOP, a Honeywell subsidiary, develops biofuels and biofuel conversion processes. UOP has a process to convert non-edible, second-generation natural oils into Honeywell Green Diesel™, engineered for use in existing fuel tanks. It also develops Honeywell Green Jet Fuel, a commercial jet fuel that has already successfully powered a transatlantic test flight using 50/50 Green Jet Fuel and petroleum-based jet fuel.

Additionally, efforts include those of **Airbus**, which aims to encourage the development of regional biofuel value chains and make use of raw materials such as camelina, jatropha, algae, yeast, woodchips and organic waste.

International biofuel initiatives

Airbus is working with the European Commission to develop a roadmap for the implementation of sustainable aviation fuels and is part of the “European Advanced Biofuels Flightpath” initiative. In Canada, it announced a partnership with Air Canada and BioFuelNet Canada to evaluate solutions for the production of sustainable jet fuel. The Brazilian firm **Embraer** has also partnered in a joint initiative that saw an experimental flight operated on biofuel derived from sugarcane. This blend is reported to reduce CO₂ emissions by 82 percent compared to regular kerosene. However, the techniques involved still need to be subjected to regulatory tests before they can generate revenue.

Still in a very early stage

Overall, the use of biofuels in the aviation industry is in a very early stage where it is confined to testing and some commercial flights. Through May 2014, only approximately 1,500 commercial flights have been performed with alternative fuels worldwide (IATA, 2014). However, biofuels constitute a promising opportunity to reduce GHG emissions and a potential solution to energy security concerns in the industry.

Beyond the aviation industry

Biofuel military planes, hybrid naval ships

Aerospace & Defence companies may also choose to provide sustainability-related products and services to customers outside of the commercial airlines industry, such as military services. **Northrop Grumman** develops clean technology in cooperation with the United States Air Force. The company has already tested F/A-18 aircraft with biofuels and developed a hybrid ship to reduce naval fuel use. **Lockheed Martin** has also begun to commercialise efforts that generate thermal energy from oceans, a technology which could be used at military shoreside bases in the tropics. For its part, **Textron** has developed the Next Generation Fuel System (NGFS) production technology to help minimise CO₂ and hydrocarbon emissions with lighter and multi-layered tanks in cars. The company also discloses its Selective Catalytic Reduction (SCR) technology, which aims to minimise nitrogen oxides (NO_x) in diesel engine exhaust fumes. Last but not least, **Rolls Royce** offers several clean technology products, including the hybrid diesel-electric propulsion system, a solid-oxide fuel cell and a lean-burn reciprocating gas engine. This last product is considered to be able to achieve a reduction of up to 90% in nitrous oxides.

Best Practice

- Exploring of the use of alternative fuel options for the aviation industry;
- Development of low-carbon, energy-efficient products and services.



Baseline: weak
Outlook: positive

Outlook – Increasing pressure, improving answers

The industry faces significant pressure to provide sustainability-related products with a lower environmental impact. In particular, aircraft manufacturers are expected to develop more energy-efficient products and explore alternative fuel options. Innovative industry leaders can benefit from new market opportunities, while industry laggards that do not meet consumer demands face significant business risks. Currently, there is room for improvement, since products with a very clear sustainable dimension still account for a relatively low share of the A&D companies' portfolios. Therefore, we consider the industry's current performance as weak. However, we see a positive outlook and expect that sustainable products and services will gain significant importance as a key ESG issue.

Indicator Chartbook⁵

Key Indicators

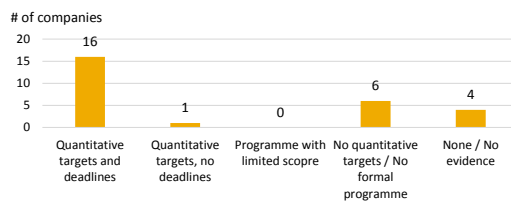
Indicator	Key ESG issue	Dimension	Weight*	Min	Average	Median	Max
Environment							
E.1.7 GHG Reduction Programmes	Energy Use and GHG Emissions	Prep	4.6%	0	53	25	100
E.1.12 Operations Incidents	Controversy	QualP	22.9%	50	96	100	100
E.2.1 Green Procurement Policy	Supply Chain	Prep	2.9%	0	37	30	100
E.3.1.2 Clean Technology Revenues	Sustainable Products and Services	QuantP	8.6%	0	15	25	100
Social							
S.1.1 Freedom of Association Policy	Human Capital	Prep	2.9%	0	21	0	100
S.1.7 Employee Incidents	Human Capital	QualP	20.0%	50	95	100	100
S.2.1 Scope of Social Supplier Standards	Supply Chain	Prep	2.9%	0	35	25	100
S.3.3 Customer Incidents	Controversy	QualP	8.6%	50	92	100	100
Governance							
G.1.1.1 Bribery & Corruption Programmes	Bribery and Corruption	Prep	8.6%	0	55	50	100
G.1.5 Business Ethics Incidents	Business Ethics	QualP	11.4%	0	89	100	100

* indicator weight within E, S, G

Environment

53

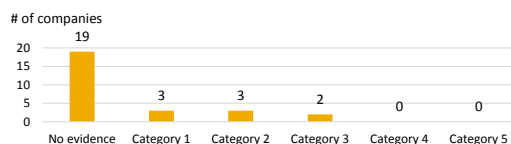
E.1.7 GHG Reduction Programmes



Aerospace & Defence shows an increased understanding of the impact climate change can have on operational costs, regulatory changes, costs of resources (such as fuels) and consumer demand. Approximately two thirds of the developed market (DM) companies in this industry have started to address their carbon footprint with programmes to reduce their direct GHG emissions. A high share of companies have also set quantitative reduction targets and deadlines.

96

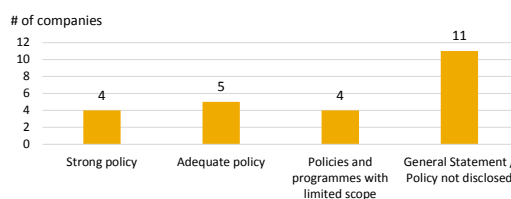
E.1.12 Operations Incidents



Operations-related environmental incidents are not widespread in the industry. No company is involved in category 4 or 5 incidents. Nevertheless, there have been operations-related cases concerning issues like emissions, effluents and waste. For instance, in 2013, **Boeing** was accused of disposing of radioactive waste at its Santa Susana Field Lab near Los Angeles, although the facilities had not been licensed to handle radioactive material.

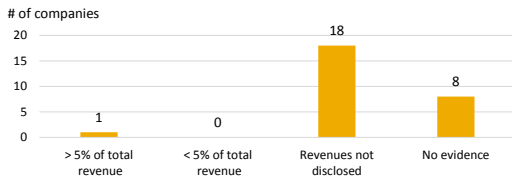
37

E.2.1 Green Procurement Policy



Apart from the integration of social standards into procurement decisions, Aerospace & Defence companies face stakeholder expectations to address environmental sourcing. Approximately 54 percent of the DM Aerospace & Defence companies have implemented a policy on green procurement or at least launched programmes to improve suppliers' performance. Nevertheless, the policies of only four companies are considered strong in addressing both product- and process-based selection criteria. **Thales** and **Zodiac Aerospace** are considered industry leaders, as they have established strong environmental purchase criteria.

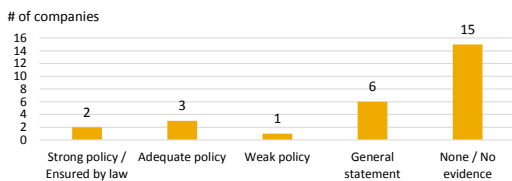
15 E.3.1.2 Clean Technology Revenues



The industry faces significant pressure to provide sustainability-related products with a lower environmental impact. In particular, aircraft manufacturers are expected to develop more energy-efficient products and explore alternative fuel options. Innovative industry leaders can benefit from new market opportunities, while industry laggards that do not meet consumer demands face significant business risks. Several companies have developed products with a clear sustainable dimension. However, disclosure on revenues or share of product portfolio is still limited.

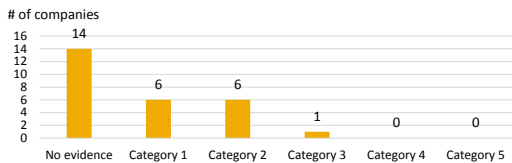
Social

21 S.1.1 Freedom of Association Policy



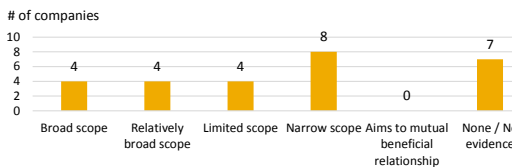
Aerospace & Defence companies depend on a highly qualified and skilled workforce to drive innovation and competitiveness. Thus, strong labour policies and programmes are considered crucial to achieve this goal, avoid labour conflicts and mitigate operations-related risks. However, the industry lacks adequate employee policies. Only a total of six DM companies have adopted a policy on freedom of association. Among these companies, only the policies of **Airbus** and **Boeing** can be considered strong, as they include a company-wide commitment to ensure employee freedom of association with labour unions.

95 S.1.7 Employee Incidents



Aerospace & Defence companies with poor labour relations management are exposed to controversies. Overall, the industry has been less involved in severe employee-related controversies compared to other manufacturing industries. Though there is a lack of controversies assessed with a category level 4 or 5, nevertheless there have been several controversies related to health and safety as well as general labour relations issues.

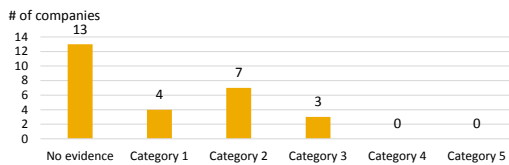
35 S.2.1 Scope of Social Supplier Standards



The Aerospace & Defence industry has an extensive global supply chain throughout developed countries and emerging markets. The integration of social and environmental criteria in the management of suppliers is considered an important step to mitigate operations-related risks and promote best practices. Only a few A&D companies like **Bombardier** or **Thales** demonstrate best practice, having implemented supply chain standards with a very broad scope of criteria.

92

S.3.3 Customer Incidents

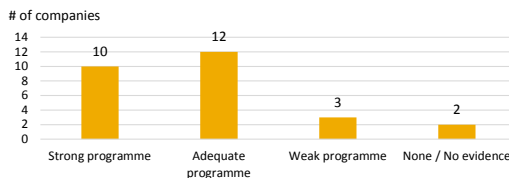


Customer incidents are relatively common in the industry. The majority of cases relate to product quality and safety issues. Though there is a lack of category 4 and 5 controversies, nevertheless several companies have been involved in moderate and significant cases in recent years. In particular, **Boeing** faced product quality and safety issues, e.g., regarding its 787 Dreamliner in Japan and the US.

Governance

55

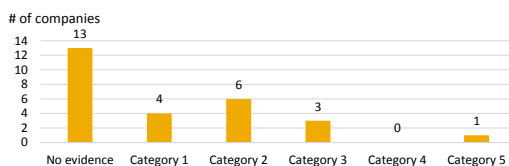
G.1.1.1 Bribery and Corruption Programmes



The A&D industry is prone to cases of bribery and corruption due to competition for limited, high-value contracts and massive secrecy surrounding military procurement. Only two companies do not have a programme, while approximately 40 percent of assessed programmes are considered to be strong. Best practices include annual training sessions, regular employee endorsements of the corporate code of conduct, implementation of internal monitoring systems to detect corruption and ethical committees that can be consulted by employees.

89

G.1.5 Business Ethics Incidents



A high level of preparedness with strong or at minimum adequate programmes is no guarantee for the mitigation of bribery and corruption cases. Approximately half of the companies tracked by Sustainalytics have been involved in bribery- and corruption-related controversies in recent years. However, the number of severe cases is limited. The most severe bribery and corruption cases in the industry concern the activities of **Finmeccanica**. Investigations carried out thus far indicate the existence of widespread, systemic and long-lasting irregularities.

Momentum

Indicator	Average score			
	2011	2012	2013	current
Environment				
E.1.7 GHG Reduction Programmes	59	66	70	53
E.1.12 Operations Incidents	96	97	96	96
E.2.1 Green Procurement Policy	33	38	44	37
E.3.1.2 Clean Technology Revenues	9	13	18	15
Social				
S.1.1 Freedom of Association Policy	27	25	19	21
S.1.7 Employee Incidents	93	92	93	95
S.2.1 Scope of Social Supplier Standards	26	31	37	35
S.3.3 Customer Incidents	92	92	89	92
Governance				
G.1.1.1 Bribery & Corruption Programmes	49	54	56	55
G.1.5 Business Ethics Incidents	92	88	87	89

Disclosure

88

Industry Leader

Northrop Grumman Corp.

+32

Momentum Leader

MTU Aero Engines Holding AG

-24

Momentum Laggard

CAE Inc.

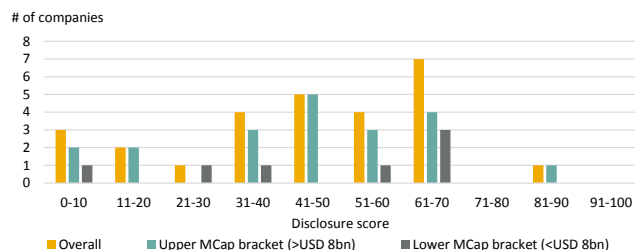
Overview

Top 5 companies upper MCap bracket (>USD 8bn)	Country	MCap (USD m)	Disc score
Northrop Grumman Corporation	United States	25,590	87.8
Thales	France	13,554	67.6
BAE Systems plc	United Kingdom	23,273	65.3
Lockheed Martin Corporation	United States	50,695	63.3
Rockwell Collins Inc.	United States	10,485	63.3

Top 5 companies lower MCap bracket (<USD 8bn)	Country	MCap (USD m)	Disc score
Finmeccanica SpA	Italy	5,416	65.3
Cobham plc	United Kingdom	5,388	63.3
Bombardier, Inc.	Canada	6,403	62.4
MTU Aero Engines Holding AG	Germany	4,407	57.6
Meggitt plc	United Kingdom	7,041	35.9

Disclosure reporting focuses mostly on standards around sustainability reporting but also on specific governance indicators like board remuneration and tax transparency. An analysis of the distribution of Disclosure scores shows that large companies slightly outperform companies of the lower market cap. However, the positive correlation between size and performance does not cover all bracket scores. Nevertheless, this observation is not industry specific. Large companies have an increased ability to devote funds to enhanced reporting and verification. Looking at the regional origin of the companies tracked does not suggest a correlation. Companies based in three different countries are among the top performers.

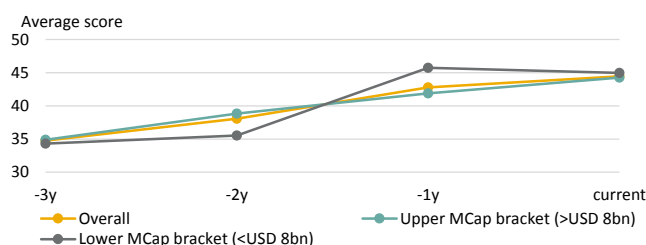
Distribution of Disclosure Scores



Disclosure Indicators

Disclosure	Key	Min	Avg	Med	Stdev	Max	Weight
Environment							
E.1.5 CDP Participation		0	53	100	50	100	15.7%
E.1.6 Scope of GHG Reporting		0	61	50	42	100	15.7%
Social							
n.a.		n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Governance							
G.1.4 Tax Disclosure		0	28	0	42	90	19.6%
G.2.1 ESG Reporting Standards		0	30	25	34	100	19.6%
G.2.2 Verification of ESG Reporting		0	19	0	30	100	19.6%
G.2.3 Board Remuneration Disclosure		0	90	100	27	100	4.9%
G.2.4 Board Biographies Disclosure		0	85	100	36	100	4.9%

Momentum



Momentum Leaders Disclosure	Score: current	-1y	change
MTU Aero Engines Holding AG	57.6	25.5	32.2
Zodiac Aerospace SA	37.3	9.8	27.5
TransDigm Group Incorporated	30.2	7.8	22.4
Bombardier, Inc.	62.4	47.1	15.3
L-3 Communications Holdings Inc.	42.9	31.4	11.6

Momentum Laggards Disclosure	Score: current	-1y	change
CAE Inc.	9.8	33.3	-23.5
Airbus Group	57.5	75.5	-18.0
Precision Castparts Corp.	9.8	27.5	-17.6
Cobham plc	63.3	73.5	-10.2
Rolls Royce Holdings plc	40.8	51.0	-10.2

As the table above shows, disclosure on governance-related indicators (G.2.3 and G.2.4) is broadly accepted, with the vast majority of Aerospace & Defence companies delivering information about board remuneration and biographies. The picture looks different when it comes to pure ESG issues, such as CDP participation and ESG reports and their verification but also tax disclosure. The relatively low average scores suggest significant room for improvement.

The chart on the left indicates that the Aerospace & Defence industry overall improved its disclosure on ESG topics. In particular, smaller companies show clear momentum. However, a comparison between current and past-year performance reveals that their Disclosure scores slightly declined and now equal larger companies' performance. The German aerospace company **MTU Aero Engines** can be considered the momentum leader. The company intensified its reporting on governance and environmental issues.

Preparedness

69

Industry Leader
Bombardier, Inc.

+24

Momentum Leader
MTU Aero Engines Holding AG

-6

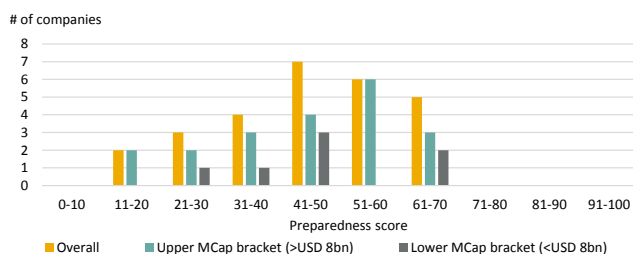
Momentum Laggard
Rockwell Collins Inc.

Overview

Top 5 companies upper MCap bracket (>USD 8bn)	Country	MCap (USD m)	Prep score
Rolls Royce Holdings plc	United Kingdom	37,727	64.9
Airbus Group	Netherlands	56,538	63.9
Thales	France	13,554	60.3
Boeing Co.	United States	95,761	56.4
United Technologies Corp.	United States	103,220	55.7

Top 5 companies lower MCap bracket (<USD 8bn)	Country	MCap (USD m)	Prep score
Bombardier, Inc.	Canada	6,403	69.2
MTU Aero Engines Holding AG	Germany	4,407	61.5
Finmeccanica SpA	Italy	5,416	47.2
Cobham plc	United Kingdom	5,388	46.8
Meggitt plc	United Kingdom	7,041	43.5

Distribution of Preparedness Scores

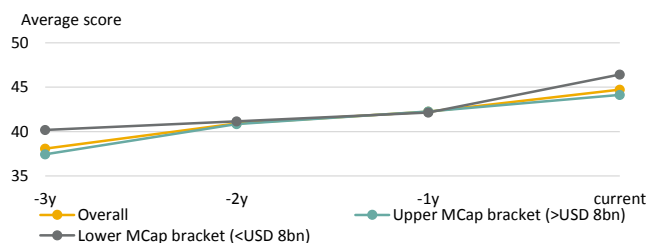


Preparedness indicators combine compliance and management systems, policies and programmes (e.g., GHG reduction programme or freedom of association policies). Our analysis does not reveal a clear correlation between large and small caps and Preparedness scores. In particular, in the range of average performers (score of 41-60), large and small caps do not significantly differ in terms of their scores. **Bombardier** stands out for leading the lower market cap companies and the total industry.

Preparedness Indicators (selection)

Preparedness	Key	Min	Avg	Med	Stdev	Max	Weight
Environment							
E.1.1 Environmental Policy	●	0	50	50	35	100	2.8%
E.1.7 GHG Reduction Programmes	●	0	53	25	44	100	3.8%
E.1.8 Renewable Energy Programmes	●	0	18	0	28	100	1.9%
E.2.1 Green Procurement Policy	●	0	37	30	31	100	2.3%
Social							
S.1.1 Freedom of Association Policy	●	0	21	0	33	100	2.3%
S.1.2 Discrimination Policy	●	0	40	50	27	100	1.2%
S.2.1 Scope of Social Supplier Standards	●	0	35	25	35	100	2.3%
S.2.2 Supply Chain Monitoring	●	0	26	0	36	100	2.3%
S.3.2.1 QMS Certifications	●	0	33	25	28	100	7.0%
Governance							
G.1.1.1 Bribery & Corruption Programmes	●	0	55	50	36	100	7.0%
G.1.5 Business Ethics Incidents	●	0	89	100	22	100	9.4%
G.3.2 Lobbying and Political Expenses	●	0	22	0	40	100	3.5%

Momentum



Momentum Leaders Preparedness	Score: current	-1y	change
MTU Aero Engines Holding AG	61.5	37.9	23.6
BE Aerospace Inc.	18.8	2.3	16.4
Finmeccanica SpA	47.2	37.2	10.0
Northrop Grumman Corporation	54.7	46.8	7.9
Rolls Royce Holdings plc	64.9	57.5	7.3

Momentum Laggards Preparedness	Score: current	-1y	change
Rockwell Collins Inc.	46.0	52.1	-6.1
Boeing Co.	56.4	60.9	-4.5
TransDigm Group Incorporated	14.3	18.7	-4.4
Precision Castparts Corp.	22.1	25.4	-3.3
Lockheed Martin Corporation	54.0	56.5	-2.5

Overall, the industry records a lack of significant momentum in terms of the Preparedness score. Neither the smaller nor the larger companies substantially improved their scores. Nevertheless, again **MTU Aero Engines** can be seen as an outstanding exception. The company achieved a score upgrade of more than 23 points, in particular due to its new or revised programmes and reporting in the areas of governance and social issues. Overall, the decrease of the Preparedness score of the momentum laggards is smaller than the score increase of the leaders. The US-based company **Rockwell Collins** is at the top of the laggards list, due to the deterioration of its bribery and corruption programmes and social supply chain standards.

The picture of the industry's performance is not homogeneous viewed across different indicators. While the average scores of Bribery and Corruption Programmes, GHG Reduction Programmes and Environmental Policy are above 50 points, the industry shows a significantly weaker performance with respect to Employee Policies, Renewable Energy Programmes and QMS Certifications.

Quantitative Performance

75

Industry Leader
Bombardier, Inc.

+29

Momentum Leader
MTU Aero Engines Holding AG

-12

Momentum Laggard
General Dynamics Corp.

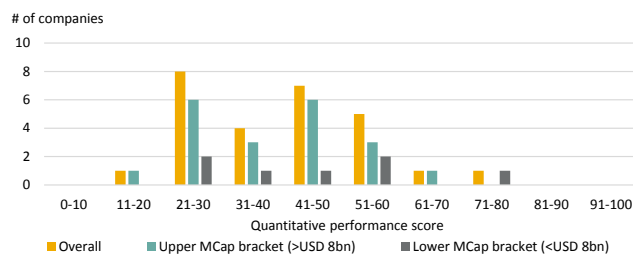
Overview

Top 5 companies upper MCap bracket (>USD 8bn)	Country	MCap (USD m)	QuantP
Airbus Group	Netherlands	56,538	65.7
Lockheed Martin Corporation	United States	50,695	58.8
Safran SA	France	30,380	51.3
United Technologies Corp.	United States	103,220	50.6
Northrop Grumman Corporation	United States	25,590	49.8

Top 5 companies lower MCap bracket (<USD 8bn)	Country	MCap (USD m)	QuantP
Bombardier, Inc.	Canada	6,403	75.0
Finmeccanica SpA	Italy	5,416	58.2
MTU Aero Engines Holding AG	Germany	4,407	56.0
Cobham plc	United Kingdom	5,388	48.0
Elbit Systems Ltd.	Israel	2,470	35.5

Quantitative Performance indicators are designed to assess a company's actual sustainability performance, including core issues such as carbon footprint, impact of products and human capital management. For the Aerospace & Defence industry, the indicators with the highest impact are those that relate sustainability-related products, environmental fines and carbon intensity of operations as well as employee health and safety. Overall, our analysis shows that large companies outperform smaller ones. However, there is no correlation between performance and market cap among the industry leaders.

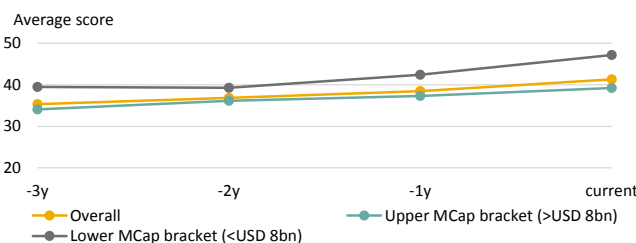
Distribution of Quantitative Performance Scores



Quantitative Performance Indicators

Quantitative Performance	Key	Min	Avg	Med	Stdev	Max	Weight
Environment							
E.1.4 Environmental Fines & Penalties		0	88	100	24	100	10.3%
E.1.9 Carbon Intensity		0	35	50	34	100	5.2%
E.1.10 Carbon Intensity Trend		0	31	0	36	100	5.2%
E.1.11 Renewable Energy Use		0	11	0	32	100	5.2%
E.3.1.2 Clean Technology Revenues	●	0	15	25	19	100	19.4%
Social							
S.1.4 Collective Bargaining Agreements		0	34	25	26	100	6.5%
S.1.5 Employee Turnover Rate		0	19	0	34	100	6.5%
S.1.6 Top Employer Recognition		0	16	0	34	100	6.5%
S.1.6.5 LTIR Trend		0	49	40	43	100	12.9%
S.1.6.6 Employee Fatalities		0	67	50	29	100	6.5%
S.4.1 Activities in Sensitive Countries		100	100	100	0	100	6.5%
S.5.3 Cash Donations		0	31	25	25	100	9.7%
Governance							
n.a.		n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

Momentum



Momentum Leaders Quantitative Performance	Score: current	-1y	change
MTU Aero Engines Holding AG	56.0	26.8	29.2
Lockheed Martin Corporation	58.8	39.2	19.6
BE Aerospace Inc.	23.5	6.1	17.4
Bombardier, Inc.	75.0	64.0	10.9
Airbus Group	65.7	56.6	9.1

Momentum Laggards Quantitative Performance	Score: current	-1y	change
General Dynamics Corp.	23.0	34.5	-11.5
BAE Systems plc	39.0	46.9	-7.9
Rolls Royce Holdings plc	48.0	54.0	-6.0
CAE Inc.	28.8	34.4	-5.6
TransDigm Group Incorporated	21.5	26.8	-5.2

Overall, the industry scores relatively low on Quantitative Performance. While the industry's performance is good on indicators such as environmental fines and employee fatalities, several other areas suggest room for improvement. In particular, the industry lags when it comes to renewable energy use, employee turnover rate and reporting on revenues generated from clean technologies. Nevertheless, the industry shows positive momentum, especially companies with lower market caps. Again, **MTU Aero Engines** has achieved remarkable improvement, especially in the areas of GHG emissions reduction, collective bargaining agreements and injury rates. The deterioration of the momentum laggards' performance is mostly attributable to new environmental fines, occupational incidents and less transparent ESG reporting. **General Dynamics** is a momentum laggard, due to the lack of carbon reporting, while **BAE Systems** lags because of its insufficient injury rate reporting.

Qualitative Performance

70 Industry Laggard
Boeing Co.

+8 Momentum Leader
United Technologies Corp.

-8 Momentum Laggard
Boeing Co.

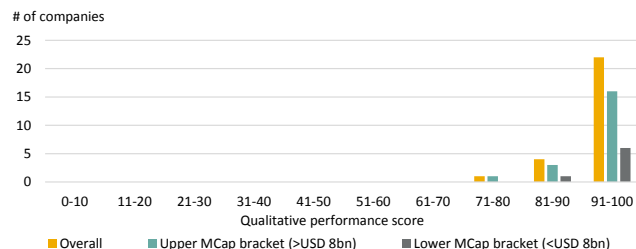
Overview

Bottom 5 companies upper MCap bracket	Country	MCap (USD m)	QualP
Boeing Co.	United States	95,761	70.2
Honeywell International Inc.	United States	73,986	81.2
BAE Systems plc	United Kingdom	23,273	84.8
Rolls Royce Holdings plc	United Kingdom	37,727	89.1
Lockheed Martin Corporation	United States	50,695	90.9

Bottom 5 companies lower MCap bracket	Country	MCap (USD m)	QualP
Finmeccanica SpA	Italy	5,416	82.2
Bombardier, Inc.	Canada	6,403	92.0
Elbit Systems Ltd.	Israel	2,470	97.8
Meggitt plc	United Kingdom	7,041	99.9
Cobham plc	United Kingdom	5,388	99.9

For Aerospace & Defence companies, Qualitative Performance is rated most heavily on environmental operations, human capital and customer- and governance-related issues. Most prominent cases include bribery and corruption incidents, product quality and safety issues, labour disputes and emissions and waste incidents. The distribution of scores underpins that only a few companies are involved in significant controversies, and the vast majority of companies have controversies associated with a relatively low impact or risk. Furthermore, our analysis shows no clear correlation between market cap, region and Qualitative Performance. For instance, both companies with a lower market cap like **Finmeccanica** (Italy) and large industry peers such as **Boeing** (US) have been involved in significant incidents in recent years.

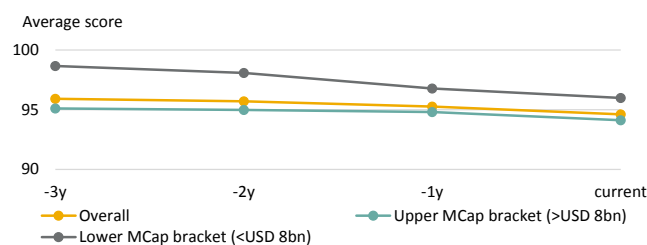
Distribution of Qualitative Performance Scores



Qualitative Performance Indicators

Qualitative Performance	Key	Min	Avg	Med	Stdev	Max	Weight
Environment							
E.1.12 Operations Incidents		50	96	100	12	100	21.8%
E.2.2 Environmental Supply Chain Incidents		100	100	100	0	100	6.8%
E.3.2 Product & Service Incidents		100	100	100	0	100	8.2%
Social							
S.1.7 Employee Incidents	●	50	95	100	10	100	19.0%
S.2.3 Social Supply Chain Incidents		99	100	100	0	100	5.4%
S.3.3 Customer Incidents	●	50	92	100	15	100	8.2%
S.4.3 Society & Community Incidents		20	94	100	17	100	2.7%
Governance							
G.1.5 Business Ethics Incidents	●	0	89	100	22	100	10.9%
G.2.13 Governance Incidents		80	98	100	5	100	8.8%
G.3.4 Public Policy Incidents		100	100	100	0	100	8.2%

Momentum



Momentum Leaders Qualitative Performance	Score: current	-1y	change
United Technologies Corp.	95.6	88.0	7.6
Singapore Technologies Engineering Ltd.	99.9	94.0	5.9
Airbus Group	92.3	90.5	1.9
General Dynamics Corp.	99.5	98.9	0.6
Meggitt plc	99.9	99.5	0.4

Momentum Laggards Qualitative Performance	Score: current	-1y	change
Boeing Co.	70.2	78.3	-8.1
Rolls Royce Holdings plc	89.1	96.0	-6.9
BAE Systems plc	84.8	90.4	-5.7
Finmeccanica SpA	82.2	85.9	-3.6
Bombardier, Inc.	92.0	95.5	-3.5

Overall, the industry's Qualitative Performance has declined slightly over the last three years. This development is, amongst others, due to new lawsuits over key issues in the industry. **Boeing** is considered a momentum laggard, especially in light of its involvement in several product quality and safety issues and incidents related to the disposal of radioactive waste cleanup of a nuclear meltdown site. However, other companies have improved their Qualitative Performance.

Momentum leader **United Technologies** resolved a groundwater contamination case and labour-related issues that resulted in a higher score. Also, **Singapore Technologies Engineering** is among the momentum leaders. The company had been involved in employee and supplier health and safety issues in the past but managed to improve its safety performance and mitigate severe cases in recent years.

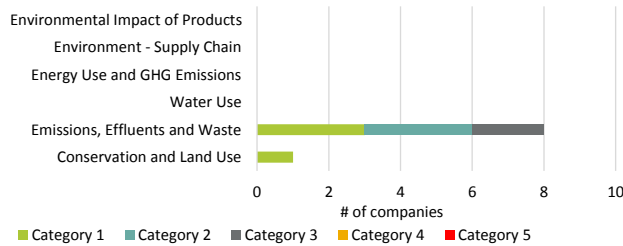
Events related to environmental issues

3 Highest Category
Boeing Co.
Honeywell International Inc.

4 Average Impact Score

3 Average Risk Score

Evaluation of Events per Indicator



Operations-related environmental incidents are not widespread in the industry. No company is involved in category 4 or 5 incidents. Nevertheless, there have been operations-related cases concerning issues like emissions, effluents and waste and conservation and land use.

Next to **Boeing**, accused of disposing of radioactive waste at its Santa Susana Field Lab near Los Angeles, **Honeywell** has been engaged in several environmental controversies primarily related to hazardous emissions to the environment. Several of these concerned the company’s liability for remediation of contaminated sites.

Events related to social issues

4 Highest Category
Elbit Systems Ltd.

2 Average Impact Score

3 Average Risk Score

Evaluation of Events per Indicator



Events related to social issues mostly include community relations, sanctions non-compliance and complicity in human rights violations. Most severely, **Elbit Systems** has provided equipment to the Israeli military believed to be specifically tailored for the security wall separating Israel from the Palestinian Territories. Although claims of complicity in human rights violations are relatively common amongst defence companies, it is the first instance that has been sanctioned by the International Court of Justice, which became the basis of the UN Special Rapporteur’s call for a boycott.

Additionally, **Boeing** has been involved in a case linked to complicity in human rights violations, as its subsidiary Nurus sold spying technology in several countries with questionable human rights records, including Egypt, Pakistan and Saudi Arabia.

Events related to governance issues

5

Highest Category
Finmeccanica SpA

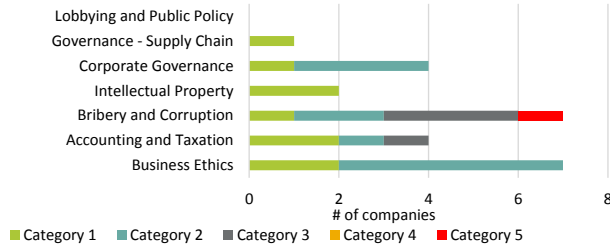
3

Average Impact Score

4

Average Risk Score

Evaluation of Events per Indicator



Events related to governance issues cover the most intense controversies and pose the highest risks to the company and investors. This is due to the industry’s high exposure to bribery and corruption risks and its potential indirect involvement in human rights issues, linked to the production of weapons delivered to areas of conflict.

Finmeccanica and its subsidiaries have faced numerous investigations of bribery and corruption over the past three years, including fraud in connection with the sale of 12 helicopters to the Indian government.

Appendix

Methodology – How we rate companies

Research process



The annual update of each company rating includes a thorough review of a broad range of generic and industry-specific ESG indicators. Our research is based on information disclosed by the companies themselves (such as annual reports, financial reports, CSR reports, CSR websites and press releases) and independent news sources such as (local) newspapers, relevant websites and NGO materials. A rigorous internal review process, followed by company contact and feedback, is implemented to ensure consistency and overall high research quality.

This process is complemented by the monitoring of around 20,000 news sources from around the world. Information from these sources is processed on a daily basis, with the aim of identifying those news items (so-called *incidents*) that may be significant from an ESG perspective. We monitor individual incidents, such as a lawsuit, explosion or strike, and assess them based on their impact on stakeholders and the environment (so-called *sustainability impact*) as well as on the reputational risk they pose for the company. For each incident, the sustainability impact assessment captures the severity of impacts (measured in terms of depth, breadth and duration), taking into consideration accountability and exceptionality, while the reputational risk assessment captures the notoriety and media exposure of incidents.

Key ESG issues

Our research framework broadly addresses three themes: Environment, Social and Governance (ESG). Within these themes, the focus is placed on a set of key ESG issues that vary by industry.

Industry-specific selection of key ESG issues based on a “materiality of impact” assessment

We define “key ESG issues” as industry-specific areas of exposure that are most material from a sustainability impact and/or business impact perspective and hence define the key management areas for a company. The list of issues that are potentially relevant for a company have been determined by us based on a detailed and systematic “materiality of impact” analysis of the business models and the value creation chains within a given sector. Similar to the incidents assessment, we evaluate sustainability and business impacts in terms of depth, breadth and duration of impacts.

Indicators, scoring and relative position

The research itself is conducted at the indicator level, where a comprehensive set of generic and industry-specific metrics is analysed, scored and weighted to determine a company’s overall ESG performance. For every indicator, our analysts evaluate the degree to which a company meets relevant best practice standards.

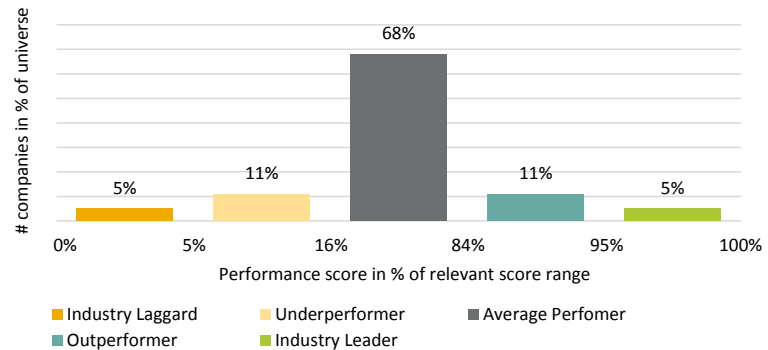
On this basis, a “raw score” out of 100 is assigned to every indicator based on a set of detailed and well-documented internal criteria. In turn, these raw scores are

Companies are allocated to five distinct performance groups

aggregated based on a sector-specific weight matrix that reflects the relative importance of an issue and the related indicators.

Based on their scores, companies are allocated to five distinct performance groups (Industry Leader; Outperformer; Average Performer; Underperformer; or Industry Laggard) according to their relative position within the respective reference universe and assuming a normal distribution of scores.

Relative position within relevant score range



Source: Sustainalytics

Types of indicators

How well do companies manage areas of exposure?

We differentiate between four types of indicators that focus on different management dimensions: Preparedness; Disclosure; Quantitative Performance; and Qualitative Performance.

Indicators cover four different management dimensions

- **Preparedness:** These indicators assess a company's management systems, policies and programmes designed to manage material ESG risks, e.g., bribery and corruption policies, environmental management systems or diversity programmes. Preparedness also includes a company's participation in relevant initiatives such as the Equator Principles.
- **Disclosure:** These indicators assess whether a company's ESG reporting meets international best practice standards and include, for example, the ESG reporting standard and its verification, but also tax disclosure, board remuneration disclosure or CDP participation.
- **Quantitative Performance:** These indicators assess a company based on quantitative performance metrics such as, for example, carbon intensity or employee turnover rate.
- **Qualitative Performance:** These indicators assess a company's ESG performance based on an analysis of incidents, events and controversies in which the company has been involved.

Report parameters






REFERENCE UNIVERSE: AEROSPACE AND DEFENCE	Global universe of Aerospace & Defence companies, according to GICS classification (Sustainalytics coverage: 39 companies). For comparability reasons, the quantitative analysis (Bottom-Up-Analysis and Chartbook) is limited to DM companies (Sustainalytics coverage: 27 companies)
WEIGHT MATRIX	Default Weight Matrix Aerospace and Defence
UPDATE FINANCIAL AND ESG DATA	21 October 2014; all company data sourced from Capital IQ
PUBLICATION DATE	27 November 2014

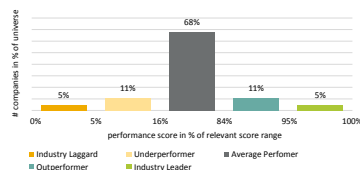
Contributions

TRANSPORTATION SECTOR TEAM	Arne Philipp Klug (Senior Analyst, Industry Lead), Enrico Colombo (Junior Analyst)
THEMATIC RESEARCH TEAM	Dr Hendrik Garz (Global Head, Thematic Research), Thomas Hassl (Junior Analyst), Madere Olivar (Editor)
ADVISORY SERVICES TEAM	Terence Berkleef (Product Manager), Andres van der Linden (Researcher)

Glossary of Terms

BASELINE	A generic assessment of the current status quo of a company's overall ESG score , controversy rating and response on a key ESG issue ; we differentiate three different grades: weak, moderate, strong
BUSINESS IMPACT	Assesses the magnitude of the potential impact that an ESG issue may have on the financial performance of a company; business impact is measured on a scale between 0 and 10.
CONTROVERSY	Collection of observation points reflecting the controversial behaviour of a company regarding environment, social and governance issues; a controversy is measured by the associated controversy indicator which is defined at the subtheme level; controversies are rated from Category 0 (no controversy) to Category 5 (severe); each controversy indicator consists of a bundle of event indicators.
DEFAULT WEIGHT MATRIX	Weight Matrix proposed by Sustainalytics
DEVELOPED MARKETS (DM)	Sub-universe including companies from: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Hong Kong, Ireland, Israel, Italy, Japan, Netherlands, New Zealand, Norway, Portugal, Singapore, Spain, Sweden, Switzerland, United Kingdom and United States.
DIMENSION	To assess a company's ability to address different kinds of ESG-related risks and opportunities, all indicators used by Sustainalytics can also be attributed to the four (management) dimensions: disclosure ; preparedness ; quantitative performance ; and qualitative performance ; for each dimension we calculate a dimension score, multiplying the relevant indicators with their respective weights and transforming the result so that the highest reachable score is 100 and the lowest 0.
DISCLOSURE	Assesses whether a company's ESG reporting meets international best practice standards; includes, for example the ESG reporting standard and its verification, but also tax disclosure, board remuneration disclosure or CDP participation.
EMERGING MARKETS (EM)	Sub-universe including companies from: Argentina, Bahrain, Bangladesh, Brazil, Bulgaria, Chile, China, Colombia, Croatia, Czech Republic, Egypt, Estonia, Greece, Hungary, India, Indonesia, Jordan, Kazakhstan, Kenya, Kuwait, Lebanon, Lithuania, Malaysia, Mauritius, Mexico, Morocco, Nigeria, Oman, Pakistan, Peru, Philippines, Poland, Qatar, Romania, Russia, Serbia, Slovenia, South Africa, South Korea, Sri Lanka, Taiwan, Thailand, Tunisia, Turkey, Ukraine, United Arab Emirates and Vietnam.

EVENT	A series of incidents that refers to the same controversial topic, tracked in one events indicator, for example “labour relations” or “environmental impact of products”; an event assessment is based on the highest impact or risk score assigned to the related incidents; events are rated on a scale from Category 0 (no event) to Category 5 (severe).
EXPOSURE	Defines an area of potential impact a company is facing due to its business activities; exposure to key ESG issues is assessed at an industry level and is further refined at the company level.
IMPACT	Refers on the one hand to the effects a company’s activities may have on the environment and/or society (sustainability impact) and on the other hand to the effects ESG issues may have on a company’s bottom line (business impact).
INCIDENT	A single observation point reflecting the controversial behaviour of a company regarding ESG issues; we monitor individual incidents like, for example, a lawsuit, explosion or strike and assess them based on their impact on stakeholders and the environment (sustainability impact) as well as on the (<i>reputational</i>) risk they pose for the company.
KEY ESG ISSUE	Industry-specific areas of exposure that are most material from a sustainability impact and/or business impact perspective and hence define the key management areas for a company; the list of issues that are potentially relevant for a company have been determined by us based on a detailed and systematic “materiality of impact” analysis of the business models and the value creation chains within a given sector.
KEY INDICATOR	An industry-specific ESG indicator that we regard as most important to assess how well a company manages areas of exposure as reflected by the identified key ESG issues .
MOMENTUM	Development of historical scores for -1, -2 and -3 years from the reference date; Note: The industry average calculation is based on the current company universe; defaulted companies are not part of the calculations.
OUTLOOK	A forecast on how a company’s overall ESG score , controversy rating or response on a key ESG issue will change over the next 12 months; for the sector report, we differentiate five different grades:  very positive;  positive;  neutral,  negative and  very negative.
OVERALL ESG SCORE	Evaluates a company’s overall ESG performance on a scale of 0-100, based on generic and industry-specific ESG indicators that are grouped in three (ESG) themes and four dimensions ; derived by multiplying the raw scores for the relevant indicators with the respective weight matrix .
PREPAREDNESS	Assesses a company’s management systems, policies and programmes designed to manage material ESG risks, such as bribery and corruption policies, environmental management systems or diversity programmes, for example. It also includes a company’s participation in relevant initiatives such as the Equator Principles.
QUALITATIVE PERFORMANCE	Assesses a company’s ESG performance based on an analysis of incidents , events and controversies in which the company has been involved.
QUANTITATIVE PERFORMANCE	Assesses a company based on quantitative performance metrics such as, for example, carbon intensity or employee turnover rate.
RAW SCORE	Score between 0-100 that assesses the performance of a company for a single ESG indicator.
RELATIVE POSITION	Classification of companies into five distinct performance groups, based on a company’s score (overall ESG score , theme score or dimension score), according to its relative position within the reference universe, assuming a normal distribution of the scores:



- Industry Leader: Within the top 5 percent of the reference universe
- Outperformer: Within the top 5 percent to 16 percent of the reference universe
- Average Performer: Within the mid-range 16 percent to 84 percent of the reference universe
- Underperformer: Within the bottom 5 percent and 16 percent of the reference universe
- Industry Laggard: Within the bottom 5 percent of the reference universe.

RISK	Refers mainly to the reputational risk a company is exposed to and forms one part of a company's incident assessment; the reputational risk assessment captures the sustainability impact , notoriety and media exposure of incidents , and is measured on a scale between 0 and 10.
SECTOR	Sustainalytics analyses 42 different sectors, grouped in 14 industries; the sector definitions are by and large aligned with the GICS classification for industry groups (level 3).
SUBTHEME	Sub-division of the three ESG themes in: <ul style="list-style-type: none">▪ Environment: Operations, Contractors and Supply Chain (Env), Products and Services (Env);▪ Social: Employees, Contractors and Supply Chain, Customers, Society and Community, Philanthropy;▪ Governance: Business Ethics, Corporate Governance, Public Policy.
SUSTAINABILITY IMPACT	Assesses the magnitude of potential impact on stakeholders, including environment and society, that may be caused by a company's activities; the sustainability impact assessment captures the severity of impacts (measured in terms of depth, breadth and duration), taking into consideration accountability and exceptionality; sustainability impact is measured on a scale between 0 and 10.
THEME	The three sustainability areas Environment (E), Social (S) and Governance (G). For each theme we calculate a theme score, multiplying the relevant indicators with their respective weights and transforming the result so that the highest reachable score is 100 and the lowest 0.
WEIGHT MATRIX	A matrix containing the weights with which individual indicators are multiplied to calculate the overall ESG score for a company; weights are sector-specific, reflecting the relative importance of indicators for companies within the respective sector; the weight matrix might be adjusted at the company level if an indicator is disabled due to company-specific reasons (e.g., specifics of the business model). Note: Weight matrices are customisable by our clients. The matrix proposed by Sustainalytics is called the Default Weight Matrix.

List of companies covered

Company Name	Region	Country	FF Market cap. (USD m)	ISIN Code	Sustainalytics Rating			
					Total	Social	Environment	Governance
Airbus Group	Europe	Netherlands	56,538	NL0000235190	74.4	65.8	86.7	70.1
Alliant Techsystems Inc.	North America	United States	4,383	US0188041042	64.4	54.6	56.3	85.4
Aselsan Elektronik Sanayi ve Ticaret A.S.	Asia-Pacific	Turkey	1,798	TRAAEELS91H2	67.9	73.6	62.0	68.3
AviChina Industry & Technology Co. Ltd.	Asia-Pacific	Hong Kong	3,296	CNE1000001Y8	47.1	48.2	40.0	54.2
BAE Systems plc	Europe	United Kingdom	23,273	GB0002634946	62.1	55.5	57.7	75.0
BE Aerospace Inc.	North America	United States	8,424	US0733021010	48.0	43.5	43.7	58.2
Bharat Electronics Limited	Asia-Pacific	India	1,241	INE263A01016	57.0	59.1	56.0	55.6
Boeing Co.	North America	United States	95,761	US0970231058	59.5	50.7	64.4	64.1
Bombardier, Inc.	North America	Canada	6,403	CA0977512007	78.2	82.2	80.7	70.7
CAE Inc.	North America	Canada	3,438	CA1247651088	52.6	50.7	49.5	58.4
Cobham plc	Europe	United Kingdom	5,388	GB00B07KD360	67.5	61.4	64.7	77.8
Elbit Systems Ltd.	Asia-Pacific	Israel	2,470	IL0010811243	55.9	53.7	53.9	60.7
Embraer SA	South America	Brazil	5,974	US29082A1079	83.0	94.0	71.4	83.5
Finmeccanica SpA	Europe	Italy	5,416	IT0003856405	62.8	65.3	69.2	52.4
General Dynamics Corp.	North America	United States	35,477	US3695501086	54.9	50.8	54.1	60.6
Honeywell International Inc.	North America	United States	73,986	US4385161066	55.6	50.4	50.1	67.9
Kongsberg Gruppen ASA	Europe	Norway	2,913	NO0003043309	64.3	51.8	59.9	84.2
Korea Aerospace Industries Ltd.	Asia-Pacific	South Korea	2,884	KR7047810007	53.8	48.8	53.4	60.2
L-3 Communications Holdings Inc.	North America	United States	10,025	US5024241045	53.5	52.0	49.9	59.7
Lockheed Martin Corporation	North America	United States	50,695	US5398301094	68.8	67.0	70.9	68.6
Macdonald Dettwiler & Associates Ltd.	North America	Canada	2,600	CA5542821031	48.7	44.3	39.7	64.2
Meggitt plc	Europe	United Kingdom	7,041	GB0005758098	61.7	55.8	66.9	62.4
MTU Aero Engines Holding AG	Europe	Germany	4,407	DE000A0D9PT0	74.6	73.1	74.4	76.7
Northrop Grumman Corporation	North America	United States	25,590	US6668071029	70.7	65.8	66.1	81.8
Precision Castparts Corp.	North America	United States	38,104	US7401891053	50.4	49.2	48.6	53.9
QinetiQ Group Plc	Europe	United Kingdom	2,398	GB00B0WMWD03	80.8	62.8	93.6	87.1
Raytheon Co.	North America	United States	30,089	US7551115071	67.6	64.1	71.4	67.3
Rockwell Collins Inc.	North America	United States	10,485	US7743411016	66.7	65.9	66.0	68.6
Rolls Royce Holdings plc	Europe	United Kingdom	37,727	GB00B63H8491	70.0	73.7	77.3	57.3
Safran SA	Europe	France	30,380	FR0000073272	61.8	66.5	65.3	52.0
Singapore Technologies Engineering Ltd.	Asia-Pacific	Singapore	9,319	SG1F60858221	61.7	59.3	64.4	61.5
Spirit AeroSystems Holdings Inc	North America	United States	4,178	US8485741099	60.1	59.1	53.4	69.0
Textron Inc.	North America	United States	10,354	US8832031012	60.9	52.2	62.5	69.3
Thales	Europe	France	13,554	FR0000121329	70.9	65.6	79.9	66.7
TransDigm Group Incorporated	North America	United States	9,237	US8936411003	47.8	42.5	44.3	57.9
Triumph Group, Inc.	North America	United States	3,393	US8968181011	50.8	47.9	42.6	63.8
Ultra Electronics Holdings plc	Europe	United Kingdom	2,249	GB0009123323	53.2	52.1	50.2	57.9
United Technologies Corp.	North America	United States	103,220	US9130171096	69.2	67.6	69.2	71.0
Zodiac Aerospace SA	Europe	France	9,974	FR0000125684	61.2	59.7	64.3	59.3

Source: Sustainalytics, Capital IQ

List of Abbreviations

A&D	Aerospace and Defence	IATA	International Air Transport Association
AIA	Aerospace Industries Association	ICAO	International Civil Aviation Organization
ASD	AeroSpace & Defence Industries Association of Europe	Ifbec	International Forum on Business Ethical Conduct for the Aerospace and Defence Industry
ATT	Arms Trade Treaty	ISR	Intelligence, Surveillance and Reconnaissance systems
CRP	Center for Responsive Politics	NPT	Nuclear Non-Proliferation Treaty
DM	Developed Markets	OECD	Organisation for Economic Co-operation and Development
DoD	Department of Defense	OTEC	Ocean Thermal Energy Conversion technology
EASA	European Aviation Safety Agency	SIPRI	Stockholm International Peace Research Institute
EM	Emerging Markets	TI	Transparency International
ESG	Environment, Social and Governance	UAS	Unmanned Aircraft Systems
ETS	Emission Trading Scheme	UAV	Unmanned Aircraft Vehicle
FAA	Federal Aviation Administration	UNCAC	United Nations Convention Against Corruption
FCPA	Foreign Corrupt Practices Act		

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Endnotes

- ¹ “What we may be witnessing is not just the end of the Cold War, or the passing of a particular period of post-war history, but the end of history as such: that is, the end point of mankind’s ideological evolution and the universalization of Western liberal democracy as the final form of human government.” (Fukuyama, 1989)
- ² The Non-Proliferation Treaty of nuclear weapons does not prohibit the continued production of nuclear weapons by the five nuclear weapons states (China, France, Russia, United Kingdom and the United States). Its aim is to stop the transfer of nuclear weapons, and it includes an article on the progressive disarmament of nuclear weapons. However, no timeline is given.
- ³ Please refer to the Sustainalytics “Controversial Weapons Radar” for more detailed information at the company level.
- ⁴ Recent rulings by the National Contact Points for the OECD Guidelines in Norway and the Netherlands have pointed to the responsibilities of investors to conduct due diligence to mitigate/prevent human rights risks resulting from their investments, including for minority shareholders.
- ⁵ All company data sourced from Capital IQ.



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