



ESG and Dual-Use

Current Status and Future Needs
in the UK and EU venture capital ecosystem

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Executive Summary

This brief summarizes the current situation, gaps and opportunities for improved ESG adoption in venture capital funds investing in dual-use technology ventures. The findings are drawn from 13 interviews – 10 with venture capital (VC) general partners (GPs) and 3 limited partners (LPs) making allocations to dual-use venture capital firms, predominately headquartered in the UK and EU.

The purpose of these interviews was to assess the baseline situation regarding ESG adoption, whether recent geopolitical events such as the War in Ukraine and awareness of rising geopolitical competition with China have altered investor sentiment towards defence and dual-use investing, and to identify specific ESG issues that need clearer definitions, guidance, tools and training going forward.

Key Findings:

The following were the key findings from the interviews with dual-use investors.

1. Awareness and Capacity for ESG: Among VCs investing in dual-use, ESG maturity is low, but growing. Similar to the broader VC industry, most VC firms investing in dual-use companies are still at the beginning of their ESG journey. The interviews revealed that there is widespread confusion about what ESG is, and interviewees frequently conflated ESG with other topics like impact investing, green investing, or as being strictly a reporting exercise on environmental issues like a startup's water use and GHG emissions. However, a few VCs had medium to high maturity in their ESG policies and processes – and most VCs expressed a desire to learn more.

2. Exclusions: Some LPs have exclusion screens for defence technologies and use cases – but they are shifting. Some LPs who are major capital providers in the European venture capital industry have contractually required their GPs not to invest in weapons, munitions or other emerging defence applications such as life sciences via exclusions policies and side letters. Several VCs perceive this as due to a lack of understanding among LPs on the nuances of defence technologies or naivety about the importance of defence to society. In contrast, LPs with such exclusions stated the reason for these exclusions was due to reputational risk and preferences of their stakeholders (i.e. pensioners, taxpayers). However, LPs also noted that the Ukraine war has shifted public sentiment more positively towards defence as an industry requiring investment.

3. ESG Standards & Risk Management: Available ESG standards do not adequately capture the material issues of defence and dual-use companies. The interviewees largely viewed existing ESG standards bodies and frameworks as overly focused on driving the clean energy transition and managing environmental footprints of operations of large publicly-held defence companies – and not on managing specific risks and tradeoffs involved in conflict prevention and warfighting. Further, ESG frameworks currently map defence applications only to the aerospace industry, while modern defence and dual-use technology touches many more industries from life sciences, chemicals, materials, energy, software, hardware, telecommunications, semiconductors, media and journalism and more.

4. Impact Frameworks & Social Good: Investors argue that dual-use technologies can contribute to advancing public goods and need frameworks that clearly measure their impact. Some VCs state that they consider themselves to be impact investors who are advancing social goals such as defending democracy, preventing armed conflicts and terrorism, and reducing civilian deaths and collateral damages of war. Deep tech investors described how they contribute to society through the advancement of scientific discoveries. Yet current impact frameworks do currently not adequately capture such considerations.

5. Responsible Use of Technology & Safeguarding Mechanisms: Defence customers need to consider ways to address the concerns of investors and companies, including demonstrating that they have safeguards in place to ensure that technologies are being responsibly deployed. Some VCs expressed that it would be helpful if defence customers could better communicate their safeguarding policies, risk management, compliance and whistleblowing processes. Some VCs also shared that some startups building breakthrough technologies do not want to engage with defence customers over ethical concerns and lack of transparency of future uses of the technology.

6. Safe Capital: Clearer guidance needs to be issued regarding under what circumstances capital should not be accepted from specific state actors via fund-of-funds. Some VCs expressed concerns that they had discovered some investments in their LP fund-of-funds have received capital from countries which they were unsure whether they should be accepting investment from. They asked for clearer guidance on how to conduct due diligence on potential LP investors and co-investors and how to handle situations when they become known post-investment.

Needs for Guidance, Tools & Trainings:

The interviewees suggested the following new guidance, tools, and training for dual-use investors:

1. Standardized Language for Exclusion Policies
2. Risk Categorization Scale of Dual-use Technologies
3. Deep Dives on Materiality of Emerging Technologies
4. Impact Framework for Dual-use and Defence
5. Responsible Technology Policies and Safeguarding Mechanisms in Defence Customers
6. Covenants and Licensing Agreements for Responsible Technology
7. Guidance on Trusted Capital

01.

Context: What are dual-use and defence technologies – and how does ESG relate to them?

This first section provides key concepts and definitions used in discussing dual-use technology and ESG as context to understand the terminology used during the investor interviews.

Dual-use Technology

“Dual-use items are goods, software and technology that can be used for both civilian and military applications.”

– [European Commission](#)

Dual-use technologies are defined as technologies that have both military and civilian applications. Dual-use items are subject to export controls and are regulated in the UK through the [UK Strategic Export Control List \(July 2023\)](#) and the corresponding EU taxonomy of dual-use technologies to be found in the Annex. In the UK/EU, dual-use items include physical goods, software and technology and are set out in 10 broad categories of 0-9, and each category is then divided again from A to E. These terms are fully defined in the annex to the legislation.

UK Strategic Export Controls List (2021)

0. nuclear materials	A. systems equipment and components
1. materials, chemicals, micro-organisms and toxins	B. test, inspection and production equipment
2. materials processing	C. materials
3. electronics	D. software
4. computers	E. technology
5. telecommunications and information security	
6. sensors and lasers	
7. navigation and avionics	
8. marine	
9. aerospace and propulsion	

In the U.S., the [U.S. Export Control Reform Act of 2018 \(ECRA\) \(H.R. 5040\)](#), codifies the export controls on dual-use technology. ECRA also expanded the scope of U.S. export controls to include technologies involved in “the protection of human rights and the promotion of democracy.”¹ ECRA requires the President to maintain a current list of Critical & Emerging Technologies (CETs). The most recent CET list update (February 2022) includes: (See **Annex A: CETs List** for full definitions).

U.S. Critical & Emerging Technologies List, 2022 (CETs)

<ul style="list-style-type: none">• Advanced Computing• Advanced Engineering Materials• Advanced Gas Turbine Engine Technologies• Advanced Manufacturing• Advanced and Networked Sensing and Signature Management• Advanced Nuclear Energy Technologies• Artificial Intelligence• Autonomous Systems and Robotics• Biotechnologies	<ul style="list-style-type: none">• Communication and Networking Technologies• Directed Energy• Financial Technologies• Human-Machine Interfaces• Hypersonics• Networked Sensors and Sensing• Quantum Information Technologies• Renewable Energy Generation and Storage• Semiconductors and Microelectronics• Space Technologies and Systems
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Source: White House. Critical and Emerging Technologies List Update: February 2022. ([Available here](#))

¹ Kelley, Hannah. “Dual-Use Technology and U.S. Export Controls: Findings from the CNAS Technology Policy Lab,” *Center for New American Security* ([Available here](#))

History of Dual-use Technology

Dual-use technologies typically arise from two sources: 1. technologies that are developed for military purposes which are later commercialized for civilian applications; and 2. technologies developed for civilian purposes which also have military applications and use cases. Dual-use technologies developed from R&D programs in military organizations have played an important role in scientific and technological advancement throughout the 20th century including, most famously, to develop the underlying technologies leading to the internet and iPhone including semiconductors, GPS, and battery and display technologies.² In recent years, innovations from the private sector, such as software platforms for Admintech, HRtech, Healthtech, etc. have also benefited military organizations in helping to streamline their sprawling bureaucracies.

Market for Dual-use Technology

Dual-use technology does not have a standardized classification or tagging in venture capital market research databases like Pitchbook or Crunchbase. Instead, individual analysts conduct their own reviews and define what technologies and use cases are in scope.

One study from [Ain Ventures](#) found that in 2021 there were 188 ventures that had both military and civilian products that were headquartered in North America or Western Europe and had raised more than \$5 million in capital. The majority of these companies were in just two technologies: AI and cybersecurity. The largest investors in the cap tables of these companies were largely [Top 50](#) Silicon Valley or New York City headquartered firms. (See **Annex B** for the full list of top dual-use technologies built by ventures and most active VC investors.)³

² For a review see: Chapter 5: “The State Behind the iPhone,” in: Mariana Mazzucato. [The Entrepreneurial State: Debunking Public vs. Private Sector Myths](#). 2013.

³ In 2022, Ain Ventures revised its classifications to include clean energy as a dual-use technology. This reclassification changed the list of leading investors to include firms specializing in defense tech and cleantech such as Bpifrance, Breakthrough Energy Ventures, Alumni Ventures, Techstars and In-Q-Tel. See: <https://www.ainventures.com/post/2022-dual-use-report>

Responsible Investment, ESG and Impact

“Responsible investment involves considering environmental, social and governance (ESG) issues when making investment decisions and influencing companies or assets (known as active ownership or stewardship). It complements traditional financial analysis and portfolio construction techniques.” -[UN Principles for Responsible Investment \(PRI\)](#)

ESG and Responsible Investing

Among the most important concepts referenced when discussing responsible investment and ESG are:

- 1. Exclusions:** are formal policies whereby certain sectors, countries, products, techniques or companies are prohibited from investment, mostly mandated by LP investors
- 2. ESG Integration:** is defined as “the explicit and systematic inclusion of ESG issues in investment analysis and investment decisions”⁴ and involves adopting a formalized ESG policy and ESG process whereby ESG risks and opportunities are considered during due diligence and investment decision deliberations. A key part of ESG integration is ensuring that the ESG issues being considered have “**materiality**” – i.e., they are the issues that the company is most likely to impact or be impacted by in the legal, regulatory, social, cultural or natural environment.⁵
- 3. Active Management:** which is also called ‘active ownership’ or ‘stewardship’ involves actively monitoring, discussing, and improving performance on ESG issues in companies post-investment.⁶ In venture capital, this often comes in the form of taking board seats, providing workshops, trainings and mentorship to founders, operating a complaints and redress mechanism for stakeholders, and requiring serious incident reporting.

⁴ See: PRI. What is ESG Integration? <https://www.unpri.org/investment-tools/what-is-esg-integration/3052.article>

⁵ For formal definitions of materiality from regulations and standards setting bodies see: <https://www.datamaran.com/materiality-definition>

⁶ Another form of Active Management is filing Shareholder Resolutions and participating in Proxy Voting for ESG issues, which is only available for investors in publicly-listed companies

4. Disclosure and Transparency: also called “ESG reporting” is the (usually) annual process of collecting data from portfolio companies on their performance on key metrics such as GHG emissions, diversity of leadership and employees, and other industry-specific impact or risk management metrics.

Impact Investing

A closely related, yet separate concept is **impact investing**, which is defined as “investments made with the intention to generate positive, measurable social and environmental impact alongside a financial return. Impact investments can be made in both emerging and developed markets and target a range of returns from below market to market rate, depending on investors’ strategic goals.”⁷ Impact investing funds are often thematic and provide capital to address specific challenges such as renewable energy, circular economy, universal health access, affordable housing, microfinance, etc. Impact investing funds also need to integrate ESG management during the investment process to identify and mitigate risks and avoid creating any negative unintended consequences in the pursuit of advancing social good.

⁷ See: Global Impact Investing Initiative (GIIN). Impact Investing definition: <https://thegiin.org/impact-investing/>

02. Results

This section summarizes key findings from interviews with venture capital investors in dual technologies. The interviews are drawn from 13 investors – 3 are institutional LPs, and 10 are venture capital VC investors, mostly headquartered in the UK or EU.

Finding 1. ESG maturity is still low in dual-use venture capital firms, but awareness and capacity is growing

Context:

Venture capital has been a late adopter of ESG generally. It has only been in the last two years (since 2021) that the venture capital industry has begun discussing ESG – and among the top 50 largest venture capital firms, less than 10% are currently adopting any form of ESG discussion in their investment due diligence and decision-making process.⁸

A venture capital firm’s ESG maturity can be classified on the following scale: none, low, medium, high:

0 None: Firm has no ESG policy or processes and is not actively seeking to build one. The reason given is often that the firm’s leadership is opposed to ESG on ideological grounds or that they perceive ESG frameworks as not material to what they do.

1 Low: Firm has some basic policies and processes in place like a basic statement of values, a basic ESG policy and some consideration towards issues of concern to stakeholders like diversity or climate change. The reason given for ESG is driven by compliance with regulations (SFDR, etc.) or specific requests from their investors. The issues the firm addresses in ESG typically do not go beyond what external stakeholders are requesting. There is typically not an ESG specialist on staff and the ESG role is taken on part-time by a compliance, marketing or investor relations professional.

2 Medium: Firm has some processes in place such as an ESG policy and due diligence questions but may not fully account for all material ESG issues, adequately monitor

⁸ For history and context of VC’s ESG adoption challenges see: Johannes Lenhard and Susan Winterberg. “How Venture Capital Can Join the ESG Revolution,” *Stanford Social Innovation Review* 2021. ([Available here](#))

companies post-investment or report on activities. The reason given for ESG is typically that it has demonstrated a value in the investment process but they are struggling to get their ESG process to high maturity due to limited knowledge, staff expertise or time. The firm may have a junior or mid-career professional overseeing ESG with some support from a partner, but ESG has often not been mainstreamed across the investment teams yet.

3 High: Firm has a fully functional pre-investment and post-investment process in place including a comprehensive annual ESG reporting process. The reason given for ESG is that it is a value driver for investment returns and a marketplace differentiator. The firm typically employs a mid-to senior-level ESG professional, a few junior professionals and may have an external ESG due diligence consulting firm on contract to support on technical issues. ESG issues are fluently discussed across the firm including by the investment teams and by investment committee members.

Findings:

The 10 VC firms in the interviews represented the full spectrum of ESG maturity from none to high – 2 had no ESG integration, 3 low maturity, 4 medium maturity, and 1 high maturity.

1a. Among the ‘No ESG’ firms, the most common reason cited for not adopting ESG is it is perceived as something that is material only to mature companies in the operations stage, and not for startups.

“We’ve looked into ESG, because there’s just a wall of money that says ESG on it. But every time we look at it, we think ... It doesn’t make sense for us. Because ESG is not really about what we do.”

“If they [startups] could get the job done and prescribe the ESG principles, they will probably do it. But if you distract them from that, or it’s going to cost them more money to do it - one, their investors may have a problem with that. And two, they may not have enough cash to do it, because they’re all cashflow negative. They’re all dependent upon their investors. It’s a nice thing to do, but not a requirement in early stage. In the same way buying a \$10,000 espresso machine may raise eyebrows. In early stage we build – but in later stage companies that are generating cash and probably close to cashflow positive, [startups] can make some decisions about what they invest in and have a little bit more latitude.”

The investment decision-making in No-ESG firms is driven largely by the personal values and preferences of the firm’s partners – or that of the defence agency customer – rather than by any formal policy or references to international safeguarding frameworks (i.e. UN Universal Declaration on Human Rights, UNGPs, weapons conventions, etc.)

“We don’t invest in anything that we’re not proud to tell our children that we’ve invested in. So, if it doesn’t pass that smell test, we don’t invest in it. So that’s our own measure of, let’s say, social acceptance.”

“We’re kind of the mind, if the [defence agency] customer really wants it and has gone through its own ethical justification of it and still wants to continue, then we’re probably going to listen to them and see what interests them to do what they need to do.”

1b. Among VCs with low ESG maturity, ESG was mostly an exercise driven by compliance, with SFDR regulation most frequently cited as the reason for their ESG adoption. A few firms also referenced their investors having raised specific issues such as how investments in green propellants can reduce the carbon footprints of the space industry or how they are improving diversity among founders.

1c. Among the medium and high ESG maturity firms, ESG is understood as a value add – and ESG policies and processes are seen as methods to de-risk investments, avoid investing in problematic companies, and clarify decision-making to remove personal biases or preferences.

“ESG has always been something where we wanted it to be value-add rather than tick box and compliance-based. And we wanted it to be more about the opportunities and the impact that you can make, than just merely being about how you mitigate risk, although, obviously, that’s a core part of what you need to consider.”

“A key topic that we explore at the time of assessment [is] privacy and human rights. A lot of the technologies we’re investing in are involved with surveillance of some type. So [we’re] trying to work out whether that surveillance can identify individuals. And if so, whether it’s being sold to governments in countries which have poor human rights records. And in that case, we would either look to mitigate the risk or not invest if we thought it was too high a risk.”

“We had to find a way of assessing each company objectively so as to get rid of as much subjectivity as possible. And the way we did that was by developing a proprietary tool...and what we found was it was very tricky to [interpret] a lot of the different terms... [but, now] we’re using established lists and definitions to make sure that we’re looking at each company in exactly the same way trying to get rid of [personal or biased] human decisions. And also [it is] something that’s relatively easy for our deal team to be able to populate and it is making [the decision criteria] very clear to them.”

Finding 2. LPs need better guidance on how to engage with the ethical nuances of defence applications of technology and need to clarify language in their exclusion lists

Context:

Some large institutional asset owners and LPs who are major providers of capital to venture capital firms in Europe have developed exclusion lists that prohibit investments in defence applications or technologies including EIF, EIB, KfW Capital, EDFI, and IFC. (See **Annex D: Exclusion Lists** for a sample of publicly-available policies on exclusions related to defence).

The history of how all these exclusions came about has not been fully documented. However, it is likely due to a combination of factors, including compliance officers reconciling exclusion lists to international human rights law and weapons conventions, redresses to stakeholder complaints of specific incidents in portfolio companies, general public sentiment around the justification of past wars (i.e., Iraq and Afghanistan wars, counterterrorism activities) and warfighting methods deployed (i.e., drone attacks, mass surveillance), and targeted activism on the part of human rights campaigns to increase the scope of exclusions such as [Stop Explosive Investments](#), [Don't Bank on the Bomb](#), and [Campaign to Stop Killer Robots](#). Another possible explanation for broad exclusions regarding defence may also lie in the lack of expertise on defence issues among ESG staff members in institutional LPs, which makes evaluating the nuances of individual cases difficult.

Findings:

2a. VCs expressed concerns that LPs are being overly restrictive in language excluding dual-use and defence technologies. The reasons they perceive this to be happening include ignorance, negative public sentiment to defence, and taking the path of least resistance.

"It's just easy ... frankly, for them [UK institutional LP investors] to just say we won't do it, rather than get into the debate about, well, we ought to do it, because it's a good thing for the country...The long and the short is, I don't agree with my investors. They are choosing the socially easy route by not investing in defence."

"Most of my investors don't want to be in defence, because their investors don't want to read that they made a load of money in their pension fund from a defence investment."

2b. In contrast, LPs defended their decisions to exclude defence from their investments historically because of reputational risks and preferences of their

stakeholders – but opinions towards investing in technologies with defence applications have changed since the Ukraine War.

"As an organization, [our] main fear is about reputational risk. So whatever would be looked at negatively, that wouldn't be ideal [for us] to do that...That could evolve over time. Before the war in Ukraine, ammunition and weapons were definitely getting looked at negatively, whereas today, it may be seen as a strong sign of support towards Ukraine. So given it's changing... we [now] cannot be accused of doing anything wrong."

"[In the past] we have been approached by funds active in defence tech or dual-use technologies. And it was a clear [decision for us to say]: 'Okay, this not an issue...[so long as] we assess it's not too close to war.' But the amount of pitch decks from [dual-use] funds increased since the Ukraine War...And [our internal] opinion changed after February 2022. It's easy to say, 'No, we do not finance these kind of things' when everything is fine. But when European serenity is threatened, then everybody says, 'Maybe we should think about it a bit more openly'...but it's still tricky."

2c. VCs highlighted that lack of clarity among definitions of certain terms appearing in exclusion lists has led to confusion in what are allowable investments.

*Offensive vs. Defensive Use of Weapons*⁹

"[A challenge we face in the interpretation of exclusions is whether a technology] has the capabilities to be offensive weaponry...Often the same technology could be used in both offensive and defensive applications. And [we're] really trying to understand how to identify that and how one can mitigate it ...and what we could do to get comfortable to invest." "[Regarding offensive vs. defensive use of weapons] - it's actually a pretty arbitrary distinction. If you progress from –'Well, is it reasonable for us to have missiles to shoot down incoming missiles? Yes. Is it reasonable for us to destroy those missiles just when they leave the launcher? Yes. Is it reasonable for us to destroy the missiles just before somebody pushes a button? Yes. Is it reasonable for us to march in to take over the missile base before they get launched?'...I mean, it's a pretty arbitrary thing actually."

Core, Strategic or Critical Components of Weapons

"[A challenge we face in interpretation from LP's exclusions list is] trying to define what a strategic part of a weapon is. What makes something strategic? Because [a company] can [make] screws [that are critical to the functioning of] a weapon -but

⁹ For definitions and a review in the context of cybersecurity see: Valeriano, Brandon. "The Failure of Offense/Defense Balance in Cyber Security," *Cyber Defense Review*, 2022. ([Available here](#))

we're not going to stop investing in a screw-making company. But the [software in the] targeting system could be [considered] a key technology that is a strategic part of a weapon?"

"We have turned down companies because once we go through our [internal due diligence] tool, we realized that a technology is a critical part of a weapon system – so we have turned down a couple of transactions because of that."

Lethality of Weapons^{10,11}

"The typical exclusion list for everybody at the moment is 'no weapons, no munitions.' ...[That is] obviously ridiculous. It doesn't really help in a complex world of sensor-shooter loops - there's a lot more deadly and effective technology than weapons and munitions. When you're talking about ISR capabilities, that is probably more deadly than a better artillery shell... The most ambitious way of redefining that is we exclude 'weapons and munitions that are not subject to a NATO export control and legal framework or EU or whatever generally trustworthy governmental body.'"

"I think it's an arbitrary distinction, to measure lethality. Think of a precision munition – that's better, right? Because if you look at the behavior of yesterday's military investments, they just bombarded an entire area. So I think it's better, to have a precision munition that takes out just the target, and not a primary school nearby because it couldn't be aimed and targeted accurately."

2d. In response, LPs noted it is also a challenge for them to arrive at a decision on an exclusion when their GPs bring them questions, due to lack of expertise in weapons and defence matters.

"It's always a [case-by-case decision] when they [GPs] approach us with a potential portfolio company. And [sometimes] I actually have no clue about the technology. I have no clue about potential [use cases or risks]. So I have to dig a bit deeper, get a better understanding and make a special assessment... I think we will have a lot of discussions going forward about this because I think it's good to have very clear guidance [to say]: 'Yes, this is definitely something we can finance' or 'Definitely no,' – but there's [still] a huge grey area."

¹⁰ For civilian use of military arms such as high-capacity assault rifles, lethality refers to number of individuals who can be killed within a given timeframe using a particular weapon. See: Lethality Index: <https://gunsandsocietycenter.com/lethality-index/>

¹¹ For a discussion on ethics of precision weapons see: Horowitz, Michael. *The Ethics & Morality of Robotic Warfare: Assessing the Debate over Autonomous Weapons*, MIT Press, 2016. ([Available here](#))

Finding 3. Dual-use investments need clearer impact frameworks

Context:

Defence spending worldwide is about 2.2% of global GDP. In 2022 the UK spent [£45.9 billion](#) on defence, approximately 2.1% of GDP. The USA currently spends [\\$877 billion](#) per year on defence – more than the next 10 countries combined – accounting for 3.5% of GDP, 12% of all national spending, and more than half of discretionary spending.

Despite its significant portion of national budgets and fundamental role in society in securing peace and security, the rule of law and fundamental freedoms – defence is largely ignored or is outright excluded as a category of investment among impact investors.

The UN Sustainable Development Goals (SDGs), [SDG 16 Peace, Justice and Strong Institutions](#) recognizes the need to prevent conflicts and reduce associated deaths, infrastructure losses and mass displacements. Similarly, [SDG 9 Industry, Innovation and Infrastructure and Innovation](#) recognizes the need to invest in R&D capacity and disseminate technological innovations to improve industrial productivity. Yet these frameworks are not currently referenced by many dual-use funds. Additionally, other frameworks for impact capital such as [IRIS+](#) also lack metrics for measuring peace and security outcomes of defence and dual-use investments.

Findings:

3a. Some VCs emphasized that they consider themselves to be impact investors who are intentionally seeking to create social good – but that current impact frameworks do not recognize the contributions they make.

"We're impacting societal problems. We are an impact fund. We don't sell ourselves as an impact fund. But that is manifestly what we do."

"[LPs need to] understand that defence has an ethical and fundamental role in society. And that, by excluding it, they are actually risking the future stability and foundation of society."

"I think there needs to be a teasing apart the difference between making landmines versus doing stuff that helps to defend our western way of life, our values, democracy and rule of law."

3b. Among the factors that VCs believe should be in an impact framework for dual-use and defence investments are the reduction of civilian casualties and collateral damages to private property and critical infrastructure, as well as reducing environmental footprints of military operations.

“[One] might consider a handful of things about whether the objectives of the investment are to reduce collateral damage, to increase precision, or to reduce fossil fuel usage – which can be quite material in the military – to reduce the number of flights that are needed or the fuel consumed in flight.”

Finding 4. Current ESG Standards do not address the material issues in defence and dual-use investments

Context:

ESG Standards bodies set the issues and metrics for monitoring, measurement and disclosure for companies. Among the major ESG standards are [Sustainability Account Standards Board \(SASB\)](#), [Taskforce for Climate-related Financial Disclosures \(TCFD\)](#), [Global Reporting Initiative \(GRI\)](#), [Carbon Disclosure Project \(CDP\)](#), and [IFC Performance Standards](#). (See **Annex C** for SASB Standards for Aerospace and Defence).

Findings:

4a. VCs shared concerns that current ESG Standards (SASB, TCFD, CDP) are focused on managing environmental footprints of large aerospace companies and not measuring issues material in emerging technology startups.

“It would be a lot of overhead of trying to measure stuff that is basically unmeasurable in startups, like showing how much paper they consume, and how much fuel the company is burning and stuff that is just silly. In a startup, it just doesn’t make any sense...We just don’t go near that ESG stuff. And we’re determined not to because it would be a real nightmare for us.”

4b. Some VCs also noted that while they are generally supportive of the clean energy transition - on a practical level, technical performance will continue to take precedence over environmental performance in military missions.

“[When presented with a tradeoff] we’re going to focus on the mission. We looked at a green launch propellant for rockets – but when it came down to performance, it was like 50% of the capability of the other technology. If it were much closer, we would have been much more interested in it – but no one’s going to put it in a

military mission if it’s going to underperform. I think there’s room to improve – and as they get there, we’ll be much more interested in it – but at this point, they’re just wildly inferior... and our customers are pretty demanding.”

4c. Among the VCs which have developed an ESG policy, they stated they cite some common international frameworks as part of their policies. Among the international frameworks they reference are:

1. [Chemical Weapons Convention](#)
2. [Biological Weapons Convention](#)
3. [UN Guiding Principles on Business and Human Rights \(UNGPs\)](#)
4. [ISO Standards](#)
5. [SASB Standards](#)
6. [Taskforce for Climate-related Financial Disclosures \(TCFD\)](#)

4d. Among the VCs which have built in-house due diligence tools, they said that the availability of relevant external resources was limited, however, they did find some tools useful. The tools they cited were:

1. [Shift Project’s: Business Model Red Flags](#)
2. [Harvard Belfer Center: Technology Factsheets for Policymakers](#)
3. [Omidyar Network: Ethical OS Toolkit](#)
4. [VentureESG: Universe of Issues & Materiality Tool](#)
5. [Church of England: Defence Investment Policy](#)

4e. Some VCs explained that the current industry classification system of defence only as a sub-component of the aerospace industry does not reflect the complexity of how defence currently intersects with technology. From life sciences, health care, agriculture and food security, software, hardware, energy, chemicals, materials, media and journalism – defence and dual-use touches many industries and the ESG frameworks need to recognize the risks and opportunities of defence applications across all industries.

“I think it needs to start with a comprehensive view about how defence actually functions in the 21st century. What parts are involved? What potential technologies are involved? How are they interacting? And that will probably trickle down into a lot of different fields.”

4f. Both VCs and LPs noted that the most challenging issue to understand for dual-use is the range of use cases a technology might be used for and the relevant risks – in both a military and a mass-market civilian use case.

Most civilian-focused VCs and LPs expressed concerns that they did not have adequate knowledge to understand the range of use cases or safeguards that are used inside military organizations. Conversely, defence tech investors noted while they have a good understanding of potential military uses, they are less sure of what the risks are when technologies are made available to the general public.

Finding 5. Defence customers need to provide better assurances to companies and investors that they have adequate policies and safeguards in place to ensure the responsible use of technology

Context:

Defence and security departments may work on classified information and operations, resulting in some programmes being compartmentalised. As a result, suppliers may have little insight into the nuances of how their technology could be used once adopted, and are therefore reliant on the appropriate governance, regulation and checks and balances within the security and defence ecosystem.

In contrast, VCs and companies who have capital that is tied to responsible investing principles typically have requirements to adhere to certain practices such as ‘human rights due diligence’, ‘stakeholder engagement’ and ‘disclosure and transparency.’ Companies and investors adhering to international frameworks such as the [UN Guiding Principles on Business and Human Rights](#) (UNGPs) are required to conduct due diligence into potential customers and monitor their customers’ use of technology for potential violations of human rights (i.e., ‘[Know Your Customer](#)’). Companies and investors who have requirements to comply with the [IFC Performance Standards](#) (a common compliance framework used by many DFIs and bilateral funds) also have a mandate to conduct stakeholder consultations with affected communities and operate a community grievance mechanism.¹²

Other recent trends in ESG and corporate responsibility – such as employees demanding a greater voice in company decision-making and ethical products - have also run into conflicts around certain use cases involving defence agency customers. Two notable examples include the controversies around Palantir and other companies providing technology to U.S. Immigration and Customs Enforcement (ICE) resulting in the [#Tech Won’t Build It](#) campaign among tech employees and the protests by Google employees against AI-assisted weapons in [Project Maven](#) in 2018. In response, DoD adopted the “[Ethical Principles for Artificial Intelligence](#)” in 2020 followed by NATO’s “[Principles of Responsible Use](#)” in 2021 and the [Data and Artificial Intelligence Review Board \(DARB\)](#) in 2022.

¹² See: IFC Performance Standard 1: Assessment and Management of Environmental and Social Risks and Impacts, Paragraphs 25-36. ([Available Here](#))

Findings:

5a. Some VCs which identify as civilian or deep tech investors expressed concern that the need for defence customers to keep certain information classified means it can be hard for them, and their portfolio companies, to directly monitor their technologies for ethical use and human rights. As a result, some companies with cutting-edge technologies are making the choice not to do business with defence customers.

“If you provided the technology could you then control how it gets used by someone on the ground? If your technology is going into a drone, and the drone is just used for surveillance and not for dropping bombs on people, how do you control that once that’s left [your company]? ... You can’t. So I think you would have to be comfortable as a company having discussed what all the worst-case scenarios were. And maybe you could debate with the customer as to what they will use it for?... It doesn’t seem to be a practical solution at all. [The decision] would be: do you want to engage with this customer or not?”

5b. Some VCs ask portfolio companies to sign restrictive covenants not to develop specific use cases in the future.

“There have been a couple of transactions where [the proposed first use-case of the technology was acceptable to us, however, it also had some dual-use application that was] something we wouldn’t want to be investing in... And therefore, we’ve had conversations with the company to see if they would sign negative covenants, not to be involved in that type of product in the future. And in some cases, we’ve been successful in doing that. “

5c. Some VCs focusing on breakthrough science innovations noted that for some companies to be comfortable engaging with defence customers, there would need to be some type of formal policy or assurance that the technology would be responsibly deployed.

“What could they [defence customers] share in terms of use? What do the normal contracts look like when engaging with civilian companies?... And what does the company need to be comfortable with in terms of how its technology will be used?”

Finding 6. Some VCs face challenges with identifying and managing LPs and co-investors with funding from non-trusted sources

Context:

A [fund-of-funds](#), a significant provider of limited partner capital to venture capital firms, combines funding from multiple sources into pooled investment vehicles. In some cases, capital in these funds is not transparent and may include '[adversarial capital](#)' that is linked to individual or state actors looking to undermine technological capabilities, military operations or engage in IP theft. To address this, the U.S. DoD launched a [digital marketplace](#) in 2019 that connects startups with trusted capital providers. Yet identifying trusted capital remains a challenge as some VCs struggle to uncover the complex financial flows behind certain LPs and co-investors.

Findings:

6a. Some VCs have expressed concerns about how to address potential adversarial capital among their LPs or others who are invested in their portfolio companies.

“Money [from potentially adversarial countries] exists already in most of the venture community in Europe, through high net worth [individuals]... and they can obscure [their identities]. They're filtered through [offshore] vehicles, and they're getting nice [fund] names... but actually, the stuff that's underneath the hood is human rights abuses. So I think that's part of the challenge in the industry. There's when a fund raises its money, do you know where it's coming from? Then there's co-investment later that [allows] an LP, as a right, to invest in the individual companies. And then that investor navigates to meet the company. That's really hard to police. And information will flow back to that investor because they've got information lines.”

“So you will find investors that will absolutely have bad money in their cap tables, for sure. And companies will as well. Now going forwards, you can clean the system out a little bit. And that's maybe the way to think about it... once you return that capital to those bad actors, then you can get them out of the system. But I think those bad actors are going to get smarter about how they channel that money.”

03.

Needs for Guidance, Tools and Trainings

The interviewees articulated several issues that need additional clarification as well as areas where they would like additional capacity building and support.

Guidance and Tools

The interviewees suggested the following new tools for dual-use investors:

- 1. Standardized Language for Exclusion Policies:** Standardized language for exclusions regarding types of defence products, techniques, and use cases. Among terms specifically mentioned for standardization are offensive vs defensive use, critical or strategic components of weapons, controversial weapons, and countries of concern. Some standardized language may also be needed for emerging technologies such as life sciences, cybersecurity, quantum, etc.
- 2. Risk Categorization Scale:** Scales to assess the ESG risk¹ of a dual-use investment (High, Medium, Low) by specific types of technologies and use cases
- 3. Deep Dives on Materiality of Emerging Technologies:** Detailed assessments of capabilities, use cases, risks and mitigations of deep technologies
- 4. Impact Framework for Dual-use and Defence:** An impact framework with goals, targets, and metrics that articulate the various ways defence provides benefits to society such as preventing terrorism, armed conflicts, cyber-attacks, damage to critical infrastructure, and protecting democracy, freedoms and rule of law
- 5. Responsible Technology Policies and Safeguarding Mechanisms in Defence Customers:** Supporting various defence and security customers to be more open about their safeguarding mechanisms and where needed develop and enforce responsible technology policies (i.e. internal policies, decision-making frameworks, values and cultures)

¹ As an example of a risk scale, see: EBRD. Environmental & Social Risk Categorization List, Update: 2009 ([Available here](#))

6. **Covenants and Licensing Agreements for Responsible Technology:** Examples of language to use in licensing and protective covenants to prohibit certain use cases or abuses; dialogue with major defence customers on what is reasonable for information sharing on technology use
7. **Guidance on Safe Capital:** Guidance on what is safe capital, what types of capital should never be accepted, support to conduct due diligence on potential LPs and co-investors, and support to manage situations when adversarial capital is discovered post-investment

Training

The interviewees requested the following topics to be covered in the forthcoming ESG training:

- Clarify the formal definitions of ESG, impact investing, green investing, impact management, risk management, and other key terms and frameworks that are used.
- A progression matrix that shows steps from low to high ESG maturity for VC funds (policy, processes, monitoring, portfolio support, etc.)
- An example of what 'good' looks like for a VC managing risks of dual-use technology.
- Peer-to-peer dialogue about how to develop an ESG policy and process internally.
- Review the formal definitions and categories of technologies that are classified as dual-use.
- Case studies of high-risk use cases of dual-use technology and what can go wrong
- A stacked hierarchy of applications and use cases of dual-use technologies, ranked from highest to least concern.
- An explanation as to when the social or environmental concern with a dual-use company is so high that it should not be invested in, despite commercial potential.

Acronyms & Abbreviations

CETs: Critical and Emerging Technologies List (U.S. OSTP)
 DoD: U.S. Department of Defense
 DFIs: Development Finance Institutions
 ECRA: U.S. Export Control Reform Act of 2018 (H.R. 5040)
 ESG: Environment, Social, Governance
 GIIN: Global Impact Investing Network
 GP: General Partner
 GRI: Global Reporting Initiative
 IFC: International Finance Corporation
 LP: Limited Partner
 OSTP: Office of Science and Technology Policy (U.S. Executive Branch)
 PRI: United Nations Principles for Responsible Investment
 SASB: Sustainability Accounting Standards Board
 SDGs: UN Sustainable Development Goals
 SFDR: Sustainable Finance Disclosure Regulation-2019/2088/EU
 TCFD: Taskforce on Climate-related Financial Disclosures
 UNGPs: UN Guiding Principles on Business and Human Rights
 VC: Venture Capital

Annexes

Annex A. Critical & Emerging Technologies (CETs) List

Category	Sub-Categories
Advanced Computing	<ul style="list-style-type: none"> · Supercomputing · Edge computing · Cloud computing · Data storage · Computing architectures · Data processing and analysis techniques
Advanced Engineering Materials	<ul style="list-style-type: none"> · Materials by design and material genomics · Materials with new properties · Materials with substantial improvements to existing properties · Material property characterization and lifecycle assessment Advanced Gas Turbine Engine Technologies · Aerospace, maritime, and industrial development and production technologies · Full-authority digital engine control, hot-section manufacturing, and associated technologies
Advanced Manufacturing	<ul style="list-style-type: none"> · Additive manufacturing · Clean, sustainable manufacturing · Smart manufacturing · Nanomanufacturing
Advanced and Networked Sensing and Signature Management	<ul style="list-style-type: none"> · Payloads, sensors, and instruments · Sensor processing and data fusion · Adaptive optics · Remote sensing of the Earth · Signature management · Nuclear materials detection and characterization · Chemical weapons detection and characterization · Biological weapons detection and characterization · Emerging pathogens detection and characterization · Transportation-sector sensing · Security-sector sensing · Health-sector sensing · Energy-sector sensing · Building-sector sensing · Environmental-sector sensing
Advanced Nuclear Energy Technologies	<ul style="list-style-type: none"> · Nuclear energy systems · Fusion energy · Space nuclear power and propulsion systems
Artificial Intelligence (AI)	<ul style="list-style-type: none"> · Machine learning · Deep learning · Reinforcement learning · Sensory perception and recognition · Next-generation AI · Planning, reasoning, and decision making · Safe and/or secure AI
Autonomous Systems and Robotics	<ul style="list-style-type: none"> · Surfaces · Air · Maritime · Space
Biotechnologies	<ul style="list-style-type: none"> · Nucleic acid and protein synthesis · Genome and protein engineering including design tools · Multi-omics and other biometrology, bioinformatics, predictive modeling, and analytical tools for functional phenotypes · Engineering of multicellular systems · Engineering of viral and viral delivery systems · Biomanufacturing and bioprocessing technologies

Communication and Networking Technologies	<ul style="list-style-type: none"> · Radio-frequency (RF) and mixed-signal circuits, antennas, filters, and components · Spectrum management technologies · Next-generation wireless networks, including 5G and 6G · Optical links and fiber technologies · Terrestrial/undersea cables · Satellite-based communications · Hardware, firmware, and software · Communications and network security · Mesh networks/infrastructure independent communication technologies
Directed Energy	<ul style="list-style-type: none"> · Lasers · High-power microwaves · Particle beams
Financial Technologies	<ul style="list-style-type: none"> · Distributed ledger technologies · Digital assets · Digital payment technologies · Digital identity infrastructure
Human-Machine Interfaces	<ul style="list-style-type: none"> · Augmented reality · Virtual reality · Brain-computer interfaces · Human-machine teaming
Hypersonics	<ul style="list-style-type: none"> · Propulsion · Aerodynamics and control · Materials · Detection, tracking, and characterization · Defense
Quantum Information Technologies	<ul style="list-style-type: none"> · Quantum computing · Materials, isotopes, and fabrication techniques for quantum devices · Post-quantum cryptography · Quantum sensing · Quantum networking
Renewable Energy Generation and Storage	<ul style="list-style-type: none"> · Renewable generation · Renewable and sustainable fuels · Energy storage · Electric and hybrid engines · Batteries · Grid integration technologies · Energy-efficiency technologies
Semiconductors and Microelectronics	<ul style="list-style-type: none"> · Design and electronic design automation tools · Manufacturing process technologies and manufacturing equipment · Beyond complementary metal-oxide-semiconductor (CMOS) technology · Heterogeneous integration and advanced packaging · Specialized/tailored hardware components for artificial intelligence, natural and hostile radiation environments, RF and optical components, high-power devices, and other critical applications · Novel materials for advanced microelectronics · Wide-bandgap and ultra-wide-bandgap technologies for power management, distribution, and transmission
Space Technologies and Systems	<ul style="list-style-type: none"> · On-orbit servicing, assembly, and manufacturing · Commoditized satellite buses · Low-cost launch vehicles · Sensors for local and wide-field imaging · Space propulsion · Resilient positioning, navigation, and timing (PNT) · Cryogenic fluid management · Entry, descent, and landing

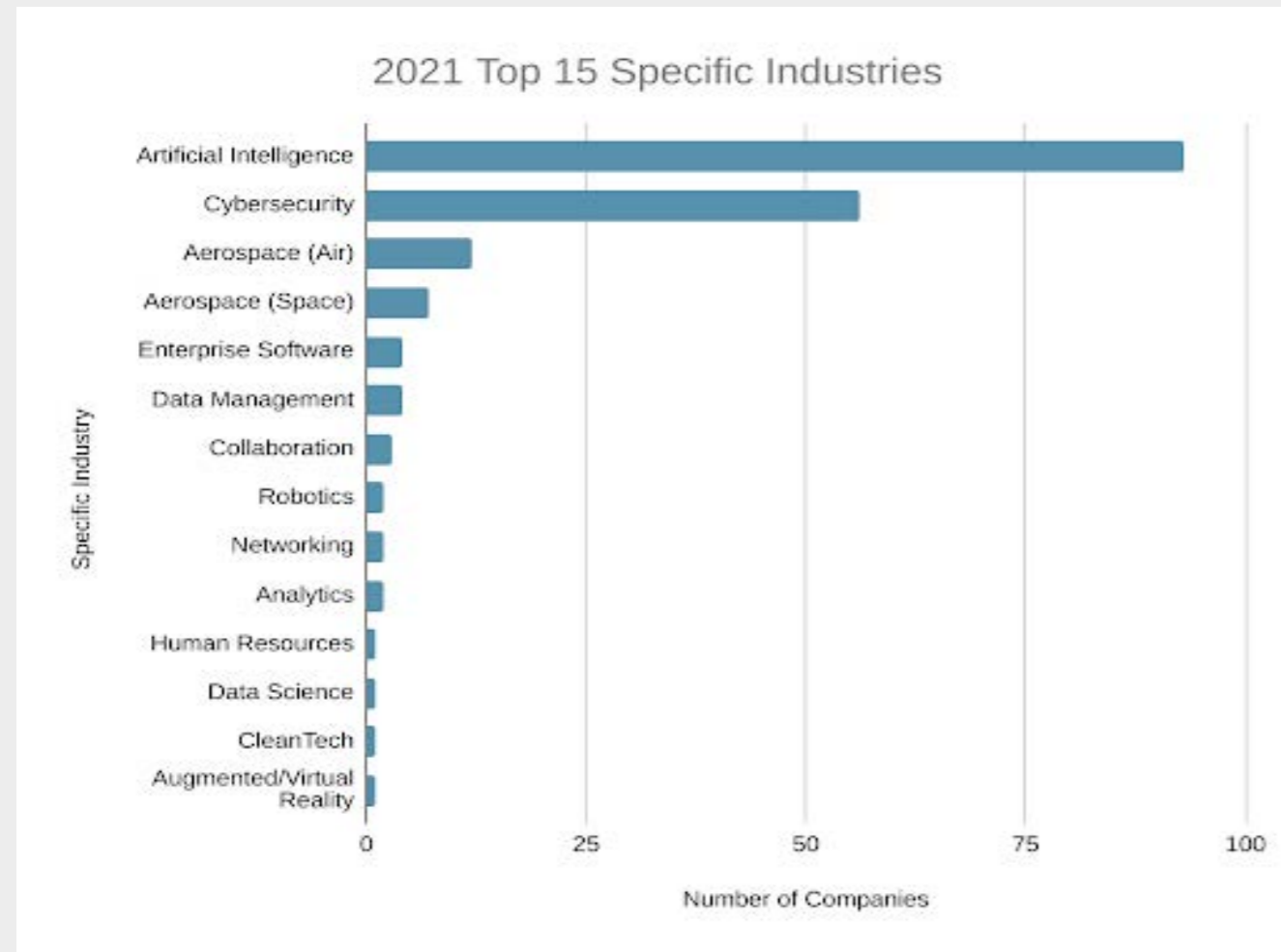
Source: White House. Critical and Emerging Technologies List Update: February 2022. [\(Available here\)](#)

Annex B. Investment Trends in Dual-use and Defence Technology

This annex provides some key statistics for dual-use ventures.

Top 15 Industries of Dual-use Ventures, 2021

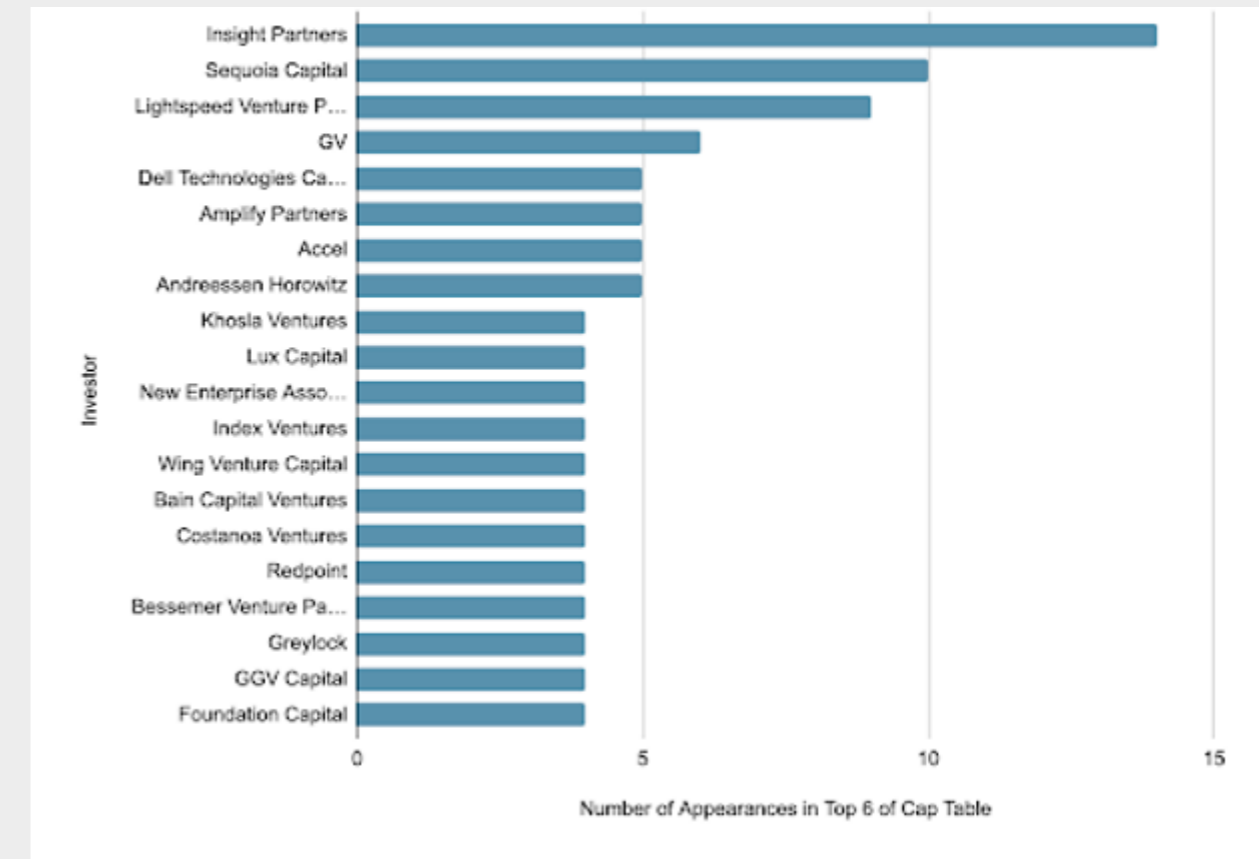
The dual-use ventures ecosystem is dominated by digital technologies companies (AI and cybersecurity.)



Source: <https://www.ainventures.com/post/2021-dual-use-report>

Top 20 Most Active Venture Capital Firms investing in Dual-use Ventures, 2021

The dual-use ventures ecosystem is dominated by 'civilian' focused VCs headquartered in Silicon Valley and New York with the highest assets under management



Source: <https://www.ainventures.com/post/2021-dual-use-report>

Annex C. ESG and Impact Frameworks Related to Defence and Aerospace

SASB Disclosure Topics for Aerospace and Defence Industry (RT-AE)

Disclosure Topic	Metrics
Energy Management	(1) Total energy consumed, (2) percentage grid electricity, (3) percentage renewable
Hazardous Waste Management	Amount of hazardous waste generated, percentage recycled
Hazardous Waste Management	Number and aggregate quantity of reportable spills, quantity recovered
Data Security	(1) Number of data breaches, (2) percentage involving confidential information
Data Security	Description of approach to identifying and addressing data security risks in (1) company operations and (2) products
Product Safety	Number of recalls issued, total units recalled
Product Safety	Number of counterfeit parts detected, percentage avoided
Product Safety	Number of Airworthiness Directives received, total units affected
Product Safety	Total amount of monetary losses as a result of legal proceedings associated with product safety
Fuel Economy & Emissions in Use-phase	Revenue from alternative energy-related products

Fuel Economy & Emissions in Use-phase	Description of approach and discussion of strategy to address fuel economy and greenhouse gas (GHG) emissions of products
Materials Sourcing	Description of the management of risks associated with the use of critical materials
Business Ethics	Total amount of monetary losses as a result of legal proceedings associated with incidents of corruption, bribery, and/or illicit international trade
Business Ethics	Revenue from countries ranked in the “E” or “F” Band of Transparency International’s Government Defence Anti-Corruption Index
Business Ethics	Discussion of processes to manage business ethics risks throughout the value chain

Source: SASB. <https://sasb.org/standards/materiality-map/>
 Blog on Aerospace and Defence: <https://sasb.org/blog/tag/aerospace-defense/>

Annex D. Exclusion Lists

This annex provides language from the Exclusions Lists of major limited partners regarding investments in dual-use, defence, and military applications.

Exclusions Clauses on Defence and Emerging Technologies from Selected Institutional Limited Partners

Institution	Exclusion Clauses
European Development Finance Institutions ¹³ (EDFI Harmonized Exclusion List)	<p>Radioactive materials and unbounded asbestos fibers.</p> <p>Racist and/or anti-democratic media</p> <p>In the event that any of the following products form a substantial part of a project’s primary financed business activities: a) Alcoholic Beverages (except beer and wine); b) Tobacco; c) Weapons and munitions; or d) Gambling, casinos and equivalent enterprises.</p>
World Bank Group / International Finance Corporation (IFC Exclusion List)	<p>Production or trade in weapons and munitions. This does not apply to project sponsors who are not substantially involved in these activities. “Not substantially involved” means that the activity concerned is ancillary to a project sponsor’s primary operations.</p> <p>Production or trade in radioactive materials. This does not apply to the purchase of medical equipment, quality control (measurement) equipment and any equipment where IFC considers the radioactive source to be trivial and/or adequately shielded.</p>

¹³ The EDFIs include: BII (UK), BIO (Belgium), CDP (Italy), COFIDES (Spain), KfW DEG (Germany), Finnfund (Finland), FMO Entrepreneurial Development Bank (Netherlands), IFU (Denmark), Norfund (Norway), OeEB (Austria), Proparco (France), SIFEM (Switzerland), SIMEST (Italy), SOFID (Portugal), Swedfund (Sweden) <https://www.edfi.eu/members/meet-our-members/>

European Investment Fund (EIF)	<p>Production of and Trade in Weapons and Ammunition The financing of the production of and trade in weapons and ammunition of any kind. This restriction does not apply to the extent such activities are part of or accessory to explicit European Union policies.</p> <p>Life Science Sector Restrictions When providing support to the financing of the research, development or technical applications relating to: (i) human cloning for research or therapeutic purposes; or (ii) Genetically Modified Organisms (“GMOs”). EIF will require from the EIF counterpart appropriate specific assurance on the control of legal, regulatory and ethical issues linked to such human cloning for research or therapeutic purposes and/or Genetically Modified Organisms.</p>
European Investment Bank (EIB)	<p>Ammunition and weapons, including explosives and sporting weapons, as well as equipment or infrastructure dedicated to military/police use. Investments within the European Union with the potential to be used for both civil and military/police purposes (dual-use) are not excluded.</p> <p>Projects which result in limiting people’s individual rights and freedom, or violation of human rights, such as - Prisons and detention centres of any form (such as correctional institutions or police stations with detention facilities)</p> <p>Activities prohibited by national legislation or international agreements ratified by the European Union: Any activities relating to the deliberate release of genetically modified organism (GMO)</p> <p>Ethically or morally controversial projects: - Animal and human reproductive cloning - Activities involving live animals for scientific and experimental purposes, including gene editing and the breeding of these animals; Projects with political or religious purpose</p>

KfW Capital	<p>Weapons</p> <p>Any production or trade in weapons, ammunition or critical components thereof.</p> <p>Controversial products</p> <p>Any production or trade of radioactive material which does not apply to the procurement of medical equipment,</p>
Church of England	<p>Indiscriminate weapons exclusion</p> <ul style="list-style-type: none"> Any company involved in the production or supply of indiscriminate weaponry (defined as nuclear weapons, anti-personnel mines, cluster munitions, chemical weapons or biological weapons), with no turnover threshold to be applied. Any company involved in the production, processing, supply or storage of weapons grade nuclear fissile materials, with no turnover threshold to be applied. Any company involved in the provision of strategic parts or services for antipersonnel mines, cluster munitions, chemical weapons or biological weapons, with no turnover threshold to be applied. <p>Conventional weapons exclusion</p> <ul style="list-style-type: none"> Any company deriving more than 10% of its turnover from strategic military sales including conventional military platforms, whole military systems, weaponry or strategic military parts or services.

Additional Resources on Exclusions for Weapons and Defence

Resource	Description
Swiss Sustainable Finance: Controversial Weapons Exclusions Guide	<p>Detailed guide to writing an investment exclusion policy for weapons and munitions</p>
Rejecting Risk: 101 Policies against Nuclear Weapons	<p>Exclusion policies from 100+ financial institutions on exclusions on nuclear weapons and other controversial weapons</p>
Don't Bank on the Bomb	<p>Activist campaign on investment exclusions for weapons</p>
Stop Explosive Investments	<p>Activist campaign on investment exclusions for weapons</p>