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NATO's actions on the impact of climate change on security

Działania NATO wobec wpływu zmian klimatycznych na bezpieczeństwo

Abstract: Incorporating the threat of climate change into the security architecture redefines the role of the military and broadens its remit to include responsibilities related to ensuring climate security. In many countries, the military's involvement in the fight against climate change is seen as essential. The aim of this research is to present the activities of the army in the face of climate change and their impact on the security of NATO countries, as the military's energy transition is currently one of the key challenges for allied armies. Four diagnostic features were included in the study: adaptation to new environmental conditions, sustainability and zero-carbon, knowledge development and training activities, and partnership cooperation. The diversity of climate strategies in selected allied countries was examined through a comparative analysis and critique of strategic documents on climate change issues and defence energy transition (e.g. army climate strategies and civilian climate strategies). The study will outline the role that the military is slowly beginning to play in the energy transition process. The results may contribute to the discussion on energy transition in NATO armies, as this process is still highly controversial, with not all defence professionals agreeing on the army becoming eco-friendly, and contribute to the wider debate on low-carbon military operations.

Keywords: climate security, military energy transition, climate change, NATO strategies

Streszczenie: Włączenie zagrożenia, jakim są zmiany klimatyczne, do architektury bezpieczeństwa redefiniuje rolę wojska i poszerza jego kompetencje o te związane z zapewnieniem bezpieczeństwa klimatycznego. W wielu państwach zaangażowanie wojska w walkę ze zmianami klimatu jest postrzegane jako niezbędne. Celem badań jest przedstawienie działań armii podejmowanych

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w obliczu zmian klimatycznych i mających wpływ na bezpieczeństwo państw NATO, bowiem wojskowa transformacja energetyczna stanowi współcześnie jedno z kluczowych wyzwań dla armii sojusznicznych. W badaniu uwzględniono cztery cechy diagnostyczne: adaptacja do nowych warunków środowiskowych, zrównoważony rozwój i zeroemisyjność, rozwój wiedzy i działalności szkoleniowej oraz współpraca w ramach partnerstwa. Źródnicowanie strategii klimatycznych w wybranych państwach sojusznicznych zbadano za pomocą analizy porównawczej i krytyki strategicznych dokumentów z zakresu problematyki zmian klimatycznych i transformacji energetycznej sektora obronnego (m.in. strategii klimatycznych armii i cywilnych strategii w tym obszarze). Badanie umożliwi nakreślenie roli, jaką wojsko zaczyna powoli odgrywać w procesie transformacji energetycznej. Wyniki mogą przyczynić się do dyskusji na temat transformacji energetycznej w armiach NATO, bowiem ten proces w dalszym ciągu budzi spore kontrowersje i nie wszyscy pracownicy sektora obronnego zgadzają się z ekologizacją armii, oraz stać się przyczynkiem do szerszej debaty w zakresie niskoemisyjnych działań militarnych.

Słowa kluczowe: bezpieczeństwo klimatyczne, wojskowa transformacja energetyczna, zmiany klimatyczne, strategie NATO

Introduction

The contemporary international security environment is characterised by a high level of dynamism resulting from new economic, military, political, social or environmental conditions, which are indicators of an evolution in the approach to the strategies undertaken at all these levels. Climate change is one of the greatest challenges facing the world today¹. How is climate change linked to security and, further, to the loss of security? The effects of anthropogenic global warming are not only worsening human livelihoods and altering ecosystems, but they are also leading to the disintegration of social relations, the breakdown of the international order, and the outbreak of conflicts and wars; ultimately, they challenge the security environment².

NATO is an international political-military organisation with a stabilisation role³. Although NATO's primary mission is collective defence, the Alliance also provides its members with the capacity to respond collectively to crises, which can also be triggered by climate change⁴. Climate change is recognised as a *risk multiplier for*

1 *Work begins on the first Solar Carport at Army Headquarters*, <https://www.army.mod.uk/news-and-events/news/2021/08/the-first-solar-carport-at-army-headquarters/> [9.04.2024].

2 H. Buhaug et al., *Climate-driven risks to peace over the 21st century*, "Climate Risk Management" 2023, no. 39, <https://doi.org/10.1016/j.crm.2022.10047> [9.10.2023].

3 NATO, *The Secretary General's Annual Report 2022*, Belgium 2023, p. 133.

4 *NATO Adopts Climate Change Actions for 2030*, <https://sdg.iisd.org/news/nato-adopts-climate-change-actions-for-2030/> [9.10.2023].

the outbreak of armed conflict and thus changes the conditions under which the militaries of Alliance member states will have to operate in the coming decades. Phenomena such as tornadoes, hurricanes, or extreme air temperatures, as well as reduced drinking water supplies will become more frequent and intense, leading to loss and damage to both nature and human life. Therefore, climate change has significant implications for NATO at tactical, operational and strategic levels⁵. Whether climate directly or indirectly affects conflict depends on the socio-economic and political factors that lead to intensification or de-escalation⁶. It has been estimated that climate change accounts for 10% of the risk of armed conflict⁷. Incorporating the threat of climate change into the Alliance's strategy will ensure that NATO is prepared to deal with an unstable environment and new geostrategic competition resulting from climate change⁸. Threats caused by natural forces increasingly involve armed forces, hence the need to fully consider their role in climate management. The armed forces are among the best-organised actors that are prepared to operate efficiently and effectively both in peacetime (in the so-called "ordinary state") as well as (and in fact, above all) in times of crisis and war⁹. The efficiency of this preparation is mainly expressed in high readiness and the ability to quickly support the actions of public administration bodies and society in situations involving various types of threats, including, inter alia, threats of non-military nature that cause events (disasters) on a mass scale (e.g. natural disasters). On the other hand, the military sector is responsible for about 5.5% of global greenhouse gas emissions, surpassing even Russia, which is ranked as the fourth largest

- 5 S. Goodman, K. Kertysova, *NATO: An unexpected driver of climate action?*, NATO Review, <https://www.nato.int/docu/review/articles/2022/02/01/nato-an-unexpected-driver-of-climate-action/index.html> [5.11.2023].
- 6 V. Koubi, *Climate Change and Conflict*, "Annual Review of Political Science" 2019, no. 22, p. 345, <https://doi.org/10.1146/annurev-polisci-050317-070830> [5.11.2023].
- 7 K.J. Mach et al., *Climate as a risk factor for armed conflict*, "Nature" 2019, no. 571, pp. 193–197, <https://doi.org/10.1038/s41586-019-1300-6> [23.10.2023].
- 8 L.G. Rico, *NATO and Climate Change: A Climatized Perspective on Security. Report 2022*, Belfer Center for Science and International Affairs, Cambridge 2022, https://www.belfercenter.org/sites/default/files/files/publication/Belfer%20Nato_Climate%20Change_VF_1.pdf [23.10.2023].
- 9 D. Jayaram, M.C. Brisbois, *Aiding or undermining? The military as an emergent actor in global climate governance*, "Earth System Governance" 2021, vol. 1, no 9, <https://doi.org/10.1016/j.esg.2021.100107> [18.10.2023].

CO₂ emitter worldwide. It is worth mentioning that the armed forces are not obliged to report or reduce their emissions, as they were omitted from the 1997 Kyoto Protocol and excluded from the 2015 Paris Agreement¹⁰. This means that the above figures are underestimates and do not reflect the true scale of the problem, which appears to be much larger.

In 2022, at the Madrid summit, NATO adopted a new strategic concept that identified climate change as one of the significant threats¹¹. This prompted an examination of current activities concerning the response of the armed forces of the most important NATO members (United States, France, UK and Germany) to climate change. This article aims to present the army's actions in the face of climate change and their implications for the security of NATO countries, as the military energy transition is currently one of the key challenges for allied armies. The following research questions serve to achieve the stated objective:

- How does climate change affect NATO?
- What preventive action are NATO and individual allies taking in relation to the changing environment?

The article consists of six parts. After the introduction, an overview of NATO's efforts to adapt to and counter climate change is presented. The third section presents the methods used in writing the article. The fourth section analyses the strategies of three selected North Atlantic Alliance countries. Section five discusses the results of the comparative analysis, and the final section of the article provides conclusions.

1. Literature review

The events of recent years, including the COVID-19 Pandemic, Russia's invasion of Ukraine, and China's military and technological rise, have dominated the international discussions on the associated risks

10 S. Parkinson, L. Cottrell, *Estimating the Military's Global Greenhouse Gas Emissions*, "Scientists for Global Responsibility (SGR) and the Conflict and Environment Observatory (CEOBS)", November 2022, p. 2.

11 NATO, *NATO 2022 Strategic Concept*, Spain 2022, p. 6, https://www.nato.int/nato_static_fl2014/assets/pdf/2022/6/pdf/290622-strategic-concept.pdf [20.10.2023].

and challenges. At the same time, the world is facing the security implications of climate change. Any international organisation, including NATO, that attempts to address climate change therefore faces the dual challenge of responding to individual hotspots (such as extreme weather events that threaten lives or lead to societal collapse), while also understanding how climate change shapes the future of global geopolitics, including its potential to increase the likelihood of future conflicts over land, water, or resources in the long term¹².

Environmental security is broadly defined and encompasses, among other things, the mitigation and prevention of energy risks, including threats to sources and supply lines, as well as environmental risks and associated stresses that directly contribute to political and economic instability or conflict¹³. Research on environmental security frameworks focuses mainly on climate change¹⁴. As T.H. Lippert notes, climate-induced environmental change will affect some, if not all, security risks. It may undermine livelihoods, increase migration, create political instability or other forms of insecurity, and weaken the resilience and ability of states to respond appropriately¹⁵. Central to the climate security debate was the publication of a report published by the CNA Corporation, an independent body in the field of defence science and research in the US. It indicated that projected climate change poses a serious threat to US national security. The consequences of these changes, which have the potential to disrupt the functioning of societies and force changes in security provision in the coming decades, include extreme weather events, droughts, floods, rising sea levels, glacier retreat, habitat changes and the increased spread of life-threatening diseases. The consequences of their occurrence could be increased migration, further weakening and collapse of states, expansion of uncontrolled spaces that can be exploited by terrorist groups,

12 J. Shea, *NATO and Climate Change: Better Late Than Never*, "Policy Brief" 2022, no. 3, GMF, March 2022, pp. 3–4, <https://www.gmfus.org/news/nato-and-climate-change-better-late-never> [15.11.2023].

13 J. Ślusarczyk, *Environmental protection in NATO policy*, "Scientific Journal of the Military University of Land Forces" 2023, vol. 55, no. 2(208), pp. 91–103.

14 A. Vogler, *Barking up the tree wrongly? How national security strategies frame climate and other environmental change as security issues*, "Political Geography" 2023, no. 105, <https://doi.org/10.1016/j.polgeo.2023.102893> [19.11.2023].

15 T.H. Lippert, *NATO, Climate Change, and International Security: A Risk Governance Approach*, Chicago 2019.

and heightened internal conflicts¹⁶. The potential occurrence of such phenomena provides space for security planning from a military perspective. Climate change is thus an important factor in supporting the understanding of strategy and operations¹⁷.

The main task of the NATO strategy is to identify threats, indicate possible responses, and enable the development of the necessary resources to be provided by member states for joint missions. It indicates priorities and sets directions for the development of Allied policy¹⁸. Environmental issues emerged in the policy concepts of the North Atlantic Treaty Organisation in the last decades of the 20th century. Until the late 1980s, the Alliance was preoccupied with Cold War confrontations. In the 1990s, the geopolitical and geostrategic situation changed. New allied countries joined the Alliance (Poland, Czech Republic, Hungary) and interest in environmental protection and security increased. Climate change was also included in the 2010 Strategic Concept, the Green Defence framework was adopted in 2014, and climate issues were highlighted in summit statements starting from the Lisbon Summit in 2010. Although the North Atlantic Treaty States had been highlighting environmental security issues and challenges for years, 2021 can be considered a pivotal year in NATO's positioning. In March of that year, NATO Foreign Ministers approved NATO's Political and Military Climate Change and Security Agenda. The document introduced, for the first time, the four pillars of the new alliance policy: awareness-building, adaptation to climate change, countering climate change, and cooperation. The NATO Summit in Brussels on 14 June 2021 reaffirmed the commitment of member states to the adopted pillars in the NATO Climate Change and Security Action Plan¹⁹. At the same time, it was emphasised that NATO wants

16 The Center for Naval Analyses, *National Security And The Threat Of Climate Change*, Alexandria (CNA) 2007.

17 Ch.M. Briggs, *Climate security, risk assessment and military planning*, "International Affairs" 2012, vol. 88, no. 5, pp. 1049–1064, <https://doi.org/10.1111/j.1468-2346.2012.01118.x> [12.01.2024].

18 W. Lorenz, *NATO's new strategy – how to restore the priority of collective defence*, "PISM Policy Paper" 2021, vol. 6, no. 192, p. 2, https://pism.pl/publikacje/Nowa_strategia_NATO_jak_przywrocic_priorytet_kolektywnej_obronie [12.01.2024].

19 D.P. Jankowski, *NATO: climate change and security*, "International Analysis" 2022, vol. 1, no. 3, p. 62.

to become the leading international organisation in understanding and mitigating the security implications of climate change²⁰.

The NATO summit in Vilnius represented significant progress in NATO's climate change efforts, as three reports were published reflecting key areas of action for member states in the coming years. The first analyses the security implications of climate change. This document strongly emphasises the effects of climate change and the resulting difficulties for the military. These include the occurrence of extreme temperatures, rising sea levels, rapid changes in precipitation patterns, and increasing frequency and intensity of weather events²¹, which pose a threat to mission accomplishment and undermine the military's effectiveness and capabilities in conducting military operations and missions, putting the resilience of military installations and critical infrastructure to the test²². The report also highlights that climate change puts pressure on the resilience of individual Alliance members, and thus on the resilience of the Alliance as a whole, challenging the ability of member states to provide critical services to their populations and armed forces²³.

The second published report is the Compendium of Best Practice and provides concrete examples of the Alliance's efforts to adapt to climate change by introducing appropriate policies and procedures into their armed forces, while reducing their environmental footprint. The third, Greenhouse Gas Emissions Mapping and Analytical Methodology, refers to guidelines and tools for calculating and analysing greenhouse gas emissions from NATO facilities²⁴.

NATO's wide range of resources enables it to support UN efforts to both reduce global warming and adapt to the effects of climate change in a number of ways. Most NATO countries have both advanced technologies and a developed financial system that can in-

20 P. Barberini, *NATO Green Defence: From the 2014 Green Defence Framework to the 2021 Climate Change and Security Action Plan*, [in:] G. Iacovino, M. Wigell (eds.), *Innovative Technologies and Renewed Policies for Achieving a Greener Defence*, Springer Dordrecht, 2022, p. 7, https://link.springer.com/chapter/10.1007/978-94-024-2186-6_2 [25.01.2024].

21 NATO, *NATO Climate Change and Security Impact Assessment. The Secretary General's Report, Second Edition*, Brussels 2023, p. 10.

22 *NATO Adopts Climate Change Actions for 2030...*

23 NATO, *NATO Climate Change...*, p. 10.

24 NATO, *NATO steps up work on climate change and security*, https://www.nato.int/cps/en/natohq/news_217212.htm [25.12.2023].

fluence military action and links to environmental quality²⁵. It is not without significance that NATO's stance on climate change is in line with the expectations and opinions of the citizens of its member states, since, according to a NATO survey, as many as 32% of Alliance citizens consider climate change or extreme weather to be the greatest threat, ranking this factor third in importance, just behind the cost of living and the economic crisis, but ahead of the risk of war, the spread of infectious diseases, or terrorism²⁶. NATO's involvement in the area of climate change only underlines the growing importance of this issue in terms of its impact on global security.

2. Research methodology

The methodology used in this thesis aligns with the stated research objective, i.e. to present the military's actions in the face of climate change and their implications for the security of NATO countries. The methodological approach of this research is based on a literature review, the description of military climate strategies of selected NATO allies, and their quantification and comparison. The main stage of the study involves comparing the military climate strategies of the armies of the United States, the UK, and France, taking into account four diagnostic characteristics: adaptation to new environmental conditions, sustainability and zero-carbon, development of knowledge and training activities, and partnership cooperation.

The study employed an integrated literature review method to group the literature sources based on the conceptual criteria adopted. In this stage of the study, the three alliance members mentioned above were selected. This choice was based on several facts: all 3 countries are among the largest NATO armies, have published climate strategies, and have taken concrete transformational actions in pursuing energy self-sufficiency and zero-carbon in their armies. The application of the benchmarking method enabled a comparison of diagnostic characteristics related to defence energy transformation efforts. The di-

25 U.K. Pata et al., *Militarization of NATO countries sparks climate change? Investigating the moderating role of technological progress and financial development*, "Journal of Cleaner Production" 2023, vol. 409, p. 137–241.

26 NATO, *The Secretary General's Annual Report...*, p. 133.

versity of climate strategies in selected allied countries was examined by means of a comparative analysis and critique of strategic documents on the issue of climate change and defence energy transformation (e.g. army climate strategies and civilian strategies in this area). The research methods used made it possible to answer the research questions posed.

The study provides strategic insights into the army's involvement in the energy transition process and will outline the role the military is slowly beginning to play in this process.

The results may contribute to the discussion on the energy transition in NATO armies, as the process remains highly controversial and not all defence professionals agree with the greening of the army. In addition, it may also contribute to the wider debate on low-carbon military operations.

3. Climate strategies of selected NATO armies (United States, UK, France)

There is little research on how to reduce the potential negative consequences of the defence industry, which is one of the most fossil fuel-dependent industries and the least open to a green transition. According to Bildirici, military strategies in various countries lead to changes in their production structure and an increase in energy consumption, which results in environmental pollution. The environmental impact of militarisation is evident not only in the direct environmental damage caused by wars and conflicts, but also in everyday military operations²⁷. The use of high-tech military vehicles such as aircraft, helicopters, and tanks, and their extensive infrastructure, result in high oil consumption. The unsustainable burning of fossil fuels is recognised as a major cause of CO₂ emissions, which in turn have been identified as a major source of global warming and climate change²⁸. An important role in the fight against climate change is played by the European Union, which, through the implementation

27 S.M. Chang, B. Chen, Y. Song, *Militarization, renewable energy utilization, and ecological footprints: Evidence from RCEP economies*, "Journal of Cleaner Production" 2023, vol. 391, p. 136298.

28 A. Khan et al., *Geopolitical risk, economic uncertainty, and militarization: Significant agents of energy consumption and environmental quality*, "Environmental Impact Assessment Review" 2023, vol. 102, p. 107166.

of action plans, aims to become a modern, competitive and, importantly, emission-free economy. The European Green Deal is the EU's strategy with the main objective of achieving zero net greenhouse gas emissions by 2050. Reducing greenhouse gas emissions by at least 55% by 2030 (compared to 1990 levels) requires an increase in the share of energy from renewable sources, as well as higher energy efficiency²⁹. Thus, combating global climate change has become one of the key elements in the strategies adopted by EU member states and NATO.

3.1 United States

The United States, more than any other NATO member, has been experiencing the negative effects of climate change for many years. Fires, hurricanes, and typhoons damage military infrastructure and increase security risks for soldiers, and worse, their families. After President J. Biden took office, there has been a turnaround in the previous course of climate and energy policy pursued by the federal government.

Climate change action has moved to the forefront of the Biden administration's policy agenda. The Climate Security Plan for America (CSPA), published in September 2019 by the Climate and Security Advisory Group at the Centre for Climate and Security, highlighted the need for the US President to support climate action through the publication of specific documents guiding the direction of change. The plan outlines four categories of action: demonstrating leadership, assessing climate risk, supporting allies and partners in their efforts to address climate change, and preparing for and preventing the impacts of climate change³⁰. Two years later, in 2021, the US intelligence community, consisting of 18 agencies and departments, unanimously recognised that climate change posed a threat to US national security³¹. Hence, the US military published a climate strategy in 2022, with

29 Regulation European Union 2021/1119 of the European Parliament and of the Council of 30 June 2021 establishing a framework for achieving climate neutrality and amending Regulations (EC) No 401/2009 and (EU) 2018/1999 (European climate law), OJ L 243, pp. 1–17, <https://faolex.fao.org/docs/pdf/eur204009.pdf> [9.07.2021].

30 J. Conger, F. Femia, C. Werrell (eds.), *Climate Security Plan For America, A Presidential Plan for Combating the Security Risks of Climate Change*, Washington 2019, https://climateandsecurity.org/wp-content/uploads/2019/09/a-climate-security-plan-for-america_2019_9_24-1.pdf [22.06.2023].

31 National Intelligence Estimate, *Climate Change and International Responses Increasing Challenges to US National Security Through 2040*, 2021, https://www.dni.gov/files/ODNI/documents/assessments/NIE_Climate_Change_and_National_Security.pdf [3.07.2023].

the primary objective of preparing for the changing reality caused by conflicts arising from global warming. The document draws attention to the increased risk of armed conflict in places where social order is already disrupted and populations are high, and where the effects of climate change threaten to quickly destroy fragile socio-economic stability and potentially lead to the outbreak of conflicts and wars. The strategy identifies three objectives:

- 50% reduction in net GHG emissions by 2030 compared to 2005 levels;
- achieving zero net GHG emissions by 2050;
- integrating the effects of climate change into strategic, planning, and logistical documents and processes.

Three lines of action are designed to achieve these objectives:

- implementing installations that will enhance resilience and sustainability;
- acquiring modern technological solutions by the army's supply departments and logistics activities, aimed at increasing operational capability while reducing maintenance requirements and strengthening resilience to climate change;
- providing training to prepare the armed forces to deal with the realities of climate change.

In each of the directions listed, actions are identified to achieve the overarching goals. Under Direction 1, the US Army plans, among other things, to deploy a fleet of non-tactical electric vehicles by 2035; to generate on-site clean energy for military missions by 2040; to install microgrids at each military installation, i.e. local electrical systems to manage multiple generation sources and loads, ensuring independent operation of military installations; or to achieve zero GHG emissions from military installations by 2045.

Actions identified in the document under the 'discussion' section of the second direction include the introduction of hybrid tactical vehicles by 2035 and electric tactical vehicles by 2050, the analysis of energy sources in terms of their impact on climate change, and the reduction of operational energy and water consumption by 2035.

The third course of action relating to the army's training activities highlights the need to update military training programmes to include

climate change risks and threats and to develop climate change sensitivity in the army's internal culture by 2028³².

It is worth mentioning that the US Army's Climate Strategy includes many of the recommendations made by CSPA³³. Hence, the US defence sector, which accounts for 56% of CO₂ emissions and 52% of electricity consumption³⁴, must help the federal government mitigate the effects of climate change while providing an edge on the battlefield or crisis response area through rapid adaptation to changing climate conditions.

3.2 United Kingdom

The UK was one of the first countries to adopt and implement legislation to reduce greenhouse gas emissions (2008)³⁵. In addition, the country is one of the 5 permanent members of the United Nations Security Council (UNSC), hence it feels a responsibility to lead by example and support other countries in achieving the UN Sustainable Development Goals (UN SDGs). *The UK sees climate policy as an opportunity to accelerate economic growth*. It is worth noting that in the second economy in the EU and fifth in the world, services have been a key driver of growth for years. They account for 79% of GDP, while manufacturing only accounts for 10%, putting the UK at the bottom of the EU in this sector. Increasing the role of industry was one of the aims of Theresa May's government's adoption of the Industrial Strategy³⁶. One of its core elements was clean, green technologies – innovative, resource-efficient and creating new opportunities for exports. Due to the changing economic environment in the UK, the above strategy has been replaced by the Build Back Better: Our Plan for Growth. The actions outlined in this document aim to support economic growth through significant investment in infrastructure,

32 Department of the Army, Office of the Assistant Secretary of the Army for Installations, Energy and Environment, *United States Army Climate Strategy*, Washington 2022, pp. 4–14.

33 J. Conger, F. Femia, C. Werrell (eds.), *Climate Security Plan...*

34 M. Birnbaum, T. Root, *U.S. Army unveils climate strategy as military prepares for climate change*, "The Washington Post" 2022, no. 2, <https://www.washingtonpost.com/climate-solutions/2022/02/10/army-military-green-climate-strategy/> [18.11.2023].

35 *Climate Change Act 2008*, <https://www.legislation.gov.uk/ukpga/2008/27/contents> [22.01.2024].

36 Department for Business, Energy & Industrial Strategy, *Industrial Strategy: Building a Britain Fit for the Future*, London 2017, <https://www.gov.uk/government/publications/industrial-strategy-building-a-britain-fit-for-the-future> [29.01.2024].

skills, and innovation³⁷. This approach is intended to enable the UK to combine active economic policy with ambitious climate policy. The UK's commitment to climate action also requires transformation in the defence sector, ensuring that the military is prepared for emerging geopolitical threats exacerbated by climate change. The defence sector accounts for 50% of the country's emissions. Moving away from the current use of energy and fuels in the defence sector means moving to RES and being ready for the geopolitical changes and challenges that the new security and defence reality will bring.

In 2021, the UK Ministry of Defence published the *Climate Change and Sustainability Strategy (CCSSA)*³⁸. It outlines the Armed Forces' strategic approach to climate change and how to achieve the 2050 sustainability goals, which are encapsulated in 3 objectives: adaptation and resilience; sustainability and zero-carbon; and global leadership.

Within the first objective, adaptation and resilience, several actions have been highlighted to help achieve this:

- Disaster response and support to civilian authorities (the armed forces must be ready and able to act quickly in response to new threats of a non-military nature in both training and technological aspects).
- Green transformation (the defence sector will be a strategic partner of industry in the energy transition, as modern energy systems will provide an operational advantage on the battlefield).
- Deployment of technologies from the civilian sector (transposing new technologies to military transport, as current forms of power will become more costly over time and limit the combat capabilities of the Armed Forces).
- Innovation, research, and development (cooperation with scientists on new technologies and the use of scientific discoveries in the Armed Forces).

37 Her Majesty Treasury, *Build Back Better: our plan for growth*, United Kingdom 2021, pp. 11–22, <https://www.gov.uk/government/publications/build-back-better-our-plan-for-growth> [2.02.2024].

38 Ministry of Defence, *Climate Change and Sustainability Strategic Approach*, United Kingdom 2021, https://assets.publishing.service.gov.uk/media/605ddbbe8fa8f5047d3a851e/20210326_Climate_Change_Sust_Strategy_v1.pdf [2.02.2024].

- Operational self-sufficiency (increasing the energy self-sufficiency of the Armed Forces will relieve the logistics chain and maintain operational freedom under difficult conditions).
- Training of the Armed Forces (training is essential to increase resilience to new threats in a changing natural and security environment).
- The second objective included in the CCSSA is sustainability and zero carbon, which will be achieved through the following actions:
 - Engaging all defence personnel in sustainability to make it part of the defence culture.
 - Reducing CO₂ emissions in the defence sector (setting reduction targets and ways to achieve them).
 - Energy-efficient construction (new buildings will be built to the latest energy-efficiency standards).
 - Taking into account all components of life cycle costing, especially ongoing operational costs, disposal costs, and emissions. Such a calculation will make the defence sector's emissions projections more accurate and, at the same time, influence investment decisions.
 - Integrating the closed-loop economy into the defence sector (recycling materials and extending their life cycle will reduce waste, which will have a positive impact on the environment).

The final objective outlined in the UK MOD report is global leadership. Given the serious implications of climate change for global security, tasks have been set out that the defence sector will carry out to achieve this goal, including:

- The UK, as a NATO member country, will encourage all allies to commit to climate action in defence.
- To work with partners to better tailor defence mechanisms to the threats that arise and build on the UK defence sector's expertise in this area³⁹.

In addition, activities under the above objectives will be carried out over 3 time periods (known as epochs). Epoch 1 covers the period 2021–2025, with the main objective of establishing the legal and or-

39 Ibid.

organisational basis for changes related to energy transition in the UK Armed Forces. The adaptation of new investment projects to the challenges of environmentally friendly technologies is being made during this time⁴⁰. One example is the Prometheus pilot project, which aims to deploy photovoltaic farms at four locations to reduce the electricity demand of the UK Armed Forces. The first farm started operations at the Defence School of Transport (DST) in 2021⁴¹. In total, the project is expected to reduce 2,000 tons of CO₂ per year and generate a total of £1m in savings, which will be used to invest in cutting-edge green technology. Other initiatives used by the Army to support the UK's Net Zero legislation include:

- Project TAURUS: At the army headquarters in Andover, the first solar-powered carport for cars belonging to British army personnel was commissioned in 2021⁴².
- Project KELPIE: a pilot project for thermal battery storage at the Duke of Gloucester barracks in South Cerney.
- ROMULUS project: developing an information system to detail each building and carbon footprint. This system, or “digital twin”, collects and collates data on how the infrastructure works, which is then used to make real-world decisions.

Epoch two covers the next ten years (2026–2035). The Armed Forces will seek to further reduce emissions using existing and emerging technologies, maximising opportunities to strengthen the global response to threats caused by climate change. Funding for the purchase and deployment of modern technologies for the military is to be increased during this period.

The third and final epoch (2036–2050) will focus on further efforts to build defence sector resilience through innovative technologies and the decarbonisation of the sector⁴³.

40 Ibid.

41 Ministry of Defence and The Rt Hon Jeremy Quin MP, *Army's Solar Farms support commitment to Sustainability*, <https://www.gov.uk/government/news/armys-solar-farms-support-commitment-to-sustainability> [7.02.2024].

42 *Work begins on the first Solar Carport at Army Headquarters...*

43 Her Majesty Treasury, *Build Back Better: our plan for growth...*

3.3. France

The oil crisis of the 1970s prompted the French government, in 1974, to launch an industrial nuclear power development programme, with the aim of making electricity production independent of external raw materials. Its implementation led to a reconstruction of the country's energy situation. Consequently, at the beginning of the second decade of the 21st century, France possessed the second largest fleet of civil nuclear reactors in the world after the United States (currently 56 active reactors) providing more than 70% of the electricity generated⁴⁴. Nuclear energy is an economic and strategic priority for France, offsetting more than a third of the cost of fossil fuel imports. It fulfils three main objectives, namely: increasing the country's energy self-sufficiency and security of supply, ensuring low and stable electricity prices (which increases the competitiveness of the French economy, especially in sectors with high electricity demand), and being an instrument in the fight against global warming⁴⁵. Thus, France is seeking to build its leadership capacity, not only in the traditional spheres of international relations (e.g. opposition to the attack on Iraq in 2002 or its active role in the military intervention in Libya in 2011), but also in new areas such as the fight against climate change. This is fostered by the global spread of low-carbon nuclear technologies, representing an opportunity for France to develop those industries in which it has maintained a *know-how* advantage over the vast majority of countries in the world for several decades. France expresses strong aspirations to take a leadership position in the fight against climate change, as evidenced by its position oriented towards tightening greenhouse gas (GHG) reduction targets during international negotiations at successive climate conferences (*Conference of Parties – COP*)⁴⁶.

In response to the Paris Agreement concluded at COP21 in December 2015, which was ratified by 195 countries, including all EU countries, in December 2019, the European Commission published

44 E. Haliżak, J. Czaputowicz (eds.), *Theory of realism in the science of international relations: assumptions and research applications*, Warsaw 2014.

45 M. Ruszel, T. Mlynarski, A. Szurlej, *Energy Policy Transition – The Perspective of Different States*, Rzeszów 2017.

46 T. Mlynarski, *French energy policy and security*, "TEKA of Political Science and International Relations" 2014, no. 9, pp. 59–60, <http://dx.doi.org/10.17951/teka.2014.0.9.51> [15.01.2024].

the European Green Deal, a roadmap to make Europe's economy sustainable and carbon neutral by 2050. France, in response to international and EU commitments, adopted a National Low Carbon Strategy (La Stratégie Nationale Bas-Carbone – SNBC) in 2020, in which it committed to achieve carbon neutrality by 2050, reduce greenhouse gas emissions by 40% by 2030 compared to 1990 and, in the short and medium term, comply with the carbon budget adopted by decree, i.e. emission ceilings not to be exceeded over five-year periods⁴⁷. In September 2020, the EU raised its climate ambitions by setting an emissions reduction target of 55% by 2030 compared to 1990 (the previous target was a 40% reduction). It should be added that France championed the adoption of such restrictions. Consequently, the agreement was approved by the European Parliament and the EU Council on 24 April 2021, introducing a set of new rules as part of a legislative package known as “Fit for 55”⁴⁸. Thus, France took advantage of its position and negotiated favourable decisions in this regard. Nevertheless, France's rational policy “clashes” with the interests of other selfish “player-emitters”, including India, China or Japan, who, due to their own economic security considerations, are not interested in tightening pollution reduction levels.

As an integral part of the EU's European Green Deal, EU action on climate change goes far beyond the economic framework to encompass the implications for peace and security around the world. In March 2022, the European Council adopted the *EU Strategic Compass*, a roadmap for strengthening the EU's security and defence policy until 2030, committing member states to develop national climate and defence strategies before 2024. The fundamental aim of the document is to ensure that the implications of climate policy become an integral part of EU thinking and action on issues such as defence R&D, industry, technology or infrastructure, as well as the EU's Common Security and Defence Policy.

47 Le Ministère de la Transition écologique et de la Cohésion des territoires, *Stratégie Nationale Bas-Carbone*, 2020, https://www.ecologie.gouv.fr/sites/default/files/2020-03-25_MTES_SNBC2.pdf [19.01.2024].

48 *Pacte vert et paquet climat: l'UE vise la neutralité climatique dès 2050*, <https://www.vie-publique.fr/eclairage/272297-pacte-vert-et-paquet-climat-lue-vise-la-neutralite-carbone-des-2050> [20.01.2024].

France was the first NATO member state to publish a *Climate & Defence Strategy* in April 2022. The document recommends four main areas of action for the Ministry of the Armed Forces, namely:

- developing knowledge and foresight on the strategic challenges of climate change;
- engaging in adaptation, involving the process of adapting defence tools to foreseeable disruptions caused by climate change;
- the aspiration of the Ministry of the Armed Forces in a collective effort towards climate change mitigation and energy transition;
- strengthening cooperation on defence issues related to climate change within the Ministry of the Armed Forces and at inter-ministerial and international levels.

The first area emphasises the importance of having the ability to forecast and anticipate the implications of climate change for the strategic and operational missions and capabilities of the armed forces. In doing so, it emphasises the need to support predictive research related to the adaptation of armed forces to climate change and energy transition, in particular through research agreements with research centres to analyse the vulnerability of military facilities to climate change, including particular military infrastructure. It also highlights the need to draw attention to the potential implications of the growing need for armed forces to cooperate and assist in managing crises caused by extreme climate events. This includes providing humanitarian assistance in the event of natural disasters or addressing challenges caused by outbreaks of epidemics or pandemics.

The second area involves the operational adaptation of armed forces to extreme cold and high temperatures. The effects of these changes may exacerbate new flashpoints of international tensions, and the preparation of armed forces to carry out tasks in extremely harsh conditions requires adequate preparation. The need to adapt equipment and armaments of the French armed forces, as well as military bases and facilities, to harsh weather conditions is thus highlighted. Furthermore, it is pointed out that the climate crisis may affect the logistical support provided to the armed forces. If they are deployed overseas, they should not place an additional burden on the critical resources of host countries, particularly in terms of water and energy. At the same time, it is stressed that the ability to guarantee the continuity of military operations should take place in a strict regulatory context, and

requires an understanding of and compliance with a range of legal requirements and obligations reflecting defence needs in the European and international context.

Another area of focus for the French Climate and Defence Strategy concerns the correlation of the objectives of the national low-carbon strategy and the energy strategy adopted in 2020 with the operational activities implemented by the armed forces. The Ministry of the Armed Forces is pursuing a policy of sustainable development, which has led to strong environmental measures. One of these is the adoption of the Defence Energy Strategy in 2020, which is now applicable to all armed forces. The strategy reflects current environmental standards and contributes to the government's climate change mitigation targets. As highlighted, it aims to control fossil fuel consumption and increase energy efficiency, thereby contributing to climate change mitigation, while emphasising the need to secure supplies for the Ministry of the Armed Forces and make energy transformation an operational asset⁴⁹. In addition, innovation activities based on the defence energy strategy are carried out within this Ministry by the Directorate General of Armaments (Direction générale de l'armement – DGA) and its subordinate Agency for Defence Innovation (L'Agence de l'innovation de défense – AID). These aim to support new technologies in the three environments in which the operational activities of the armed forces take place, including⁵⁰:

- land, involving hybrid vehicles, based on the Griffon armoured personnel carrier, which are expected to enter service by 2025⁵¹;
- maritime, where the navies of France and Italy have teamed up to research the potential of fuel cells for surface ships under a programme called POSEIDON;
- aerospace, where the RAPID HYDRONE project has paved the way for the use of hydrogen fuel cells in small UAVs, enabling a significant increase in endurance compared to battery-powered drones;

49 Le Ministère des Armées, *Climate & Defence Strategy*, 2022, p. 21, <https://www.defense.gouv.fr/ministere/politique-defense/strategie-climat-defense> [17.12.2023].

50 Ibid.

51 Direction Générale De L'Armement, *Focus véhicules blindés GRIFFON et Jaguar*, Paris 2022, https://www.defense.gouv.fr/sites/default/files/dga/022_dossier_Griffon_Jaguar.pdf [19.12.2023].

- all three environments, where research into new methods of monitoring energy consumption in different scenarios is being conducted by the military under a programme called GENOPTAIRE⁵². In particular, the integration of alternative sources with a lower carbon footprint is being investigated.

The last of the key areas of the French Ministry of the Armed Forces will focus on developing a holistic approach to cooperation on climate change defence issues within the ministry, at the inter-ministerial and international levels.

It should also be added that, in parallel and in line with the Climate and Defence Strategy, the French armed forces are pursuing two other strategies. The first of these is the Energy Defence Strategy, adopted in 2020, which aims to commit the entire ministry to the energy transition, to strengthen energy efficiency and energy security, and to contribute to governmental and European climate change mitigation targets. Bearing in mind that climate change will affect an increasing number of military missions and operations across a very broad spectrum, from humanitarian assistance to populations to potentially high-intensity conflicts⁵³, a Biodiversity Conservation Strategy was also adopted in 2021, which aims to reduce the impact of the armed forces' activities on natural areas, while ensuring that their operational capabilities are maintained.

4. Results

The global energy transition has accelerated significantly. NATO armed forces have become aware of how climate change is affecting their ability to operate and how the decarbonisation of the energy sector will affect their operational capabilities. Following the goals set out in NATO's Climate Change and Security Agenda, some NATO member armies have published their own climate strategies. Unfortunately,

52 V. Machi, *French military eyes tech solutions to deal with climate change*, DefenseNews.com, June 2022, <https://www.defensenews.com/global/europe/2022/06/10/french-military-eyes-tech-solutions-to-deal-with-climate-change/> [2.10.2023].

53 V. Breton, *Dérèglements climatiques: Quelles conséquences sur les engagements opérationnels?*, [in:] N. Regaud, B. Alex, F. Gemenne, *La guerre chaude. Enjeux stratégiques du changement climatique*, Paris 2022, pp. 35–49, <https://doi.org/10.3917/scpo.regau.2022.01.0035> [25.11.2023].

the majority of allies are only just committing to do so. It is worth mentioning that when it comes to tackling climate change, the Allies, like the EU member states, are at different starting points. The differences in the progress of the energy transition reflect the divergent interests of each country in terms of energy security. Due to their different geographic locations, natural resources, histories and political traditions, NATO members' positions related to ensuring energy security differ and influence their decision-making in joint initiatives⁵⁴. In summary, the actions taken by states in the field of energy transition at the civilian level are generally reflected in their actions in the defence sector.

The United States, the United Kingdom, and France were among the first NATO allies to adopt climate strategies for their armies. The analysis conducted shows that all three climate strategies of the major armies of the democratic world are based on three main objectives: adaptation and resilience to climate change; sustainability; and enhancing cooperation and assistance to other allies on defence issues related to climate change. The strategies discussed indicate solutions for each line of action. They contain a breakdown of milestones that correspond to the implementation of actions in specific years (e.g. UK, US strategy), but do not include the costs that the defence sector will have to bear as a result of these changes (Table 1). Also missing was a statement on the mapping and analysis of greenhouse gas emissions from military activities and those produced by military infrastructure. The above data can be useful in planning new investments and can support the operational planning process.

54 E. Kochanek, *Wielowymiarowość interesów energetycznych w dobie transformacji systemowej*, Warsaw 2021.

Table 1. Main objectives of the climate strategy of selected NATO armies

NATO member	Objectives			
	Adaptation to new environmental conditions	Sustainability and zero-emission	Development of knowledge and training activities	
United States	<ul style="list-style-type: none"> - implementing facilities that will enhance resilience and sustainability 	<ul style="list-style-type: none"> - introduction of a fleet of non-tactical electric vehicles by 2035, - clean energy generation for military missions by 2040, - installation of microgrids in any military installation - achieving zero GHG military installations emissions by 2045. 	<ul style="list-style-type: none"> - updating military training programmes (to include climate risks and hazards), - developing climate sensitivity in the minds of soldiers and army personnel by 2028. 	<ul style="list-style-type: none"> - no information
France	<ul style="list-style-type: none"> - adapting to changing areas of operation (e.g. the Arctic Region); - adaptation of defence bases and installations to new conditions; - influencing regulatory measures by promoting defence interests at inter-ministerial levels. 	<ul style="list-style-type: none"> - setting emission targets and the path to achieve them, - Defence will be a partner in the United Kingdom green industrial transformation, - implementation of a closed-loop economy throughout the army's supply chain. 	<ul style="list-style-type: none"> - climate risk mapping to predict risks to defence infrastructure, - strengthening monitoring, research instruments, - cooperation with major research institutions (e.g. French Space Agency) 	<ul style="list-style-type: none"> - the introduction of new governance, including a broader role for the climate and defence coordinator, - further promotion of climate and energy cooperation at EU/NATO level
United Kingdom	<ul style="list-style-type: none"> - supporting civil authorities in the fight against disasters; - adapting the equipment of defence bases and installations to changing areas and conditions of operation, - rapid adaptation of civilian technologies in the military sector. 	<ul style="list-style-type: none"> - the United Kingdom is set to be a role model for allies in terms of environmental action in the military, - defence needs to develop the capacity to anticipate climate risks in the long term, - defence must respond to threats in cooperation with the other partners. 	<ul style="list-style-type: none"> - updating education and training programmes for the military - increasing the number of simulation training courses. 	<ul style="list-style-type: none"> - the United Kingdom is set to be a role model for allies in terms of environmental action in the military, - defence needs to develop the capacity to anticipate climate risks in the long term, - defence must respond to threats in cooperation with the other partners.

Source: Le Ministère des Armées, *Climate & Defence Strategy*, 2022, <https://www.defense.gouv.fr/ministere/politique/politique-defense/strategie-climat-defense>; Climate Change Act, 2008, <https://www.legislation.gov.uk/ukpga/2008/27/contents>; Department of the Army, Office of the Assistant Secretary of the Army for Installations, *Energy and Environment, United States Army Climate Strategy*, Washington 2022, pp. 4–14.

The greening of the military is not an invention of environmental organisations; its implementation is necessary to maintain operational efficiency in a changing environment. Climate change increasingly impacts the shortened life cycle of military equipment and installations, resulting in more frequent maintenance and replacements, and leading to increased lifetime costs. Energy sufficiency of the Armed Forces is particularly desirable in military mission outposts, especially in politically and economically unstable regions, and continuous access to electricity and fuels is essential for mission continuity and security. The actions indicated in the above-mentioned documents consisting in the use of photovoltaic or wind installations for energy generation, the introduction of hydrogen fuel cells in small unmanned aerial or naval vehicles, as well as the introduction of first non-tactical and, in time, tactical electric vehicles or the recycling of used equipment, uniforms and materials consumed by the military will allow for a significant reduction of greenhouse gases by the defence sector.

Conclusions

The realisation of the complexity of the problem related to the negative security consequences of global warming was a watershed moment in terms of taking action in the area of military energy transition. The issue of combating climate change became a topic of extensive discussion in NATO countries, as the scale of the phenomenon has a global dimension and the effects of existing or potential phenomena may significantly impact allied operations and missions in the Euro-Atlantic area, as well as in the Alliance's wider neighbourhood.

The contemporary challenges facing the 31 NATO countries are beginning to grow. On the one hand, there is the need to address ongoing armed conflicts (e.g. Ukraine, Israel) and the consequent emergence of a new world order led by Russia, Iran and China; on the other hand, the need to focus efforts on achieving zero CO₂ net emissions and mitigating the effects of climate change. On the latter front, NATO has made significant progress in recent years. The Climate Change and Security Action Plan was adopted in 2021, NATO's Strategic Concept 2022 emphasised the profound impact of climate change on Alliance security, and in 2023, the Vilnius Summit adopted three reports on the issue, setting out key directions for action. Leading

actors in the Alliance, including the US, United Kingdom, and France were the first NATO countries to adopt national climate strategies for their militaries, thus responding to emerging challenges in this area.

The role of the military in the energy transition is extremely important. As noted earlier, the defence sector is one of the largest emitters of greenhouse gases, hence the civilian sector's efforts to shift the economy to zero-carbon, without the participation of the defence sector, will not be fully achieved. The development of modern low- and zero-carbon technologies in the civilian sector will displace fossil fuels from the market and increase the cost of operating military infrastructure. In addition, a younger generation brought up with pro-environmental values will not express a desire to work in such a carbon-intensive sector of the economy⁵⁵. The varying pace of progress towards zero-carbon among NATO members, over the course of a decade, raises the concern of deepening technological backwardness in terms of equipment and fuels used between allies, and will ultimately lead to a weakened ability to act collectively.

The results of the research carried out indicate that it is possible to identify common ground in the strategies adopted in the countries studied, which correlate with the main objectives chosen for NATO countries. It is clear that they are characterised by a high degree of generality, which makes it possible to adapt to the complexity of climate-related problems and allows for a flexible approach by individual countries to specific challenges. Such a solution, on the one hand, indicates that there is no clear consensus on solutions that can be adopted for all armies of the Alliance and, on the other hand, allows for independence in the selection of methods and tools to achieve the set objectives in individual NATO armies. This creates space for the development of military education aimed at changing attitudes and adopting pro-environmental behaviour required to achieve the stated objectives.

55 D. Depledge, *Low-carbon warfare: climate change, net zero and military operations*, "International Affairs" 2023, vol. 99, no. 2, p. 674, <https://doi.org/10.1093/ia/iia001> [22.01.2024].

References

1. Barberini P., *NATO Green Defence: From the 2014 Green Defence Framework to the 2021 Climate Change and Security Action Plan*, [in:] G. Iacovino, M. Wigell (eds.), *Innovative Technologies and Renewed Policies for Achieving a Greener Defence*, Springer Dordrecht, 2022, https://link.springer.com/chapter/10.1007/978-94-024-2186-6_2.
2. Birnbaum M., Root T., *U.S. Army unveils climate strategy as military prepares for climate change*, "The Washington Post" 2022, no. 2, <https://www.washingtonpost.com/climate-solutions/2022/02/10/army-military-green-climate-strategy/>.
3. Breton V., *Dérèglements climatiques: Quelles conséquences sur les engagements opérationnels?*, [in:] N. Regaud, A. Bastien, F. Gemenne, *La guerre chaude. Enjeux stratégiques du changement climatique*, Paris 2022, pp. 35–49, <https://doi.org/10.3917/scpo.regau.2022.01.0035>.
4. Briggs Ch.M., *Climate security, risk assessment and military planning*, "International Affairs" 2012, vol. 88, no. 5, pp. 1049–1064, <https://doi.org/10.1111/j.1468-2346.2012.01118.x>.
5. Buhaug H. et al., *Climate-driven risks to peace over the 21st century*, "Climate Risk Management" 2023, no. 39, <https://doi.org/10.1016/j.crm.2022.10047>.
6. Chang S.M., Chen B., Song Y., *Militarization, renewable energy utilization, and ecological footprints: Evidence from RCEP economies*, "Journal of Cleaner Production" 2023, no. 391.
7. *Climate Change Act 2008*, <https://www.legislation.gov.uk/ukpga/2008/27/contents>.
8. Conger J., Femia F., Werrell C. (eds.), *Climate Security Plan for America, A Presidential Plan for Combating the Security Risks of Climate Change*, Washington 2019.
9. Department for Business, Energy & Industrial Strategy, *Industrial Strategy: Building a Britain Fit for the Future*, London 2017, <https://www.gov.uk/government/publications/industrial-strategy-building-a-britain-fit-for-the-future>.
10. Department of the Army, Office of the Assistant Secretary of the Army for Installations, Energy and Environment, *United States Army Climate Strategy*, Washington 2022.
11. Depledge D., *Low-carbon warfare: climate change, net zero and military operations*, "International Affairs" 2023, vol. 99, no. 2, <https://doi.org/10.1093/ia/iiad001>.
12. Direction Générale de L'Armement, *Focus véhicules blindés GRIFFON et Jaguar*, Paris 2022, https://www.defense.gouv.fr/sites/default/files/dga/022_dossier_Griffon_Jaguar.pdf
13. Goodman S., Kertysova K., *NATO: An unexpected driver of climate action?*, NATO Review, <https://www.nato.int/docu/review/articles/2022/02/01/nato-an-unexpected-driver-of-climate-action/index.html>.
14. Halizak E., Czuputowicz J. (eds.), *Theory of realism in the science of international relations: assumptions and research applications*, Warsaw 2014.
15. Her Majesty Treasury, *Build Back Better: our plan for growth*, United Kingdom 2021, <https://www.gov.uk/government/publications/build-back-better-our-plan-for-growth>.
16. Jankowski D.P., *NATO: climate change and security*, "International Analysis" 2022, vol. 1, no. 3.

17. Jayaram D., Brisbois M.C., *Aiding or undermining? The military as an emergent actor in global climate governance*, "Earth System Governance" 2021, vol. 1, no. 9, <https://doi.org/10.1016/j.esg.2021.100107>.
18. Khan A. et al., *Geopolitical risk, economic uncertainty, and militarization: Significant agents of energy consumption and environmental quality*, "Environmental Impact Assessment Review" 2023, no. 102.
19. Kochanek E., *Wielowymiarowość interesów energetycznych w dobie transformacji systemowej*, Warsaw 2021.
20. Koubi V., *Climate Change and Conflict*, "Annual Review of Political Science" 2019, no. 22, <https://doi.org/10.1146/annurev-polisci-050317-070830>.
21. Le Ministère de la Transition écologique et de la Cohésion des territoires, *Stratégie Nationale Bas-Carbone*, 2020, https://www.ecologie.gouv.fr/sites/default/files/2020-03_25_MTES_SNBC2.pdf.
22. Le Ministère des Armées, *Climate & Defence Strategy*, 2022, <https://www.defense.gouv.fr/ministere/politique-defense/strategie-climat-defense>.
23. Lippert T.H., *NATO, Climate Change, and International Security: A Risk Governance Approach*, Chicago 2019.
24. Lorenz W., *NATO's new strategy – how to restore the priority of collective defence*, "PISM Policy Paper" 2021, vol. 192, no. 6, https://pism.pl/publikacje/Nowa_strategia_NATO_jak_przywrocic_priorytet_kolektywnej_obronie.
25. Mach K.J. et al., *Climate as a risk factor for armed conflict*, "Nature" 2019, no. 571, <https://doi.org/10.1038/s41586-019-1300-6>.
26. Machi V., *French military eyes tech solutions to deal with climate change*, DefenseNews.com, June 2022, <https://www.defensenews.com/global/europe/2022/06/10/french-military-eyes-tech-solutions-to-deal-with-climate-change/>.
27. Ministry of Defence and The Rt Hon Jeremy Quin MP, *Army's Solar Farms support commitment to Sustainability*, <https://www.gov.uk/government/news/armys-solar-farms-support-commitment-to-sustainability>.
28. Ministry of Defence, *Climate Change and Sustainability Strategic Approach*, United Kingdom 2021, https://assets.publishing.service.gov.uk/media/605d5bbe8fa8f5047d3a851e/20210326_Climate_Change_Sust_Strategy_v1.pdf.
29. Mlynarski T., *French energy policy and security*, "TEKA of Political Science and International Relations" 2014, no. 9, <http://dx.doi.org/10.17951/teka.2014.0.9.51>.
30. National Intelligence Estimate, *Climate Change and International Responses Increasing Challenges to US National Security Through 2040*, 2021, https://www.dni.gov/files/ODNI/documents/assessments/NIE_Climate_Change_and_National_Security.pdf.
31. *NATO Adopts Climate Change Actions for 2030*, <https://sdg.iisd.org/news/nato-adopts-climate-change-actions-for-2030/>.
32. *NATO steps up work on climate change and security*, https://www.nato.int/cps/en/natohq/news_217212.htm.
33. NATO, *NATO 2022 Strategic Concept*, Spain 2022, https://www.nato.int/nato_static_fl2014/assets/pdf/2022/6/pdf/290622-strategic-concept.pdf.
34. NATO, *NATO Climate Change and Security Impact Assessment. The Secretary General's Report, Second Edition*, Brussels 2023.
35. NATO, *The Secretary General's Annual Report 2022*, Belgium 2023.
36. *Pacte vert et paquet climat: l'UE vise la neutralité climatique dès 2050*, <https://www.vie-publique.fr/eclairage/272297-pacte-vert-et-paquet-climat-lue-vise-la-neutralite-carbone-des-2050>.

37. Parkinson S., Cottrell L., *Estimating the Military's Global Greenhouse Gas Emissions*, "Scientists for Global Responsibility (SGR) and the Conflict and Environment Observatory", November 2022.
38. Pata Ugur K. et al., *Militarization of NATO countries sparks climate change? Investigating the moderating role of technological progress and financial development*, "Journal of Cleaner Production" 2023, no. 409.
39. Regulation European Union 2021/1119 of the European Parliament and of the Council of 30 June 2021 establishing a framework for achieving climate neutrality and amending Regulations (EC) No 401/2009 and (EU) 2018/1999 (European climate law), OJ L 243, pp. 1–17, <https://faolex.fao.org/docs/pdf/eur204009.pdf>.
40. Rico L.G., *NATO and Climate Change: A Climatized Perspective on Security. Report 2022*, Belfer Center for Science and International Affairs, Cambridge 2022, https://www.belfercenter.org/sites/default/files/files/publication/Belfer%20Nato_Climate%20Change_VF_1.pdf.
41. Ruzzel M., Mlynarski T., Szurlej A., *Energy Policy Transition – The Perspective of Different States*, Rzeszów 2017.
42. Shea J., *NATO and Climate Change: Better Late Than Never*, "Policy Brief" 2022, no. 3, <https://www.gmfus.org/news/nato-and-climate-change-better-late-never>. [15.11.2023].
43. Ślusarczyk J., *Environmental protection in NATO policy*, "Scientific Journal of the Military University of Land Forces" 2023, vol. 55, no. 2(208).
44. The Center for Naval Analyses, *National Security And The Threat Of Climate Change*, Alexandria (CNA) 2007.
45. Vogler A., *Barking up the tree wrongly? How national security strategies frame climate and other environmental change as security issues*, "Political Geography" 2023, no. 105, <https://doi.org/10.1016/j.polgeo.2023.102893>.
46. *Work begins on the first Solar Carport at Army Headquarters*, <https://www.army.mod.uk/news-and-events/news/2021/08/the-first-solar-carport-at-army-headquarters/>.