

The OSCE and Military Emissions: Next Steps and Mitigation of Greenhouse Gases

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Climate change threatens ecosystems and the health and livelihoods of humans around the globe. To limit the increase in global temperature to 1.5 degrees Celsius and reduce greenhouse gas emissions, major transitions are required across all sectors, including the military. Armed forces are facing increased pressure to make progress on mitigating their emissions, and doing so requires transparency and collaboration to ensure an effective climate mitigation policy on the part of the military.

Current status

Ten years ago, the Intergovernmental Panel on Climate Change released its globally peer-reviewed Fifth Assessment Report (IPCC, 2013), which concluded that climate change is unequivocal, and human activities – chiefly the release of polluting greenhouse gases from burning fossil fuels (coal, oil, gas) – the main cause. Yet, international climate action has been slow, and efforts remain insufficient to prevent the global temperature from rising more than 1.5 degrees Celsius by the next century (UNFCCC, 2022). The IPCC's 2021 Sixth Assessment Report (AR6 report) warned that changes to the climate are unprecedented and that there is no more time to be wasted (IPCC, 2021). The outcome from COP28 climate conference was historic, with States agreeing to transition away from fossil fuels and towards renewables (Carbon Brief, 2023), but drastic reductions in greenhouse gas emissions are needed. The World Meteorological Organisation confirmed that 2023 was the hottest year on record (see Figure 1, WMO 2024) and there are concerns that the IPCC has 'underestimated climate sensitivity and understated the threat of large sea level rise and shutdown of ocean overturning circulations' (Hansen, 2023).

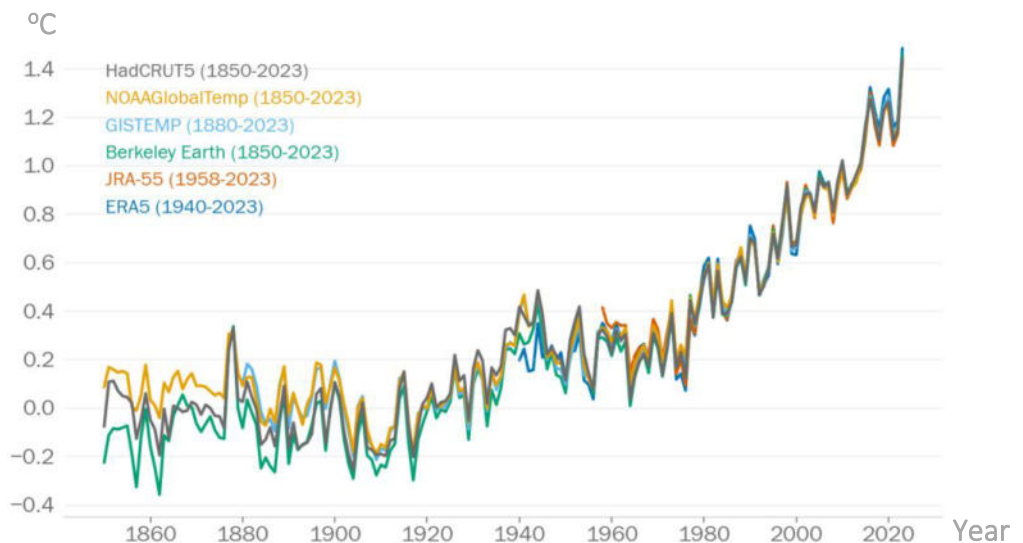
Until recently, armed forces around the world have been largely exempted from national or trans-global discussions to mitigate climate change by reducing their greenhouse gas (GHG) emissions. While almost every country in the world has set GHG reduction targets (Umemiya, 2023), few have committed to include their military forces.

The military is a huge consumer of fossil fuels, with large and complex supply chains. Analyses of fuel procurement data between 1998 and 2018 indicated that the United States’ military was the single largest institutional consumer of fossil fuels in the world (Crawford, 2019). The total greenhouse gas emissions across all military forces remains unclear, although estimates have been made.

In June 2023, the NATO Secretary General reiterated the need “to reduce the quite substantial emissions from military activities” (NATO, 2023e, para.6), and the second annual Climate Impact Assessment includes the requirement to reduce the NATO enterprise’s GHG emissions (NATO, 2023b). As set out below, in order to do so it is important to better understand the significance of military GHG emissions, the mitigation measures that can be taken, the challenges in addressing this, and the relevance to OSCE participating States (pS).

Critically, what can the OSCE do to support this transition and how can the OSCE promote greater cooperation between participating States in tackling the military contribution to climate change?

Figure 1 – Changes in global mean temperatures compared to 1850-1900 average
(Reproduced figure from the World Meteorological Organization, 12 January 2024)



Greenhouse gases and the military: the ‘dual obligation’

Some people refer to the impact of climate change upon armed forces as a ‘dual obligation’. On the one hand, armed forces must respond and adapt to a larger and more diverse set of demands, from the prospect of warfighting in climate-exacerbated conflicts to non-warfighting roles, such as humanitarian assistance, disaster relief and border control, and climate-related emergencies. The role of the military in providing climate-related emergency relief and preparedness planning is controversial (Bollen & Kalkman, 2022) and marked by varying views, according to the country and the respective political context, and accusations of ‘military mission creep’. This obligation to adapt leads to increased incentives and pressure to expand operational capabilities. On the other hand, armed forces face increasing political and public pressure to reduce their own climate and environmental impact and avoid creating the very effects that catalyse insecurity.

This second obligation is significant in both scale and urgency. It is estimated, for example, that the activities of military forces worldwide (including the industrial production of military capabilities but not warfighting activities themselves) account for approximately 5.5% of all global GHG emissions (Parkinson & Cottrell, 2022). Indeed, research suggests that there may even exist a two-way link between military expenditures and GHG emissions (Bildirici, 2018), and that militarisation itself can drive production and consumption patterns of wider national economies towards more carbon-intensive systems (Jorgenson et al., 2023). In addition to this, the act of conflict itself causes significantly damaging environmental impacts that can lead to a vicious cycle of conflict and loss (Weir, 2020).

Military forces belonging to OSCE pS represent a particularly large share of this overall total. The US Department of Defence alone, for example, is the largest institutional producer of GHGs – of any kind or sector – in the world, with annual emissions (from installations and operations) akin to the national GHG emissions of an entire country, such as Portugal (Crawford, 2019). Although the US represents a disproportionately large share of these outputs, other OSCE pS are not exempt. The official annual GHG emissions for 2022-2023 of the UK Ministry of Defence, for example, are given as 3.1 million tons of carbon dioxide equivalent (CO₂e) (UK MOD, 2022), which

is similar to the emissions of about 1.7 million average cars.¹ These official statistics, however, under-report the true picture, since other indirect emissions are not included. An inquiry report by the UK House of Commons Defence Committee noted that ‘understanding and reporting total emissions will be essential’ and that ‘Defence can do much more to measure and reduce its carbon emissions – without eroding the military capacity’ (2023, p.3).

Only broad estimates on the overall contribution of the military to global greenhouse gas emissions are possible, with limited attention or research done by just a few academics to date. Data on military fuel use submitted to the United Nations Framework Convention on Climate Change (UNFCCC) is incomplete² and, given the huge gaps, not useful for estimating total military emissions. The problem with data gaps in reporting extends beyond the military, but as global military spending increased to around US\$ 2.24 trillion (Stockholm International Peace Research Institute [SIPRI], 2023) in 2022, concerted action is needed to better report military emissions and take measures to reduce the related carbon footprint – especially as these emissions are very likely to increase in line with military expenditures.

The methodology used to provide the 5.5% global estimate (Parkinson & Cottrell, 2022) relies on assumptions about variations between military structures across regions. This includes estimates on the number of military personnel, the carbon intensity of their economies, and the likely ratio of stationary GHG emissions (i.e. from military assets and bases) compared to mobile military activities (such as the use of aircraft, navy vessels, land vehicles and spacecraft). Emissions from mobile activities depend on several factors, including the quantity, age, specification and utilisation of equipment, which highlights the difficulty and limitation of the assumptions made. The 5.5% estimate does not even include emissions caused by warfighting itself or the additional non-carbon dioxide heating effect from aircraft flying at high altitudes, and the effects of aviation contrails.³

¹ Based on the assumption that an average car emits approximately 1.8 metric tonnes of CO₂e each year.

² See <https://militaryemissions.org/>.

³ Water vapour, contrails and non-CO₂ effects are recognised as a significant contribution to the effects of aviation on climate change but are not widely taken into account.

As will be discussed later, there are significant barriers preventing a clear picture of military emissions. This scenario also creates a wide range of known and unknown risks and opportunities for military forces and their governments. These risks and opportunities, which are critical for the OSCE remit, include:

- **Conflict prevention and resource management.** As a contributor to global GHG emissions, the military function ranks among those factors that threaten life, health and wellbeing, habitability, income, food security and infrastructure, as well as cause land loss and migration (IPCC, 2022). These risks are further exacerbated in areas where resource extraction for use in military capabilities generates pollution, habitat destruction and armed force (Downey et al., 2010). This presents the OSCE pS with the opportunity to reduce potential drivers of conflict by enhancing efficiency, sustainability and circularity across the value chains of its military forces, and capacity building in areas where resource extraction occurs as a result of military requirements.
- **Energy security.** The fossil fuel requirement of OSCE pS armed forces have generated a scenario in which national security is not only ensured at the cost of socio-economic harms (Healy et al., 2019), but is also becoming increasingly vulnerable to supply disruptions and price fluctuations (Samaras et al., 2019). Harnessing the collective influence and buying power of OSCE pS armed forces to drive sustainable energy innovation could not only enhance energy independence and security, but also help catalyse positive tipping points for socio-technological advances (e.g. price reductions in renewable technologies, wider societal behavioural shifts, etc.) (Fesenfeld et al., 2022; Motta et al., 2021)
- **Operational effectiveness.** Climate change poses direct risks to the operational effectiveness of military forces as it creates environmental conditions, which are beyond the operating capacity of military platforms and personnel, and also stretches military resources as the military is increasingly called upon to support non-traditional roles (e.g. humanitarian and disaster relief, border control, epidemic response, etc.) (Cox et al., 2021). Enhancing sustainability is often

viewed from a military perspective as reducing the drivers of such risks, while providing forces with significant logistical advantages (e.g. on-site power, water and food production and more self-sustaining systems would reduce high-risk and high-cost resupply missions) (UK Strategic Command Defence Support, 2022; Samaras et al., 2019). It is also suggested that tying such capabilities to local adaptation initiatives can also serve as a force multiplier for other local adaptation initiatives (Teicher, 2019).

- **Financial and legal risks.** The legal framework on the Protection of the Environment in Relation to Armed Conflict (PERAC) was adopted in 2022 and sets out how the environment should be protected before, during and after armed conflicts as well as in situations of occupation (UN General Assembly, 2022). The twenty-seven PERAC principles vary from non-binding guidance to reflecting binding international law, including recognition of the potential to exacerbate global environmental challenges, such as climate change and biodiversity loss. As such, national military forces face an increased obligation to comply with international and national environmental agreements and regulations, although exemptions or derogations are often applied. Furthermore, the Aarhus Convention also makes it possible to refuse giving environmental information if this adversely affects national defence or public security (UN Economic Commission for Europe, 1998). Military forces, however, may face legal challenges and accusations based on ‘environmental negligence’ and even ‘ecocide’ in theatres in which such laws may be enacted prior to, during or following a conflict.⁴ This includes costs associated with responding to environmental damage through wartime and peacetime emissions (from humanitarian relief to pollution clean-up), but risks also significantly strain the national budgets of OSCE pS (Weir, 2020).

⁴ There are calls to amend the Rome Statute of the International Criminal Court to include ecocide. For a proposed consensus definition of ‘ecocide’, see <https://www.stopecocide.earth/legal-definition>.

- **Reputation and diplomacy.** All the issues highlighted above create significant reputational risks for the armed forces of nation-states and the nations they represent (exacerbated by information operations by adversary groups) (Bellasio et al., 2023). This, in turn, may undermine diplomatic efforts, hamper collaboration, and erode trust between local populations and the military. Active and transparent efforts to reduce the environmental impact of the military represents an opportunity to enhance the reputation and performance of OSCE pS. Tangible gains in the sustainability policy and innovation may also provide a valuable subject for inter- and intra-state diplomacy and collaboration and is likely to be of increasing importance in future climate-exacerbated security scenarios (Bellasio et al., 2023).

As this section highlights, and although these areas might involve significant risks, they could equally be seen to provide an opportunity for leadership on the part of the OSCE and its participating States. These contexts highlight three clear areas for the OSCE to demonstrate leadership in the area of military emissions; namely: i) collaboration on military GHG mitigation policy; ii) transparency in reporting; and iii) collaboration on implementing mitigation action.

Collaborating on military GHG mitigation policy

The OSCE's comprehensive approach to security incorporates politico-military, economic, environmental and human dimensions, and affirms that "*military security and stability can be achieved through greater military transparency, openness and exchange of military information.*" (OSCE, n.d.d, par.1) Environmental matters have always been an intrinsic component of the OSCE's agenda. The 1975 *Helsinki Final Act*, which founded the OSCE's forerunner organisation, recognised the importance of environmental protection for peace and security, and underlined the relevance of close international collaboration in this regard (OSCE, 1975).

To the same extent as the understanding of the science and impacts of climate change have progressed, also the recognition of the interconnected strategic risks across social, economic and environmental dimensions has increased. Consequently, climate change is seen to hold critical implications for national security, although divergent perspectives remain between some

nations on the magnitude of climate change impacts and their prioritisation of climate action. There is a general global trend of growing political attention paid to climate security, as addressed at the OSCE High-Level Conference on Climate Change in July 2023 (OSCE, 2023).

The complexity and interdependent nature of climate change makes the topic fit naturally into the OSCE's comprehensive approach. The 2003 *Strategy Document for the Economic and Environmental Dimension* includes the concepts of sustainable development and "environmentally friendly energy supply" (OSCE 2003, p.5), as well as encouragement to participating States for "further development and use of new and renewable sources of energy" (OSCE 2003, p.5) and the ratification of the Kyoto Protocol (OSCE, 2003). The 2007 *Madrid Ministerial Declaration on Environment and Security* specifically acknowledged climate change and its potential to amplify environmental factors leading to conflict, as well as recognised climate change as a long-term challenge (OSCE, 2007). Furthermore, the OSCE has collaborated in projects to enhance transboundary and regional cooperation in the Southern Caucasus, Eastern Europe, South-Eastern Europe, and Central Asia (OSCE, n.d.b; OSCE, n.d.f).

In December 2021 (OSCE, 2021a), the OSCE's Ministerial Council Decision No. 3/21 (MCD 3/21), *Strengthening Co-operation to Address the Challenges Caused by Climate Change*, was issued. This document is the result of increasing attention being paid to climate change on the part of OSCE pS and was prioritised by the then OSCE Chairperson-in-Office that hailed the agreement as "truly ground-breaking" (Linde in OSCE, 2021b, par.2) and underlined that it demonstrates that "the world's largest regional security organization...has an important part to play in finding, preventing and mitigating measures that can make a difference for the security of the people in the OSCE region. (Linde in OSCE, 2021b, par.2)" Enshrined in the document are aspects such as cooperation in mitigating the negative economic, social, and environmental impacts of climate change, the increased use of clean and renewable energy sources, and the adoption of a multi-stakeholder approach to addressing climate change by engaging the private sector, academia, civil society, and beyond (OSCE, 2021a).

MCD 3/21 put the topic of climate change firmly on the OSCE's agenda, representing the first time that OSCE pS agreed how they would collaborate

in addressing the diverse challenges of climate change (2021a). This agreement was entered into during a period of high military tension in Europe, while Russia was amassing military forces in advance of its February 2022 invasion of Ukraine (Bremberg, 2023), and only a week before Russia vetoed a UNSC resolution that was the culmination of a multi-year effort to “integrate climate-related security risks as a central component into comprehensive conflict-prevention strategies of the United Nations” (United Nations Meetings Coverages and Press Releases, 2021, par.3). This underscored the continuing relevance of the OSCE and its convening power in bringing together 57 participating States from across three continents and by creating consensus on a topic of common interest, but not always common agreement.

Nations and international organisations must not only learn to effectively respond to climate-related impacts, but also accept their responsibility to meaningfully and visibly contribute towards helping mitigate climate change through GHG reductions. Unfortunately, up to the present, military forces have made little progress in reducing their fossil fuel requirements, and typically increase their energy needs over time because of more powerful weapons and communications systems, longer operational reach, infrastructure improvements, and other technologies. The European Parliament’s resolution for COP28 cites the need for accelerated decarbonisation in the defence sector, target setting and transparency by its Member States (European Parliament, 2023). Progress in decarbonisation will depend on budgetary resources and operational priorities, and to date few countries have set out climate mitigation strategies for their military (Council of the European Union, 2024). While technology may provide significant battlefield advantages and improve the soldiers’ quality of life, the trade-off has been an enormous modern-day energy demands that risks overextension and is often inefficient. As well as environmental impacts, unmanageable military energy demands can lead to unacceptable risks for disruption to operational plans, leaving time and space for adversaries to plan countermeasures and seize the initiative.

A reduction in military carbon-based fuel requirements and the diversification and reduction of energy needs mitigates the operational carbon footprint and enhances military energy security. In the short term, many armed forces have achieved various levels of GHG reductions for assets such as

domestic military installations and with civilian pattern vehicle fleets. Operationally speaking, the military forces of many OSCE pS have succeeded in reducing carbon-based energy dependencies for deployed camps, but emissions from these camps are typically only a very small portion of the total operational emissions and technically much easier to achieve than other more substantial reductions. Meaningful GHG reductions for large platforms, most importantly air assets, will be much more critical and challenging if operational effectiveness must not be compromised in the process.

Within the coming decades, global energy transitions will increasingly affect military organisations. These and other innovations will continue to change our societies, our economies and the structure of our workforces. OSCE pS will have to continuously assess technological developments for their energy implications and adapt accordingly. States will have to be attentive to accelerating innovations for alternative energy sources and their applications. This is especially important for large military equipment procurements that typically require a significant lead-time and whose operational lifecycle lasts several decades. Poor purchases that do not have the potential for adaptation to future energy needs, or for which the full lifecycle and environmental footprint have not been properly considered, must be avoided. Achieving all these objectives will not just be a military concern but require significant support from the civilian sector.

Given the existing partnerships and national overlap across the OSCE, NATO and the EU, there is strong potential for reciprocal exchange of best practice in mitigation action, to foster interoperability and avoid unnecessary overlap in efforts. All three organisations have produced progressive policies, roadmaps or agreed on decisions on how they will deal with challenges related to climate change. MCD 3/21 encourages using the OSCE as a platform for facilitating such exchanges, and the EU's Climate and Defence Roadmap invites Member States to share ideas and best practices (European Union, 2020). NATO elevated the subject of climate change as a key topic within the NATO 2030 process – it received attention within the 2021 (Brussels), 2022 (Madrid) and 2023 (Vilnius) Summit Communiqués, as well as NATO's 2022 Strategic Concept. Furthermore, a *NATO Climate Change and Security Action Plan* has been promulgated, and Canada will be the framework nation for a NATO-accredited Climate Change and Security Centre of Ex-

cellence (CCASCOE) opening in early 2024. All twelve of the CCASCOE's sponsoring nations are also OSCE pS.⁵

NATO has also published a compendium, containing examples on how some NATO members are putting climate change and security plan measures into practice (NATO, 2023a).

As mentioned earlier, armed forces have typically been exempted from national and international GHG reduction discussions as well as meaningful reporting or commitments. This is often framed as military necessity due to the belief that operational effectiveness and security for this component of national power is paramount, beyond responsibility or accountability for their climate change impacts. While armed forces do hold important roles in societies for reasons of deterrence, national defence and the promotion of peace, the scope for armed forces to escape criticism for inadequate climate action within its forces will diminish over time, particularly as governments and private citizens must absorb the increasing costs and physical effects from climate-related extreme weather conditions. Some nations that want only disregard climate action of their military forces could conceivably find themselves unwelcome to participate in multinational exercises or other forms of collaboration.

All components of society across the planet have a role to play in mitigating climate change, including international organisations. How the OSCE and its participating States take on, and follow-through in, this role will directly reflect on their leadership in the world. Organisations such as the OSCE, NATO and the EU recognise the severe challenges that climate change has brought and cannot hope to declare organisational values that underscore the importance of peace and international stability without intentionally choosing adequate levels of climate action (Barnhoorn, 2023). OSCE climate action can reinforce transparency around allocations to national defence spending, and even potentially avoid impacts on military recruitment and retention if citizens perceive organisational values that are disconnected from their own.

⁵ The twelve CCASCOE sponsoring nations are Canada, Denmark, France, Germany, Greece, Italy, Latvia, Luxembourg, Norway, Romania, Türkiye, and the United Kingdom.

Enhancing transparency and consistency in military GHG reporting

The OSCE's approach is that 'military security and stability can be achieved through greater military transparency and openness.' (n.d.d, para.1) Because almost every country has set a national GHG reduction target, it is critical that governments understand the make-up of all their emissions, including the contribution from their respective armed forces. Low quality inventories will affect a country's ability to track and meet their climate targets. Governments, including their armed forces, will come under mounting pressure to make improvements, with increased attention from civil society organisations on carbon accountability and recognition that the military is not always fulfilling even minimum reporting obligations.⁶ Despite growing momentum on the need for better reporting of military GHG emissions, significant improvements are still needed.

NATO released a new methodology to measure NATO's civilian and military GHG emissions in July 2023 (NATO, 2023d), and has established a research task group, including a sub-group covering climate mitigation (NATO, 2023c). A NATO proposal for carbon footprint assessment has also been put forward (NATO, n.d.). The new methodology covers emissions across the NATO enterprise yet excludes emissions from NATO-led operations and missions as well as any other activities such as training and exercises. The methodology also does not refer to categories relating to warfighting activities (such as landscape fires or reconstruction needs) or how these may be addressed in the future. In the absence of an agreed international approach on military emissions reporting, a proposed framework was published in 2022, including a comprehensive set of additional categories that specifically relate to other military and warfighting activities and that are not given in the NATO methodology (Cottrell et al., 2022). It is important that these warfighting contributions are not overlooked. Given its inherent complexity, little research has been done on the GHG emissions from a conflict itself, although the emissions from Russia's war in Ukraine have been initially estimated (de Klerk et al., 2023). An estimated 150 million metric tonnes of CO₂ are attributed to the first 18 months of the war in Ukraine, equivalent to the total annual GHG emissions for an industrialised country like Belgium (de Klerk et al., 2023).

⁶ See <https://militaryemissions.org/>

Although the new NATO methodology does not cover all emission categories pertaining to military activities, it is a useful starting point to help improve transparency and be applied by the military to initiate their own reporting, develop mitigation targets and establish reporting improvement goals. Some states have already set out ambitions to improve or develop their military GHG reporting based on the GHG protocol.⁷ In this way, Slovenia has indicated that the assessment of the carbon footprint of its Ministry of Defence is in progress and will include investments in arms, ammunition and other specific military goods (NATO, 2023a). All State Parties have the obligation under the Paris Agreement to submit reports on their progress to the UNFCCC in a transparent (UNFCCC, 2015) and regular manner. Unfortunately, since data requested by the UNFCCC on military fuel use is voluntary, most countries do not provide disaggregated data, although some countries – such as the US, the UK, Canada, Germany, Norway and the Netherlands – already report some military GHG emission data publicly, under national reporting commitments. In comparison to 2022, the UNFCCC data submitted in 2023 shows no improvement in the provision or overall transparency in military fuel use data. This includes some OSCE pS, which do not provide any useful data on military fuel use.

Overall reporting obligations remain a challenge for many developing countries, including those with large militaries in terms of overall GDP. Research into the consistency, regularity and quality of inventories indicated that over half of the world’s developing countries are struggling to reliably and regularly report their emissions (Umemiya, 2023). Emissions reporting is a critical factor for the overall progress assessment of global climate goals. Although inventory capacity has been improved to some extent, many countries still have low-quality inventories and do not provide useful disaggregated military data.

The Paris Agreement also requires each country to submit a Nationally Determined Contribution (NDC), which forms the basis of a country’s ability to reduce its national emissions, adapt to the effects of climate change, and communicate a country’s efforts to address climate change. Updated NDCs are due every five years and contain information on targets, policies and measures for reducing national emissions and climate adaptation. Countries

⁷ The GHG protocol, see <https://ghgprotocol.org/>.

will be expected to submit updated NDCs in 2025. NDCs rarely refer to the indirect consequences of climate change (Vogler, 2023), such as migration or potential conflict, but they also typically fail to mention the contribution that the military could make to GHG emission reductions. In some cases, the military is explicitly exempted. Australia, for example, as an OSCE Asian Partner for Co-operation has committed to reduce the emissions of the government to net zero by 2030, but this excludes defence and security agencies (Australian Government Department of Industry, Science Energy and Resources, 2022).

Improvements are needed across the board as far as reporting is concerned, through target setting for, and inclusion of, the military in national reduction targets and their NDCs. The OSCE's core aim on strengthening confidence and security relies on the exchange of military information, dialogue and openness, which means that this should also include transparency around military GHG reporting and reduction target setting (OSCE, n.d.c).

Collaborating on military GHG mitigation action

In addition to supporting collaboration on military emissions policies and transparency of emissions reporting, the OSCE is placed well to promote enhanced standards and physical mitigation activities and initiatives. The scope of mitigation activities required across the OSCE pS' military forces is broad, including technological initiatives, from retrofitting estates and military platforms with renewable energy generation and storage technologies through to developing and testing new technologies (such as synthetic fuel alternatives or portable food and water production systems) (British Army, 2021; DARPA, 2021).

Various armed forces are currently increasing their focus on non-technological components of mitigation, from enhancing sustainability communication, education and behavioural change (Jalili, 2022a) to supporting initiatives for nature-based mitigation, such as afforestation, peatland restoration and sustainable land use practices on training sites (Ellwanger & Reiter, 2019). The ways in which the OSCE could support such initiatives has the potential to expand and diversify, including within the following three areas, in which the OSCE is already well prepared to support current military mitigation action:

1. **Localising political action.** Given the number of OSCE members that are NATO members as well, the NATO Standardization Agreements (STANAG) system represents a key procedural route for enhancing military mitigation across the majority of OSCE participating States when applied. Since MCD 3/21 encourages the sharing of best practices, such frameworks and guiding principles could be equally followed by non-NATO members. However, implementation of such agreements hinges on political support, particularly in terms of finances and material resources. NATO has managed to circumvent some of the resource challenges through programmes such as the Connected Forces Initiative (CFI) (Derleth, 2015). Maintaining political will is key, and the implementation of mitigation criteria within STANAGs is at risk from the relative inexpediency of this issue. The OSCE's Aarhus Centres provide an alternative route through which political pressure can be applied from the 'bottom up' by supporting communities and local action groups near military installations regarding the requesting of information, participating in decision-making on local emissions and pollutant risks, and implementing local mitigation strategies in cooperation with local military representatives (Sehring & Buttanri, 2018).
2. **Enhancing public-private partnership and collaboration.** The OSCE's Environment and Security (ENVSEC) Initiative already provides a valuable resource for countries seeking to develop implementation plans for adaptation and disaster risk reduction. As a part of this, it has gained significant experience in facilitating public-private partnerships between state authorities and actors of the private sector in the fields of energy production and environmental management (Diaz Galán, 2019). This facilitation has not only provided adaptation gains for various areas in Eastern Europe, the Southern Caucasus and Central Asia, but also has highlighted the opportunities for creating resilient water and energy production and distribution agreements (including in areas affected by environmental disasters) (Diaz Galán, 2019). This represents a potentially significant resource for military leaders involved in mitigation initiatives. In this way, leaders engaged in developing or integrating sustainable technologies or in analysing force development strategies could benefit from examining the degree to which these technologies or strategies could help generate or support greater resilience in communities affected by ad-

verse climate conditions (Teicher, 2019). Perhaps the most obvious areas are the refinement of strategies and practices for ecosystem restoration, anti-poaching, stabilisation and Humanitarian and Disaster Relief (HADR) missions, and the testing of viable technologies for sustainable energy and staple production. The OSCE has the potential to act as a form of “trusted intermediary” in supporting the integration of expertise in military practice, policy and education (Teicher, 2019; Jalili, 2022a). Perhaps most importantly, OSCE networks can support dialogue and community engagement in the fields of resource management and circular economy, such as the development and use of biofuels and synthetic fuels, and critical minerals for battery production and electrification (Mirumachi et al. 2020).

3. **Enhancing equity across OSCE security forces.** Although many armed forces are voicing concern as far as climate risks are concerned, there is a risk of cross-force inequity in the drive towards reducing military emissions. Among OSCE pS, the security forces that tend to be the most vocal about reducing their GHG emissions are also generally those with the highest emissions (particularly the USA, but also the UK, France and Germany). This could be seen as beneficial, as the emissions of these larger security forces represent the vast majority of OSCE pS’ military emissions and, thus, their buy-in would be integral to any OSCE reform agenda. However, it also presents notable areas of risk. As highlighted by Brzoska, the threat posed by climate change has been used by military forces as a rationale for expanding their relative capabilities and roles, rather than moving towards ‘leaner’ or ‘greener’ models (2015).
4. Armed forces of smaller OSCE pS may also be notably concerned that major nations will shape mitigation discourse in ways that privilege their own priorities. This is particularly acute as far as the question of mitigation technologies is concerned. For example, if such forces seek to take the lead as ‘first movers’ by developing their own capabilities, they may capture certain technology markets, fail to develop workable products, and divert finances from more affordable and interoperable systems (Workman et al., 2022). This is particularly risky if these forces defer the historical, socio-organisational bias towards more expensive and less expendable “exquisite” technologies (Center for Strategic & International Studies [CSIS], 2023).

5. Military forces, however, seek to adopt a ‘fast follower’ approach, in which they seek to take advantage of decarbonisation technologies from the wider marketplace, buying them as and when required. This has the benefit of rapid adaptation and increasing the demand signals for products that would be affordable and interoperable with smaller military forces. However, it also creates risks, such as causing a reliance on external industry partners and increasing the prospect of a moral hazard (in which, i.e., capability officials continually defer sustainability investments in the hope that a ‘silver bullet’ technological solution is just over the horizon) (Wagner & Zizzamia, 2022). These risks are a cause for concern given the continued lobbying and political support for the defence sector (including the defence industry) to remain exempt from various environmental laws and regulations (PAX, 2023).

Conclusion

Success will require tremendous political leadership to be sustained over the extended period needed to address climate change. Within the OSCE and other multinational organisations, this could be done effectively through a platform for dialogue on climate change, increased understanding of how to achieve consensus, and mainstreaming, since more ambitious targets for the military will be required to effectively meet the challenges ahead.

The OSCE’s network of Aarhus Centres (OSCE, n.d.a) and the Environment and Security Initiative (OSCE, n.d.e) could provide the necessary platform to support the necessary dialogue for, and consultation on, addressing the military emissions reporting gap, thereby focusing on the transparency and clarity of the status of military emissions data, and dispelling concerns over national security from data sharing, the need for inclusion within NDCs, and setting out expectations for military GHG reduction targets.

OSCE pS will have to look beyond individual interests, share best practices and technologies, and contribute to the enabling conditions necessary for innovation and transformation, while avoiding drawn-out internal discussions that water down targets and delay actions. Public diplomacy and outreach efforts must then communicate these targets through the media, conferences, technological demonstrations and other venues.

OSCE pS should be transparent in their actions and with information and data wherever possible, not only to build trust, but also to facilitate discussion and research among civil society and communicate how progress is ensured across the OSCE and its participating States.

The OSCE's role around equity across the armed forces is particularly valuable. Its historical role and influence as regards dialogue facilitation, mediation and confidence-building activities places it in a position to avoid disconnects and disenfranchisement in terms of the technological capabilities of OSCE pS with larger armed forces and those with less developed forces (Schaller, 2021). This could become particularly important in view of the nascent NATO Centre of Excellence for Climate Security and the NATO Science and Technology Committee (STC). In addition, the OSCE can encourage information sharing, joint exercises and capacity-building initiatives to bridge the military mitigation gap between its NATO and non-NATO members.

The OSCE should also encourage new norms and policies to be adopted, which are aimed at mitigating activities across both the armed forces and the wider defence industry, and which are aligned with principles and regulations that are critical to achieving the UN Sustainable Development Goals (SDGs). Doing so calls for transparent reporting mechanisms to be in place to demonstrate the effectiveness of the military climate action policy and allow its measurement against GHG reduction targets.

In July 2023, the OSCE Secretary General suggested establishing a Climate Fund to support participating States and the vital work needed (OECD, 2023). The OSCE's MCD 3/21 acknowledges that climate change requires the widest possible international co-operation, and as such opportunities exist for the wealthiest OSCE participating States to spearhead funding mechanisms (Greminger et al., 2021) as a means of enhancing sustainability investment and innovation among less wealthy OSCE participating States, for example through a centralised fund, as has been similarly proposed for NATO (Shea, 2022). However, any future funding for mitigation initiatives must be measured against net GHG reductions achieved across the military sector. The MCD 3/21 sets out the platform to achieve the necessary international co-operation, and in doing so national military climate mitigation plans, which implement the GHG emission reductions needed, must be in place.

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