

Climate Change as a Security Risk: Disruptive Impacts on the European Union's Defence-Related Critical Energy Infrastructure

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Abstract

This essay explores the nexus between climate change, international security, and defence-related Critical Energy Infrastructure (CEI) within the European Union (EU) against the backdrop of an unstable multipolar context. Focusing on climate-induced security, the study draws connections between the identified threats to international stability and security and the influence of climate change on CEI, military installations, and capabilities. By using environmental studies and climate impact research, the findings emphasize the urgent need for adaptive governance strategies. The research identifies options for strengthening climate resilience, fostering multinational collaboration, avoiding internal conflict escalation, and aligning with the EU's goals of climate neutrality by 2050, contributing to the ongoing energy transition.

Keywords: Climate Change; Critical Energy Infrastructure; International Stability; Sustainability; Governance; Resilience.

Resumo

Mudanças Climáticas como Risco à Segurança: Impactos Disruptivos na Infraestrutura Energética Crítica Relacionada com a Defesa da União Europeia

Este ensaio explora o nexo entre mudança climática, segurança internacional e Infraestrutura Crítica de Energia (Critical Energy Infrastructure ou CEI) relacionado com a área da defesa na União Europeia (UE) num contexto multipolar instável. Com foco na segurança face ao clima, o estudo estabelece conexões entre as ameaças identificadas com a estabilidade e segurança internacionais e os impactos da mudança climática na CEI, designadamente nas instalações e capacidades militares. Ao recorrer a estudos ambientais e investigação de impacto climático, o artigo enfatiza a necessidade de novas estratégias de governação. A investigação identifica opções para fortalecer a resiliência climática, promover a colaboração multinacional, evitar a escalada de conflitos internos e acautelar o alinhamento com as metas da UE de neutralidade climática até 2050.

Palavras-chave: Alterações Climáticas; Infraestrutura Energética Crítica; Estabilidade Internacional; Sustentabilidade; Governança; Resiliência.

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Introduction

Climate change, emerging as a critical security risk, demands comprehensive global policies, being recognized as a ‘threat multiplier’ (Center for Climate and Security, 2023) due to its ability to intensify conflicts, challenging global governance. This designation highlights the extensive reach of climate change’s destabilizing effects, which amplify existing social, economic, and political tensions, exacerbating poverty, resource scarcity, and forced displacement. The German Advisory Council on Global Change (WBGU) (WBGU, 2024) argues that traditional military interventions are insufficient (WBGU, 2007) against climate-induced security risks, emphasizing the need for a global governance strategy with effective climate policies, as conventional military tools are limited in managing these complex, systemic threats, where climate change interacts with vulnerabilities like weak infrastructure, political instability, and poverty.

In regions with compounded challenges, such as drought-affected agricultural zones or flood-prone urban centres, military actions can become increasingly complex and less effective. For instance, in politically unstable areas like the Sahel, the North-Central African semi-arid region between the Sahara Desert and savannah regions, military responses are further strained by climate-related challenges such as water scarcity and desertification, which fuel local grievances, migration, and insurgency recruitment, making lasting stability elusive.

This ‘threat multiplier’ effect is particularly concerning in areas such as the Sahel and Pacific Islands. In the Sahel, prolonged droughts and expanding desertification have intensified competition for resources, exacerbating regional tensions and contributing to the rise of armed groups. These groups exploit resource scarcity and socioeconomic hardship, creating a cycle of violence that traditional military approaches struggle to address. Meanwhile, low-lying Pacific Island nations face rising sea levels, threatening entire communities with displacement and potentially creating “climate refugees” who may strain resources and political relations in host countries. This vulnerability demands not only humanitarian intervention but also long-term adaptation strategies that military forces alone are unequipped to provide. Urgent international cooperation, proactive climate action, and adaptive strategies are crucial to contain conflicts (IPCC, 2001), develop compensation mechanisms, and stabilize the global economy. However, the effectiveness of this process is directly affected by climate change itself, heightening its urgency. To understand the multifaceted risks posed by climate change, it is essential to consider the spectrum of security threats, spanning military, economic, and environmental changes. Research increasingly shows that climate change’s destabilizing effects on nations are not limited to environmental challenges but include cascading effects on public health, migration, and even political stability in vulnerable regions. For instance, climate-in-

duced migration patterns are anticipated to strain international borders, potentially sparking international conflicts. Furthermore, intensifying resource scarcity due to prolonged droughts, loss of arable land, and depletion of fisheries complicates both local and international conflict dynamics.

The IPCC (2001) warns that unabated climate change threatens international security, with global impacts projected from 2025 to 2040 if mitigation efforts fail (WBGU, 2007). The EU, recognizing climate change's critical effects on security, developed the Climate Change and Defence Roadmap (EEAS, 2022), the first EU action plan addressing the links between defence and climate change. According to the "Impacts of Climate Change on Defence-Related Critical Energy Infrastructure" (Tavares Da Costa, Krausmann & Hadjisavvas, 2023) study, which specifically explores climate change repercussion on the EU's defence sector, the vulnerability of critical energy infrastructure (CEI) aligns sustainability goals with the European Green Deal (European Commission, 2020).

Climate Change as a Threat to Defence-Related Critical Energy Infrastructure

Climate change poses a significant threat to Defence-Related Critical Energy Infrastructure (CEI), disrupting military operations. Recent climate events underscore this vulnerability, with hurricanes in the Caribbean causing severe damage to U.S. military bases, disrupting logistics and necessitating costly repairs. Similarly, in Europe, wildfires have threatened military installations, raising concerns about the readiness of such facilities amid intensifying climate hazards. These events reveal a significant gap in climate risk management, such as unidentified risks, inadequate integration into defence planning, and the lack of a comprehensive EU strategy for energy and climate in defence, which worsens the threat (WBGU, 2007). Addressing this issue requires the modernization of EU energy systems, fostering civilian-military cooperation, and tackling potential security threats from foreign-owned CEI (EDA and JRC, 2023) as existing challenges are amplified by limited coordination, sparse technology implementation, and a lack of quantitative studies (WBGU, 2007). Expert opinions further highlight the gaps within the EU's climate risk management for defence, emphasizing the fragmented approach among EU members.

According to the recent European Defence Agency's report "Impacts of climate change on defence-related critical energy infrastructure" (published on June 8th, 2023), the absence of standardized resilience measures leaves installations vulnerable to climate extremes. A coordinated defence strategy that includes climate-proofing initiatives is crucial to bolstering defence readiness, particularly as risks escalate. Consider the vulnerabilities faced by CEI in regions such as the Arctic, where melting permafrost disrupts infrastructure, affecting energy supply chains and military operations. The

thawing permafrost has already destabilized energy pipelines and transportation routes in these regions, exemplifying how critical infrastructure can become compromised, requiring substantial resource allocation to repair and reinforce. Another example includes the US Gulf Coast, where hurricanes increasingly disrupt oil production and military installations, highlighting the need for reinforced infrastructure resilient to extreme weather events.

Another major concern lies in managing foreign-owned CEI within EU borders. For example, in a hypothetical scenario where a foreign entity controls a critical energy grid within the EU, the possibility arises that this external control could be used as leverage in political disputes, posing significant security risks. Should tensions escalate, the EU might face disruptions or even intentional outages, complicating emergency response and compromising military readiness. This hypothetical but plausible risk illustrates the need for rigorous assessments and contingency plans concerning foreign ownership.

The report also indicates that a significant portion of EU defence installations, particularly those in Southern Europe, are prone to climate-related hazards such as wildfires, extreme heat, and droughts. This emphasizes the need for an EU-wide strategy that involves identifying the CEI most vulnerable to climate hazards, creating a risk index for installations, and planning resilient reinforcements accordingly. Climate change exacerbates storm and flood disasters, particularly in vulnerable coastal zones like the east coasts of India and China (Das et al., 2023). Thus, urgent strategies are crucial for Defence-Related Critical Energy Infrastructure in densely populated areas, ensuring resilience amid evolving climate risks. In the context of EU security and defence, climate change presents a multifaceted challenge in which military installations, assets, and supplies are susceptible to damage, affecting operational capabilities. An unplanned Maintenance, Repair, and Overhaul (MRO) may incur higher costs, while the geopolitical landscape evolves due to climate change, introducing potential tensions, disputes, and economic disruptions from changing shipping routes, highlighting the need for effective climate risk management.

Climate policy itself carries security risks (Tavares Da Costa, Krausmann & Hadjisavvas, 2023), influencing economies reliant on fuel exports or set to benefit from global warming. Transitions can reshape supply chains, job markets, and geopolitics, exacerbating disputes over land, raw materials, and technology. The intersection of climate change and energy introduces challenges for the armed forces, requiring capabilities aligned with a transitioning civilian energy system and increased support requests in civilian operations. The potential consequences of climate change on military installations, equipment, and personnel range from malfunctions and increased MRO to disrupted missions and secondary hazards triggered by natural disasters. Critical infrastructure disruptions, such as electricity, gas, and water supply systems, significantly impair operational effectiveness (WBGU, 2007). Addressing

these challenges requires collaboration with critical infrastructure operators and regulators, considering the complex interdependency of energy systems, making an integrated approach key to enhancing resilience against climate change.

Climate Change and Its Impact on Energy Infrastructure

As climate change threatens global energy production and distribution, exerting significant pressure on critical infrastructure, rising temperatures escalate energy demand and challenge existing systems, while extreme weather events strain production and distribution networks. For instance, coastal energy installations, especially in densely populated areas like the east coasts of India and China (Das et al., 2023), face operational failures, environmental hazards, and security threats, as highlighted in the report “Climate Change and Security: Challenges for German Development Cooperation”, under the WBGU Conflict Constellation (Box 2.6) section, which refers to violent conflicts as directly linked consequences of “Climate-induced increase in storm and flood disasters” (WBGU, 2024). Meanwhile, sea level rise further jeopardizes naval bases, undermining capabilities and global security (WBGU, 2024), while melting glaciers introduce complexity and potential conflicts over essential resources (WBGU, 2024).

Extreme heat has severely disrupted nuclear energy production in regions like France, where cooling systems in power plants have been strained, reducing output, and forcing shutdowns to prevent overheating. This has significant security implications, as nuclear power constitutes a substantial part of France's energy portfolio. The situation underscores the need for climate-adapted infrastructure, including enhanced cooling systems for plants in increasingly warm climates, to ensure energy continuity and defence readiness. In Brazil, prolonged droughts have reduced hydropower capacity, challenging energy stability and affecting the country's CEI. Such limitations on reliable power sources during extreme climate events not only strain local resources but also point out vulnerabilities that could be exploited in times of conflict.

During the 2021 winter storm in Texas, natural gas supply disruptions, electricity failures, and water shortages severely damaged the region, exemplifying the cascading effects on infrastructure critical to national security. Military bases experienced operational challenges and economic setbacks due to energy supply issues, highlighting the inadequacy of the resilience measures in place. This event underscored the necessity of robust, redundant systems capable of withstanding severe weather events and the importance of national resilience planning.

Addressing climate change's disruptive shifts on global security demands a strategic, multidimensional approach from national to EU levels. Collaboration across sectors is imperative, especially concerning the integration of climate issues into defence

planning. The “Impacts of climate change on defence-related critical energy infrastructure” report recommended concrete measures for EU defence decision-makers, advocating proactive responses to climate challenges. One essential adaptation involves constructing flood barriers around coastal CEI, especially for installations in low-lying areas, to prevent inundation from storm surges and rising seas. Additionally, enhancing cooling systems for power plants in warmer regions has become crucial, as prolonged heat waves challenge traditional cooling capacities, compromising power output and infrastructure resilience.

One of the more subtle yet dangerous effects of climate change is its role in shifting geopolitical alliances and exacerbating international tensions over resources. For example, as polar ice melts, new maritime routes open in the Arctic, sparking interest from global powers, including Russia, the US, and China. This increased competition in previously inaccessible areas is representative of the intersection of climate change and defence, with states asserting control over strategic territories. Additionally, resource scarcity caused by drought and desertification in regions like sub-Saharan Africa could lead to mass migrations and increased regional instability.

The Nile River Basin dispute illustrates the potential for climate-induced water scarcity to fuel regional tensions. Egypt, Ethiopia, and Sudan have historically shared the Nile waters, but Ethiopia’s dam construction has escalated tensions, given Egypt’s reliance on the river for agriculture and drinking water. The nexus between water scarcity and climate change increases the likelihood of conflicts over resource access, stressing the need for diplomacy and cooperative management.

The changes in resource availability intensify competition, complicating collaborative efforts as resource scarcity directly threatens defence capabilities, calling for a strategic reassessment of global defence postures. For nations with limited resources, worsening climate conditions could turn them into conflict hotspots, especially as essential resources like water and arable land grow increasingly scarce. This unequal consequence raises equity concerns and fosters conflict, underscoring the need for comprehensive strategies to ensure stability, defence capabilities, and international security (United Nations Security Council, 2023).

An already mentioned example of the intersection between climate change and energy infrastructure challenges, that can be further explained, occurred during the winter storm of February 2021 in Texas, USA (NCEI, 2023). The storm disrupted natural gas, electricity, water supply, and transportation for days, affecting military installations. The U.S. Air Force faced operational challenges and economic losses, highlighting the need for comprehensive measures. The key lessons from this episode include the recognition that relying exclusively on markets for the resilience of Critical Energy Infrastructure (CEI) is insufficient. There is a pressing need for coordinated oversight to ensure energy systems are weatherized effectively. A more detailed approach to demand-response mechanisms and rolling outages is essential, alongside the promo-

tion of greater flexibility in energy systems. Stakeholder engagement is also critical in developing resilience strategies through scenario planning. Additionally, it is vital to understand the consequences of reducing gas exports, particularly on countries that rely on imports, such as EU Member States (Tavares Da Costa, Krausmann & Hadjisavvas, 2023).

Moreover, managing foreign-owned CEI within EU borders introduces another layer of complexity. For instance, in a hypothetical scenario where foreign ownership controls critical energy infrastructure, such as a gas pipeline in Eastern Europe, the EU may face a situation where energy supply could be used as leverage in times of geopolitical tension, posing risks to both energy security and defence readiness. This hypothetical situation highlights the need for rigorous oversight and resilience planning to prevent potential vulnerabilities.

Disruptive Impacts on Global Security: A Call for Comprehensive Strategies

A pivotal recommendation from the “Impacts of climate change on defence-related critical energy infrastructure” (Tavares Da Costa, Krausmann & Hadjisavvas, 2023) report is the creation of an EU defence strategy on climate change (EEAS, 2022), designed to ensure a unified response across Member States to climate risks weakening defence capabilities. One key recommendation in the report includes establishing an EU Multi-stakeholder Forum for defence, energy, and climate, which aims to foster cross-sector collaboration and resilience (Joint Research Centre, 2023).

This forum would bring together representatives from government, military, industry, and civil society to exchange insights and develop coordinated strategies for managing climate threats. Additionally, the report emphasizes the need for a tailored Critical Energy Infrastructure (CEI) Strategic Framework (Drossos et al., 2017) to address specific vulnerabilities, particularly through enhanced coordination between civilian and military entities during climate disasters. Regular reviews of risk management plans, designed to identify gaps in integrating climate hazards into defence planning, support the development of guidelines for assessing climate risk and its integration into military planning, procurement, and research. Modernizing infrastructure, especially CEI, based on site-specific climate risks, is essential for maintaining resilience across the EU.

To bolster these efforts, the report recommends a permanent EU program for Research and Development on climate change and defence, alongside an EU-led Competence Centre, to provide continuous support to Ministries of Defence (EEAS, 2022). Such initiatives would inform policy decisions and enhance the EU's capacity to adapt to disruptive climate shifts, contributing to global security by keeping Europe's defence infrastructure resilient and capable.

Globally, coordinated climate-defence strategies have shown success, offering examples for the EU. In Japan, proactive disaster resilience measures have significantly enhanced the country's ability to mitigate the effects of natural disasters on critical infrastructure, including defence-related facilities. Japan's model of integrating early warning systems, building flood-resistant infrastructure, and conducting regular joint exercises between military and civil defence units has proven effective in minimizing disruption. This model of preparedness could serve as a benchmark for the EU as it develops a more unified approach to climate resilience in defence.

The necessity of involving civil society in climate-defence discussions cannot be overstated, as climate change repercussions extend beyond the military sphere to affect society at large. By engaging civil society organizations, local communities, and industry experts in strategic conversations, the EU can promote transparency and gather diverse perspectives, strengthening societal resilience against climate threats. The role of civil society in disaster preparedness and response can significantly enhance military initiatives, ensuring that climate-security policies are inclusive and aligned with the broader needs and interests of society. This inclusive approach would foster public support and enhance the adaptability of climate-security strategies across Europe.

Acknowledgment of climate change as a security concern is already widespread, with EU Member States, the European Defence Agency (EDA), the EU, and NATO recognizing its implications (EDA, 2023). Global commitments, such as the Joint Statement on Climate Change and the Armed Forces (Tavares Da Costa, Krausmann & Hadjisavvas, 2023), underscore the intersection of climate change and security, reflecting that EU Member States are shaping energy strategies for the armed forces with a focus on resilience and sustainability. Proactive measures, including circular economy principles, recycling projects, and sustainability-focused funding, illustrate initial efforts. However, to further strengthen EU Ministries of Defence (MoDs), a more comprehensive integration of climate risk management into infrastructure policies is necessary.

Mitigating Climate-Induced Security Risks: A Call to Action

Rising global temperatures pose a growing threat to defence infrastructure, especially naval bases, which face mounting risks from sea-level rise, storms, and flood disasters. Adaptive strategies are essential to protect these assets, and the World Federation on Global Development and Environment (WFUNA, n.d.) recommends recognizing climate shifts as threats to international security, urging the UN Security Council to adapt its mandate and invoke the "responsibility to protect" principle (Global Centre for the Responsibility to Protect, n.d.). In response, an integrated approach to crisis prevention – merging development cooperation, military spending, and financing

for resilience – is vital, accompanied by a comprehensive review of security budgets to prioritize preventive measures within broader development initiatives.

Historically, the European Union has played a key role in international climate-defence cooperation, gradually recognizing the links between climate risks and security. In the early 2000s, EU policy began to shift towards integrating climate change into its defence and security frameworks, with notable initiatives like the European Security Strategy of 2003 and subsequent climate-focused amendments. The EU Climate Diplomacy initiative, launched in 2011, was an early step towards addressing climate risks through diplomatic engagement. It highlighted the EU's commitment to fostering international dialogue on climate resilience, urging cooperation on early warning systems, disaster preparedness, and resource management.

Yet, EU-led climate-defence initiatives have faced challenges. Political disagreements among Member States have sometimes stalled progress, particularly regarding funding for defence-related climate adaptation. For instance, Central and Eastern European countries, more reliant on coal, have historically resisted ambitious climate policies due to economic concerns. Despite these challenges, the EU has made significant strides in promoting climate-defence cooperation, setting the groundwork for further international efforts. Multilateral forums are pivotal in advancing the global climate-defence agenda, enabling countries to coordinate resilience measures, share resources, and collectively address climate threats. The United Nations and NATO have been particularly influential, with both organizations adopting resolutions and initiatives to address the intersection of climate change and security.

In recent years, the United Nations has made considerable efforts to integrate climate issues into global security dialogues. For example, the UN Security Council debated climate security for the first time in 2007, recognizing climate change as a “threat multiplier” that exacerbates existing conflicts. In 2021, the UN Security Council introduced a resolution – though ultimately blocked – that would have officially categorized climate change as a security threat. Despite challenges, these efforts underscore the growing recognition of climate risks in global security frameworks. NATO has also stepped up its climate-defence initiatives, recognizing that climate change affects operational readiness and mission effectiveness. At the NATO Summit in 2021, the Alliance committed to achieving net-zero emissions by 2050, while establishing a NATO Climate and Security Action Plan to enhance climate resilience across all NATO operations. These initiatives highlight NATO's understanding of climate change as a core security issue, marking a significant shift in traditional defence priorities. Additionally, NATO has pledged to assist member nations in developing sustainable energy solutions, reinforcing infrastructure resilience, and ensuring that military readiness is not compromised by climate-related disruptions. The EU and developed countries play a critical role in establishing a fair multilateral order that addresses climate resilience and supports developing countries. Developing nations,

disproportionately influenced by climate change, often lack the resources to adapt effectively, making them vulnerable to both climate risks and related security threats. Recognizing this, the EU has committed to various support mechanisms to promote climate resilience in these regions.

Financial support for climate adaptation is one of the EU's core contributions to developing nations. Under the Paris Agreement, the EU pledged significant climate financing to assist vulnerable countries in implementing adaptation measures, including building climate-resilient infrastructure, and enhancing disaster preparedness. This support is essential for reducing climate-related conflicts in regions where resource scarcity, exacerbated by climate change, fuels instability. For example, EU funding has helped establish early warning systems and water conservation projects in regions like sub-Saharan Africa, reducing the potential for resource-based conflicts. Moreover, the EU and other developed nations have worked to facilitate technology transfer, equipping developing countries with advanced tools for climate monitoring and adaptation. Programs like the European Climate Adaptation Platform (Climate-ADAPT) provide technological support to partner countries, helping them track climate risks and develop mitigation strategies. By sharing data and resources, the EU empowers developing countries to proactively address climate vulnerabilities, fostering a more equitable multilateral order. In addition to financial and technological support, the EU emphasizes the importance of inclusivity in international climate negotiations. Developing countries, often marginalized in decision-making processes, are now increasingly represented in global climate forums, where their voices contribute to shaping policies that reflect their unique challenges. Ensuring that these nations have a say in international climate-defence strategies strengthens multilateral cooperation and promotes a fairer global system.

Aligning security policies with climate challenges enables nations to fortify the resilience of their defence infrastructure, contributing to global stability. Robust international cooperation, spearheaded by the EU and Germany, is critical for diplomatic initiatives (Daehnhardt, 2018) aimed at addressing climate security risks and preventing conflicts related to resource scarcity. The EU should champion sustainable mitigation policies, set ambitious emission reduction targets, implement energy policy reforms, and advocate for innovative mitigation strategies, ensuring that comprehensive international cooperation extends to development assistance, supporting vulnerable countries in adaptation. Recent EU strategies, such as the Energy Union Strategy (European Parliament Research Service, 2015), Governance of the Energy Union and Climate Action (European Commission, 2024), Clean Energy for All (European Commission, n.d.), RepowerEU Plan (European Commission, 2022), Fit for 55 Package (Council of the European Union, 2023), European Critical Infrastructure Directive (European Commission – Directorate-General for Home Affairs, 2024), Environmental Impact Assessment Directive (European Commis-

sion – Directorate-General for Environment, n.d.), EU Civil Protection Mechanism (ECHO, 2024), and regulations on Energy Supply Security and Emergency Response (European Commission – Directorate-General for Energy, n.d.) and the Seveso-III Directive (UK-EU) (HSE, n.d.), aim to mitigate climate risks, enhance energy security, and safeguard critical infrastructure. These strategies lay the groundwork for a collaborative and resilient approach to climate-security challenges, integrating energy and environmental policies into a unified framework.

The intertwining of strategies for enhancing defence infrastructure resilience, advocating for international cooperation, and championing sustainable policies emerges as a comprehensive approach to global security. As climate risks intensify, the EU's commitment to a fair and effective multilateral order – where developed nations support climate adaptation in developing regions – will be essential for reducing global instability and promoting a more secure future for all.

International Cooperation and Diplomacy in Addressing Climate-Induced Security Risks

In the face of escalating global climate security risks, international collaboration is essential to contain climate-induced conflicts (OECD, 2013). Diplomatic initiatives, compensation mechanisms, and economic stabilization play pivotal roles. Establishing a fair multilateral order is crucial for fostering cooperation, with Germany leading within the EU (Schoeller, n.d.). A forward-looking Common Foreign and Security Policy becomes indispensable amid geopolitical shifts caused by climate change, and proactive societal involvement is necessary to tackle the global challenge of climate change.

Notably, the EU Climate Diplomacy Initiative, launched in 2011, exemplified a more proactive stance, focusing on partnerships with countries in climate-vulnerable regions. Through this initiative, the EU provided climate-related assistance to developing countries, particularly in Africa and the Caribbean. Despite these successes, challenges emerged as EU Member States sometimes disagreed on budget allocations and prioritization of climate-defence issues, diminishing the initiative's effectiveness. Nevertheless, the EU has consistently championed climate resilience through its Green Deal, 'Fit for 55 Package', and recent policy frameworks that emphasize defence preparedness in a changing climate.

The importance of multilateral forums, such as the United Nations and NATO, has grown as climate-security threats increase globally. These institutions have been instrumental in bringing together diverse actors to coordinate climate resilience efforts. In particular, NATO has integrated climate considerations into its defence planning through the NATO Climate Change and Security Action Plan. This initiative represents a paradigm shift, prioritizing climate risks as fundamental security

concerns across Member States, even though these efforts face challenges due to varied national interests and resource constraints.

The UN has also taken significant steps to address climate-security risks, with the Security Council frequently debating climate change as a “threat multiplier”. While formal resolutions categorizing climate change as a security risk have faced resistance, the UN remains a critical forum for climate-defence discussions. Recently, the UN proposed integrating climate response measures into peacekeeping missions, emphasizing environmental stewardship as a central tenet of peace and resilience. Such initiatives underscore the UN’s commitment to embedding climate resilience into its broader security frameworks.

In establishing a fair multilateral order, developed nations have a responsibility to support developing countries’ climate resilience, given the disproportionate effect climate change has on these regions. The EU has pioneered various financial and technical assistance programs aimed at enhancing climate adaptation capabilities in developing countries, acknowledging that vulnerability to climate risks often coincides with limited resources and infrastructure. Under the Paris Agreement, the EU pledged substantial climate financing to assist countries most affected by climate change. These funds support essential adaptation projects, including infrastructure development, disaster preparedness, and resource management initiatives. This commitment to financial support is critical for reducing potential climate-induced conflicts in regions where resource scarcity is aggravated by climate change. For instance, EU-backed water conservation projects and early warning systems in sub-Saharan Africa and Southeast Asia have played a role in reducing conflict risks associated with resource scarcity.

In addition to financial support, the EU focusses on knowledge-sharing and technology transfer. Programs like the European Climate Adaptation Platform (Climate-ADAPT) facilitate technical assistance for partner countries, empowering them to track and respond to climate vulnerabilities. These efforts aim to create equitable access to climate resilience strategies, promoting a fairer multilateral order by equipping vulnerable nations with tools to address climate risks. A proposed EU-led Climate Resilience Initiative would enhance cooperation with nations particularly vulnerable to climate challenges by establishing frameworks for shared resources, adaptive infrastructure investment, and knowledge exchange on climate adaptation strategies. This initiative aligns with the EU’s broader Green Deal, connecting resilience efforts across sectors, including energy, transportation, and emergency response. By aligning these efforts with the EU Green Deal, this initiative would provide a holistic approach to climate resilience, promoting sustainable development within and beyond EU borders.

In the realm of defence, comprehensive actions across EU Ministries of Defence (MoDs) are critical, requiring coordinated responses to Critical Energy Infrastructure (CEI) failures. Challenges remain, including limited control over civilian-owned CEI, dependence on finite energy sources, and insufficient identification of mission-critical

loads. Integrating climate considerations into military planning is currently limited (U.S. Department of Defence, 2021), exposing EU MoDs to energy security vulnerabilities. Governance issues further compound these challenges, with the lack of an integrated EU strategy for energy and climate in defence (Tavares Da Costa, Krausmann & Hadjisavvas, 2023). To address these gaps, a multi-stakeholder approach is necessary, involving structured civilian-military cooperation. Research and development in the defence sector must focus on sustainable adaptation solutions, with a two-pronged approach emphasizing both adaptation and mitigation. This strategy can ensure that EU defence mechanisms remain resilient against climate threats, securing a sustainable future for both the EU and its global partners.

Sustainable Policies for Climate Change Mitigation: A Global Imperative

The World Federation on Global Development and Environment (WBGU) (WBGU, n.d.) underscores the UN's critical role in managing environmentally induced conflicts, calling for enhanced coordination and proposing that the United Nations Environment Programme (UNEP) (United Nations, 2020) be elevated to a specialized agency. WBGU advocates for international co-financing of adaptation measures in developing countries, highlighting the importance of increasing Official Development Assistance (ODA) to 0.7% of gross national income to ensure an equitable distribution of responsibility. To achieve this, a comprehensive strategy under the United Nations Framework Convention on Climate Change (UNFCCC) is necessary, with a particular focus on adaptation for developing and newly industrializing nations. One of WBGU's innovative proposals is the creation of an international environmental migration fund, structured on the "polluter pays" principle (European Commission – Environment, 2023). The fund would be financed through contributions based on country-specific emissions and GDP indicators. This approach aims to address the growing issue of environmental migration by providing financial support to communities harmed by climate change and facilitating a fair distribution of resources for adaptation. The International Dialogue on Migration could be instrumental in implementing such a fund, enabling cooperation among countries to manage climate-induced migration flows effectively. This fund has the potential to significantly reduce pressure on vulnerable regions by supporting migration as an adaptive response to climate risks, which could, in turn, stabilize global migration patterns. In the European context, climate change has been recognized as a threat multiplier since 2008. The EU, through groundbreaking initiatives like the EU's Climate Change and Defence Roadmap (EEAS, 2022), has embedded climate considerations into its security and defence policies. This roadmap aligns with broader EU strategies, such as the European Green Deal and the European Climate Law, focusing on transitioning

EU Ministries of Defence towards climate neutrality and enhancing energy resilience within defence operations.

The EU's 'Fit for 55 Package' is a key component of the European Green Deal, aiming to reduce greenhouse gas emissions by 55% by 2030. This ambitious package includes measures to modernize the energy grid, advance renewable energy adoption, and support decarbonisation efforts across industries. In terms of defence resilience, 'Fit for 55' encourages EU Member States to consider energy efficiency and renewable energy sources in military operations, thereby decreasing dependency on fossil fuels and increasing preparedness for energy-related disruptions.

Similarly, the 'Clean Energy for All' initiative aims to make energy systems more sustainable and accessible. By focusing on energy security, this initiative enhances the resilience of critical infrastructure, including defence infrastructure, in the face of climate threats. The anticipated results of both 'Fit for 55' and 'Clean Energy for All' extend beyond emission reductions to foster a more secure and resilient energy landscape for defence operations.

Other countries, such as Canada and Australia, have made notable advancements by integrating climate adaptation into their defence policies, setting examples that could inform EU adaptation strategies. Canada's Department of National Defence has implemented the 'Strong, Secure, Engaged' policy, which includes provisions for addressing climate disturbances on military infrastructure and operations. In Australia, the Department of Defence developed the "Defence Environmental Strategy 2016-2036" and the "Defence Net Zero Strategy", which outline steps to manage climate risks, adapt infrastructure, and secure supply chains in anticipation of climate-induced challenges. These examples demonstrate effective models for incorporating climate resilience into defence policy, reinforcing the need for proactive measures within the EU to enhance military adaptability in response to climate threats.

The EU's Strategic Compass for Security and Defence (EEAS, 2022), published in March 2022, sets ambitious targets for resilience, climate neutrality, and enhanced crisis support capabilities, underscoring the commitment of EU Member States to develop national strategies for climate change preparedness within their armed forces by the end of 2023. These measures reflect the importance of sustainable policies in mitigating climate risks and fostering a stable and resilient global future. By adopting these strategies, the EU aims to strengthen its defence framework, ensuring it is well-prepared to face climate-related security challenges.

Conclusion on a Climate-Resilient and Sustainable Future for EU Defence

In conclusion, addressing security threats from climate change requires immediate, robust responses, with a key focus on the fallout on defence-related energy infrastructure, especially considering the 2°C threshold. Proactive climate protection policies

are essential to mitigate emissions and prevent global economic destabilization amid complex challenges such as increased migration, water and food crises, storms, and floods, while global unity is necessary for effective crisis management, institution strengthening, and resource mobilization.

The evolving understanding of climate change as a security risk calls for a re-evaluation of policy frameworks, focusing on resilience, inter-agency collaboration, and adaptive strategies. Future policies should emphasize comprehensive climate risk assessments for defence installations, integrating adaptation into defence budgets, and increasing cooperation with civilian agencies. A strengthened EU mandate to address climate change within military planning would also facilitate coordinated responses, ensuring energy security and operational integrity across Member States. The proposed EU Defence Strategy, Multi-Stakeholder Forum, Critical Energy Infrastructure (CEI) framework, and coordinated response mechanisms reinforces the importance of incorporating climate considerations into military planning, investment, and infrastructure to enhance resilience. Additionally, the EU-led Competence Centre fosters innovation and decision-making in climate change mitigation, as failure to implement strong climate protection policies may result in conflicts and global destabilization. The EU's strategies proactively tackle climate risks, align the defence sector with the EU's 2050 energy and climate neutrality targets, and stress operational measures, capability planning, and governance efforts. These strategies emphasize the need for decisive action to make EU defence sustainable and resilient to climate change. Acknowledging the challenges, they accentuate the significant role the defence sector can play in addressing global warming, which is why a delayed action increases the risk of military capability loss, higher costs, and serious consequences for EU security, making the proactive involvement of the armed forces essential for a secure and sustainable future.

Bibliography

- Center for Climate and Security, 2023. *Climate Change as a Threat Multiplier: History, Uses, and Future of the Concept*. [Online] Available at: <https://climateandsecurity.org/2023/01/briefer-climate-change-as-a-threat-multiplier-history-uses-and-future-of-the-concept/#:~:text=The%20term%20was%20coined%20in,to%20contribute%20to%20security%20risks> [Accessed 1 December 2024].
- Council of the European Union, 2023. Fit for 55: Delivering the European Green Deal. Available at: https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal/delivering-european-green-deal_en [Accessed 1 December 2024].
- Daehnhardt, P., 2018. European Defence and German Defence Cooperation. *Nação e Defesa*, n.º 150, pp. 94-114. Available at: Repositório Científico de Acesso Aberto de Portugal (RCAAP). https://comum.rcaap.pt/bitstream/10400.26/29557/1/NeD150_PatriciaDaehnhardt.pdf [Accessed 31 October 2024].

- Das, D., et al., 2023. *Assessing the impacts of climate change on hydropower generation and its vulnerability in the Brahmaputra River basin*. Natural Hazards and Earth System Sciences (NHESS), 23. [Online] Available at: <https://nhess.copernicus.org/articles/23/2475/2023/> [Accessed 31 October 2024].
- Drossos, N., et al., 2017. *Critical Infrastructure Protection: Prevention, detection, response, and mitigation of the combination of physical and cyber threats to the critical infrastructure of Europe, Defending the European Energy Infrastructures*. CEI Security Stakeholder Group Manifest. [Online] Available at: <https://ec.europa.eu/research/participants/documents/downloadPublic?documentIds=080166e5b7096f83&appId=PPGMS> [Accessed 31 October 2024].
- European Civil Protection and Humanitarian Aid Operations (ECHO), 2024. *EU Civil Protection Mechanism*. Available at: https://civil-protection-humanitarian-aid.ec.europa.eu/what/civil-protection/eu-civil-protection-mechanism_en [Accessed 31 October 2024].
- European Commission – Directorate-General for Energy, n.d. *Security of Electricity Supply*. Available at: https://energy.ec.europa.eu/topics/energy-security/security-electricity-supply_en [Accessed 31 October 2024].
- European Commission – Directorate-General for Environment, n.d. *Environmental Impact Assessment*. Available at: https://environment.ec.europa.eu/law-and-governance/environmental-assessments/environmental-impact-assessment_en [Accessed 01 December 2024].
- European Commission – Directorate-General for Home Affairs, 2024. *Critical infrastructure resilience at EU-level*. Available at: https://home-affairs.ec.europa.eu/policies/internal-security/counter-terrorism-and-radicalisation/protection/critical-infrastructure-resilience-eu-level_en [Accessed 01 December 2024].
- European Commission – Environment, 2023. *Zero Pollution: Commission Consults Citizens and Stakeholders on the Polluter Pays Principle*. Available at: [https://environment.ec.europa.eu/news/zero-pollution-commission-consults-citizens-and-stakeholders-polluter-pays-principle-2023-05-12_en#:~:text=The%20%22polluter%20pays%22%20principle%20is%20enshrined%20in%20Article%20191,\(source%20and%20holding%20polluters%20accountable](https://environment.ec.europa.eu/news/zero-pollution-commission-consults-citizens-and-stakeholders-polluter-pays-principle-2023-05-12_en#:~:text=The%20%22polluter%20pays%22%20principle%20is%20enshrined%20in%20Article%20191,(source%20and%20holding%20polluters%20accountable) [Accessed 31 October 2024].
- European Commission, 2020. *European Green Deal*. [Online] Available at: https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal_en [Accessed 31 October 2024].
- European Commission, 2022. *Repower EU: Affordable, Secure, and Sustainable Energy in Europe*. Available at: https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal/repowereu-affordable-secure-and-sustainable-energy-europe_pt [Accessed 31 October 2024].
- European Commission, 2024. *Governance of the Energy Union, and Climate Action*. Available at: https://climate.ec.europa.eu/eu-action/climate-strategies-targets/governance-energy-union-and-climate-action_en [Accessed 31 October 2024].
- European Defence Agency (EDA) and Joint Research Centre (JRC), 2023. *EDA-JRC Study*. [Online] Available at: https://eda.europa.eu/docs/default-source/brochures/eda-jrc-study_web-version.pdf [Accessed 26 October 2024].

- European Defence Agency (EDA), 2023. *Climate Change and EU Defence: Released New Report Analysing the Links Between Climate, Energy and Defence*. Available at: <https://eda.europa.eu/news-and-events/news/2023/06/08/climate-change-and-eu-defence-released-new-report-analysing-the-links-between-climate-energy-and-defence> [Accessed 31 October 2024].
- European External Action Service (EEAS), 2022. *Climate Change and Defence – EU's Climate Change and Defence Roadmap*. [Online] Available at: <https://www.eeas.europa.eu/sites/default/files/documents/2022-03-28-ClimateDefence-new-Layout.pdf> [Accessed 31 October 2024].
- European External Action Service (EEAS), 2022. *Strategic Compass for Security and Defence*. Available at: https://www.eeas.europa.eu/sites/default/files/documents/strategic_compass_en3_web.pdf [Accessed 31 October 2024].
- European Parliament Research Service, 2015. *European Parliament*. Available at: [https://www.europarl.europa.eu/RegData/etudes/BRIE/2015/551310/EPRS_BRI\(2015\)551310_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/BRIE/2015/551310/EPRS_BRI(2015)551310_EN.pdf) [Accessed 31 October 2024].
- German Advisory Council on Global Change (WBGU), 2024. *Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU)*. [Online] Available at: <https://www.bmuv.de/en/ministry/tasks-and-structure/independent-advisory-bodies/german-advisory-council-on-global-change-wbgu> [Accessed 31 October 2024].
- Global Centre for the Responsibility to Protect, n.d. Global Centre for the Responsibility to Protect. Available at: <https://www.globalr2p.org/what-is-r2p> [Accessed 31 October 2024].
- Health and Safety Executive (HSE), n.d. Introduction to Seveso III Directive. Available at: <https://www.hse.gov.uk/seveso/introduction.htm> [Accessed 31 October 2024].
- Intergovernmental Panel on Climate Change (IPCC), 2001. Adaptation to Climate Change in the Context of Sustainable Development and Equity (Chapter 18). In, *Climate Change 2001: Impacts, Adaptation, and Vulnerability*. [Online] Available at: <https://www.ipcc.ch/site/assets/uploads/2018/03/wg2TARchap18.pdf> [Accessed 31 October 2024].
- Joint Research Centre, 2023. *Climate change and EU defence: released new report analysing the links between climate, energy and defence*. [Online] Available at: https://joint-research-centre.ec.europa.eu/jrc-news-and-updates/climate-change-and-eu-defence-released-new-report-analysing-links-between-climate-energy-and-defence-2023-06-08_en [Accessed 31 October 2024].
- National Centers for Environmental Information (NCEI), 2023. *Great Texas Freeze: February 11-20, 2021*. [Online] Available at: <https://www.ncei.noaa.gov/news/great-texas-freeze-february-2021#:~:text=On%20February%2011%2D20%2D2021,the%20entire%20state%20of%20Texas> [Accessed 31 October 2024].
- Organisation for Economic Cooperation and Development (OECD), 2013. Environmental fiscal reform (Chapter 3). In, *Scaling-up Finance Mechanisms for Biodiversity*. Report, OECD Publishing, Paris. Available at: <https://doi.org/10.1787/9789264193833-5-en> [Accessed 1 December 2024].
- Schoeller, M. G., n.d. Leadership in the Eurozone: The Role of Germany and EU Institutions. European Council. Available at: <https://www.consilium.europa.eu/en/documents-publications/library/library-blog/posts/leadership-in-the-eurozone-the-role-of-germany-and-eu-institutions-magnus-g-schoeller/> [Accessed 31 October 2024].

- Tavares Da Costa, R., Krausmann, E. & Hadjisavvas, C., 2023. *Impacts of climate change on defence-related critical energy infrastructure*. EUR 31270 EN. Luxembourg: Publications Office of the European Union. doi:10.2760/03454, JRC130884.
- U.S. Department of Defence, 2021. Department of Defence Climate Adaptation Plan. Available at: <https://www.sustainability.gov/pdfs/dod-2021-cap.pdf> [Accessed 31 October 2024].
- United Nations Department of Political and Peacebuilding Affairs (DPPA), n.d. *Conflict-Sensitive Climate-Security Toolbox: Briefing Note*. [Online] Available at: https://dppa.un.org/sites/default/files/csm_toolbox-1-briefing_note.pdf [Accessed 31 October 2024].
- United Nations Security Council, 2023. *UN Security Council*. [Online] Available at: <https://press.un.org/en/2023/sc15318.doc.htm> [Accessed 31 October 2024].
- United Nations, 2020. *United Nations Environment Programme* (UNEP). Available at: <https://www.unep.org> [Accessed 31 October 2024].
- WBGU, 2007. *World in Transition, Climate Change as a Security Risk*. [Online] Available at: <https://eda.europa.eu/docs/default-source/brochures/climate-report.pdf> [Accessed 31 October 2024].
- World Federation of United Nations Associations (WFUNA), n.d. World Federation of United Nations Associations (WFUNA). Available at: <https://wfuna.org> [Accessed 31 October 2024].
- World Federation on Global Development and Environment (WBGU), n.d. World Federation on Global Development and Environment. Available at: <https://www.wbgu.de/en/> [Accessed 1 December 2024].