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## THE ENVIRONMENTAL IMPACT OF MILITARY AI

*While militaries increasingly rely on artificial intelligence (AI) applications, including in the areas of enhancing preparedness and mitigation for climate-related disasters, AI development can counterproductively be energy intensive and environmentally damaging. The environmental consideration must be included in military AI governance, contends **WICHUTA TEERATANABODEE**.*



Used by the North Atlantic alliance, this intelligent system which stores surplus energy and distributes it has been known to cut fuel consumption by an average of 30 per cent. Source: North Atlantic Treaty Organization.

From the North Atlantic Treaty Organization's [Green Defence Framework](#) adopted in 2014 to the United States Army's 2022 [Climate Strategy](#), it is becoming more evident that some militaries are attempting to reduce the impact of their operations on the environment. A lot of attention has gone into the [infrastructure](#) (installations that support military forces, such as bases) and [operations](#) of conventional forces due to the carbon emissions from their massive fuel consumption. However, little has been

said about the climate impact of the emerging technologies that these forces are increasingly employing.

Artificial intelligence — one of the key emerging kinds of technology in defence — has been used to combat climate crises, including by improving preparedness and disaster risk mitigation. With the capability to store, process, and analyse large amounts of data, AI and machine learning systems can help monitor and forecast extreme natural disasters, subsequently reducing the risks of those occurrences.

However, AI technologies may at the same time have adverse environmental impact as most processes involved in training and developing the technology, such as data storage and processing, themselves consume enormous amounts of energy. Consequently, militaries must address the environmental aspects in their development of AI governance frameworks.

### **How Militaries Can Help Fight Climate Change**

[Relying on](#) machine-based learning systems and patterns of data to make predictions, recommendations, or decisions, AI can assist in preparing for and responding to climate-related disasters. AI's ability to process vast amounts of data, including pictures, graphs, and maps, has opened the door to more possibilities for monitoring natural terrain across its spatial and temporal differentials, as well as in spotting unusual changes in those areas.

Furthermore, many military technologies with dual-use capabilities can become tools to [help fight climate change](#). Drones or unmanned aerial vehicles, for instance, are commonly used to [collect data](#) to help scientists understand basic atmospheric processes and eventually apply them to climate models. The gathered data could lead to more accurate weather pattern forecast systems, which would enhance climate-related disaster [mitigation](#).

Such use of AI technologies can help improve [alert systems](#) so that responsible stakeholders and first responders — who, in many cases, are military personnel — might act promptly in the event of natural disaster, while civilians are given early warning. In the United States, for example, the Department of Defense (DoD) carried out a joint research project with the Joint Artificial Intelligence Center and the California National Guard to develop automated fire tracking support [using machine learning](#) as a tool to delineate a wildfire's perimeter.

The project should help [increase accuracy](#) in locating a fire, and provide near-real time updates so that responders and local communities might be better informed. Consequently, in the event of wildfire, responsible units would be able to detect the sources of the fire and respond more quickly to reduce the physical and environmental damage. A similar approach can be applied to cope with other climate-related disasters, including floods and storms.

### **AI's Environmental Challenges**

While military AI could enhance climate disaster preparedness and response, it is equally, if not more, essential to assess the impact of such technologies on the

environment. This point is particularly important as the integration of AI in the military is [steadily increasing](#), adding more environmental concerns to an institution that is already one of the primary sources of global [carbon emission](#).

Every process involved in AI and machine learning systems can be [energy intensive](#) and therefore environmentally damaging. Before the systems are deployed, the algorithms often require [millions](#) of rounds of practice to be able to identify a particular object accurately. Such training comes at a high cost in terms of energy consumption, which does not even include the energy needed for data storage and processing.

Virginia Dignum, a professor in social and ethical AI at Sweden's Umeå University, has noted that some of the huge data farms which support the training and operating of AI systems, especially in European countries and Canada, could consume "[as much energy as a small city](#)". As the use of AI for both military and civilian purposes increases, it is estimated that the amount of energy required for computing would take up to [8 per cent](#) of the world's total energy consumption by 2030.

Furthermore, manufacturing the devices and other electronics necessary to develop AI technology requires the intensive use of [raw materials](#), particularly nickel, cobalt, and graphite. The extraction and transportation of those materials would add to the technology's environmental costs.

## **Green Technologies and AI Governance**

Given the advantages of AI systems in helping to fight climate change, abandoning the technologies altogether for environmental reasons might not be the best solution. However, using them without proper regulation or accountability mechanisms would continue to compromise their effectiveness.

Efforts have been made to address the environmental impact of military AI, yet they are too limited, compared to the urgency of the issue. The DoD, for example, released the [Responsible AI Guidelines in Practice \(RAI\)](#) in 2021 to provide guidance to the various collaborators who partner with it on AI projects. The RAI puts forward [environmental impact](#) as one of the questions for third-party developers' consideration. Nevertheless, it confines environmental considerations to the planning phase, overlooking the development and deployment processes.

Addressing the environmental challenges requires novel approaches to AI governance. If the objective of AI governance frameworks, in general, is to ensure that the application of AI is safe, ethical, and responsible, climate change — one of the world's most pressing issues — must not be neglected. Consequently, more comprehensive and transparent military AI governance frameworks are necessary to help ensure that the benefits of AI would be greater than their potential environmental harm.

In designing their AI governance frameworks, militaries should specifically identify and clarify all the processes involved in AI technology and machine-based learning systems, and then analyse the potential environmental impact of each — whether these involve energy consumption, raw material extraction, or any other means of leaving a carbon footprint. They should also consider the roles and responsibilities of

different actors involved in those stages to minimise the gaps in climate responsibility between actors and across processes. Simultaneously, defence institutions should continue to improve AI systems' capabilities to combat climate-related events more efficiently.

## **Green Technologies in Defence**

Several militaries today aspire towards green defence, aiming to achieve [smart energy](#) and transition away from fossil fuels to more sustainable energy sources. These green defence initiatives will not only support the global effort to fight climate change, but can also yield strategic advantages on the battlefield by improving the forces' [mobility and endurance](#).

Accounting for the environmental aspect in AI governance frameworks would contribute to achieving those green aspirations. Furthermore, as the military is increasingly becoming the first responder in climate-related disasters, ensuring that military training and operations — including those involving AI systems — put less of a burden on the environment might be a good way to help solve climate change at its roots.

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