CLIMATE CHANGE ADAPTATION AND MITIGATION ROADMAP OF THE ARMED FORCES

MINISTRY OF NATIONAL DEFENCE

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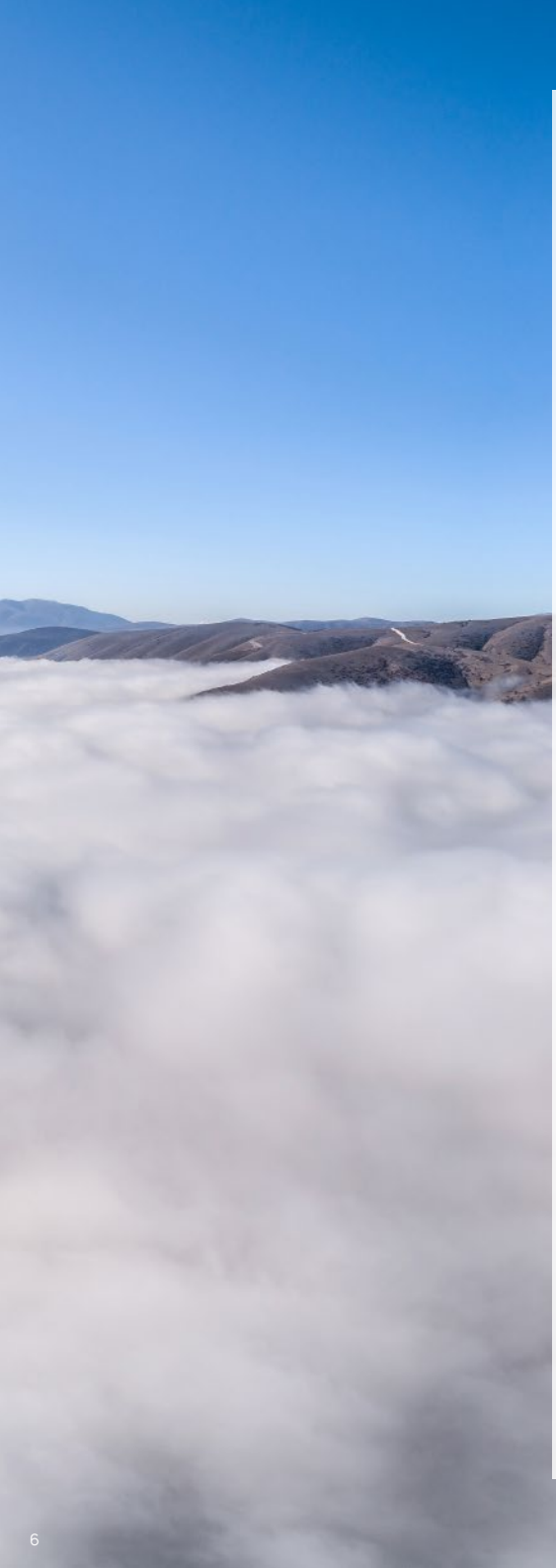

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TABLE OF ABBREVIATIONS

HMoD: Hellenic Ministry of National Defence
HNDGS: Hellenic National Defence General Staff
HAGS: Hellenic Army General Staff
HNGSL: Hellenic Navy General Staff
HAFGS: Hellenic AirForce General Staff
AF: Armed Forces
EECCAP: Environmental – Energy and Climate Change Adaptation Policy
EU: European Union
UN: United Nations
NATO: North Atlantic Treaty Organization
CC: Climate Change
GHG: Greenhouse Gases
IPCC: Intergovernmental Panel on Climate Change
A/C: Aircraft
NECP: National Energy and Climate Plan
RES: Renewable Energy Sources
CSDP: Common Security and Defence Policy
SDG: Sustainable Development Goal(s)
NGO: Non-Governmental Organisations
LA: Local Authorities
HEDNO: Hellenic Electricity Distribution Network Operator
A/P: Airport(s)
R/W: Runway
P/G: Power Generator Sets
FS: Fire Service
PV: Photovoltaics
WT: Wind turbine(s)

FOREWORD

Minister of National Defence
Nikolaos Panagiotopoulos

Climate Change is a complex challenge for Defence and Security, with catalytic impacts on the mission and work of the Armed Forces. It inflates operational demands, while it can lead to social and political destabilization, international conflict and mass migration.

Following a Government mandate, for the preparation of institutional texts against the effects of Climate Change by all competent bodies, first the Ministry of National Defence, recognizing this new reality and taking into account the above concerns, completed the creation of a roadmap, to deal with the emerging and now a calculable threat.

As a first step in this direction, in December 2020, the Ministry of National Defence issued the revised «Environmental - Energy and Climate Change Adaptation Policy (EECCAP)», which, among other things, describes the ways of adapting the Armed Forces to Climate Change, as well as the areas of environmental interest.

In a second stage, the current roadmap was drawn up, which defines priority axes, in order the available resources to be used rationally, in a way to reduce the negative effects of Climate Change and strengthen the resilience of the Armed Forces.

This roadmap analyses the concept of Climate Change and how it effects Defence and Security, summarizing initiatives to address and shield at all levels. Additionally, it includes the methodological approach for planning and setting out the Ministry's actions, dividing them by pillar, area of interest and time horizon of implementation.

The present roadmap is an excellent collaborative project, the implementation of which will effectively contribute to limiting the effects and adapting the Armed Forces to Climate Change. This document is expected to be a point of reference for other bodies that will try to deal with the issue of Climate Change. In this context, the contributors of this edition deserve my deepest appreciation.

Therefore, moving forward, year by year, we will continue to prioritize the limitation of the effects, as well as the adaptation of the Armed Forces to Climate Change, since this is not only a matter of environmental responsibility, but also a matter of major National Security.

FOREWORD

Deputy Minister of National Defence
Nikolaos Hardalias

Over the last twenty years, it has become internationally understood, even by the most cautious observers, that Climate Change, which is now aptly called as climate crisis, is primarily caused by human activity and poses a significant threat to humanity, affecting both developing and developed countries.

It is self-evident that the consequences of the climate crisis will affect Greece, as well as the EU, on each activity. In particular, in the domain of National Defence and Regional Security, many issues arise that need to be addressed immediately. Of course, to draw up a practical and feasible roadmap, a common understanding, a broader consensus and selfless cooperation are required. Obviously, the Armed Forces must be vigilant in the whole project.

Specifically, the climate crisis affects operational requirements, wears out the military infrastructure, increases the maintenance cost and poses risks to the health of personnel. At the same time, it requires the expanded involvement of the Armed Forces to natural disasters both within our country and abroad. Moreover, it leads to increased refugee and migratory flows - that potentially could be evolved into a hybrid threat - reflecting the need for enhanced surveillance of land and maritime borders.

Apart from the apparent adaptation in our operational planning, the Ministry of National Defence has adopted measures and policies to address the phenomenon holistically, with a view to a gradually transmitted climate-neutral economy. The main axes of this approach are specified in the recently revised 'Environmental – Energy & Climate Change Adaptation Policy (EECCAP)' of the HMoD.

All this effort fits harmoniously into the broader approach of the EU, which has already recognized Climate Change as a phenomenon that poses challenges to European Defence and Security, contributing to increased international instability and forcing the European Armed Forces to adapt to a changing operational environment and to invest in new, «green» technologies. For this reason, the EU, with the active participation of our country, has undertaken various initiatives and actions, through implementation tools such as the Permanent Structured Cooperation (PESCO) and the European Defence Fund (EDF), in order to enhance innovation and reduce the dependence of Member States' defence equipment on fossil fuels.

Nevertheless, except for the EU, NATO is equally aware and determined to play an active role. The Alliance has acknowledged Climate Change as threat multiplier, affecting allied Security, so has committed to fully integrating it into its planning procedure. The strong NATO interest is reflected, among other things, in the recently announced establishment of the Centre of Excellence for Climate Change and Security, based in Canada, where our country will participate, seeking an enhanced role.

The climate crisis is the most defining challenge of our time, with implications for the present and future generations. This reality acts as a guide for the Hellenic Republic, which, fully aware of this crucial problem and with a high sense of responsibility and debt to all citizens - especially to our children -, has made Climate Change a high priority over the last three years.

In this effort, the Armed Forces, as a timeless guarantor, are evolving dynamically and are at the forefront of the fight against the effects of the climate crisis.

FOREWORD

Chief of Hellenic National Defence General Staff
General Konstantinos Floros

Climate change, as a global complex environmental phenomenon, could not have left the Armed Forces unaffected. It affects our operational actions, wears down military infrastructure while increasing the cost of maintaining it, poses risks to our personnel and affects the execution of our mission. The effects of Climate Change are not only numerous and serious, but also unpredictable in their intensity, type and scope, which creates an environment of intense precariousness and uncertainty for everyone.

It is our responsibility to adapt to this new reality, taking into account not only the EU's guidelines, but also our present and our children's future. Adapting the Armed Forces to Climate Change means improving the energy efficiency of our building infrastructure, integrating renewable energy sources into our energy balance, implementing integrated waste management programs, supplying means, systems and materials that leave the smallest possible energy and carbon footprint. We are called to reduce as much as possible the environmental consequences of our activities, reassessing and rearranging our entire effort with a view to Climate Change.

The Armed Forces, which are always been prepared for major battles, are also in this case at the forefront of the fight to deal with the effects of Climate Change, adapting their activities, infrastructure and general mentality to a more sustainable way. In this context, during the last three years, initiatives

have been undertaken, such as the installation and operation of PV panels, generators and accumulators on micro-islands of the Aegean, the energy upgrade of the 1st Army Headquarters, while within this year the completion of the energy upgrade of the 115CW is expected. The energy upgrade of our other infrastructures will follow, such as the 401 and 424 Military Hospitals, the Tactical Aviation Headquarters, as well as the military academies SAN, SSE and SSAS.

This roadmap sets clearly and precisely the axes on which the Armed Forces are obliged to follow in the short, medium and long term. In this context, having always the fulfilment of our main mission on top, we adapt to the new reality set by Climate Change.

INTRODUCTION

1. The HMoD recognizes Climate Change as a tough defence and security challenge with strategic implications for its mission and work. Climate Change is expected to increase the severity and frequency of weather-related risks, bringing about social and political destabilization, international conflicts and mass migrations. In this challenging period, in which the AF are expected to act more, longer and with fewer resources available, complex and sustainable internal decisions and actions are required to enhance their resilience.

2. The HMoD is called upon to make a decisive contribution to developing and promoting a solid policy to address the emerging and now dominant threat. To this end:

a. In December 2020, the revised «Environmental – Energy and Climate Change Adaptation Policy (EECCAP)» was issued, which outlines, among other things, the means for adaptation to CC and the areas of environmental concern. [[1](Chapters C, E (pp. 10-29, 36-43))]

b. The present roadmap was published, in order to set the Vision and the priority axes to use the available resources, by minimizing the negative impacts of CC and the risks, while maximizing the benefits. In this way, the AF will continue to evolve by enhancing its capabilities and operational capacity to remain resilient to the impacts of CC. With the elaboration of this institutional text, our country fulfils the obligation to develop a National Strategy for the preparation of the AF against the effects of CC by the end of 2023, as required by the «Strategic Compass for Security and Defence» of the EU Council. [28]

3. The time horizon of the roadmap actions is set at 2050, which is fully in line with the EU's guidelines and the State's commitments, a milestone year by which it has been agreed to make the EU's climate neutral. [2][3]

4. It is divided into three (3) distinct parts as described below:

a. The first (I) part is divided into three (3) Chapters:

(1) The first chapter (Chapter 1) analyses the Concept of Climate Change and describes its significant impacts.

(2) The second chapter (Chapter 2) refers to how the CC, directly or indirectly, affects the Security and Defence sectors.

(3) Chapter 3 summarises the initiatives to address and shield against the impacts of CC at all levels.

b. The second (II) part consists of one chapter (Chapter 4), which develops the methodological approach for forming the roadmap of the HMoD's actions. In particular, it defines:

(1) The Design Principles of the Methodological Framework, while the main element being the Vision, is the critical component of the strategic framework developed below. The roadmap supports the following:

(a) Adaptation to the new climate reality and implementing the methodological framework due to compliance.

(b) The Armed Forces' transition to an operationally sustainable, energy efficient, climate neutral and resilient security pillar.

(2) The two pillars on which the actions are built. These are:

(a) Adaptation to Climate Change.

(b) Climate Change Mitigation.

(3) The time horizon for implementation mainly serves the optimal planning of actions and the smooth transition.

c. The third (III) and the central part of the Roadmap sets out the actions to strengthen resilience by pillar, area of interest and time horizon for implementation.

CLIMATE CHANGE: AN «INVISIBLE» THREAT AT THE DOORSTEP

1 THE CONCEPT OF CLIMATE CHANGE

1.1. The Phenomenon of Climate Change

1. According to the United Nations Framework Convention on Climate Change (1992), which was ratified by Greece by Law 2205/1994, «Climate Change» means a change in climate that is directly or indirectly attributable to human activity that alters the composition of the planet's atmosphere and which is added to the natural climate variations observed during comparable periods. [4]

2. Paris Agreement (2016), in the context of strengthening the implementation of the above Convention, aims to strengthen the global response to the threat of CC, by keeping the increase of global average temperature well below 2°C comparing to the pre-industrial levels and continuing efforts to limit it to 1.5°C above them, recognizing that this will significantly reduce the risks and impacts of CC. [5]

3. According to the IPCC, global warming will exceed 1.5°C/2°C during the 21st century, unless there are drastic reductions in CO2 emissions and other GHG in the coming decades. [[6](para. B1)]

4. The IPCC panel initially adopted five Shared Socioeconomic Pathways (SSP), which describe evolution trends of society in the 21st century and differ in the socioeconomic challenges (population growth, economic and technological development, lifestyle and governance). These pathways are: (a) SSP1: 'sustainability,' (b) SSP2: 'intermediate pathway,' (c) SSP3: 'regional competition,' (d) SSP4: 'inequality' and (e) SSP5: 'fossil fuel-based development'.

5. Then, after considering the wide range of implications for energy consumption, land use and GHG emissions and studying a wealth of scientific data, the IPCC panel formulated the following climate change scenarios up to the year 2100:

a. **SSP1-1.9:** Increase in average global temperature by 1.4oC by 2100

The optimistic scenario is that global GHG emissions are reduced to net zero around 2050. Extreme weather events will be more frequent, but the world will have avoided the worst effects of CC. This scenario is the only one that meets the Paris Agreement's goal of limiting global warming to 1.5°C above pre-industrial levels.

b. **SSP1-2.6:** Increase in average global temperature by 1.8oC by 2100

Global GHG emissions will fall considerably but more slowly, reaching net zero after 2050.

c. **SSP2-4.5:** Increase in average global temperature by 2.7oC by 2100

The intermediate scenario is the one that GHG emissions hover around current levels before starting to decline in mid-century but not reaching net zero by 2100.

d. **SSP3-7.0:** Increase in average global temperature by 3.6oC by 2100

GHG emissions will steadily increase and almost double from current levels by 2100.

e. **SSP5-8.5:** Increase in average global temperature by 4.4oC by 2100

In the worst-case scenario, GHG emissions will have been doubled by 2050.

6. The IPPC study cannot predict which scenario is more likely, as a number of critical factors, including the policies implemented by governments, will form this. However, it does show how current choices will affect future developments and makes it clear that the chosen path will determine the magnitude of the risk of CC to humans and ecosystems.

1.2. The Consequences of Climate Change on the Natural Environment

The significant impacts of CC on the natural environment are as follow [7]:

1.2.1. High Temperatures

1. The climate crisis has increased the average global temperature and is leading to more frequent high-temperature extremes, such as heatwaves. Higher temperatures can cause increased mortality, reduced productivity and damage to infrastructure.

2. Higher temperatures are also expected to cause a shift in the geographical distribution of climate zones. These changes are altering the distribution and abundance of many plant and animal species, which are already under pressure from habitat loss and pollution.

3. Meanwhile, the yields and viability of agriculture and livestock, or the capacity of ecosystems to provide important services and goods (such as the supply of clean water or cool and clean air) could be diminished.

4. Higher temperatures increase the evaporation of water, which – together with the lack of precipitation – increases the risks of severe droughts.

5. Low-temperature extremes (cold spells, frosty days) could become less frequent in Europe. However, global warming affects the predictability of events and therefore our capacity to respond effectively.

1.2.2. Drought and Forest Fires

1. Due to the changing climate, many European regions are already facing more frequent, severe, and longer lasting droughts. Droughts often have knock-on effects, for example on transport infrastructure, agriculture, forestry, water and biodiversity. They reduce water levels in rivers and ground water, stunt tree and crop growth, increase pest attacks and fuel wildfires. It is estimated that annual losses in Europe related to drought events amount to EUR 9 billions.

2. With a global average temperature increase of 3°C, it is projected that droughts would happen twice as often and absolute annual losses from droughts in Europe would increase to EUR 40 billion.

3. More frequent and severe droughts will increase the length and severity of the wildfire season, particularly in the Mediterranean region. CC is also expanding the area at risk from wildfires. Regions that are not currently prone to fires could become risk areas.

1.2.3. Availability of Fresh Water

1. As the climate heats up, rainfall patterns change, evaporation increases, glaciers melt and sea levels rise. All these factors affect the availability of fresh water.

2. More frequent and severe droughts and rising water temperatures are expected to cause a decrease in water quality, exacerbating the problem of water scarcity.

3. The increase of cloudburst events (sudden extreme rainfall) is also likely to influence the quality and quantity of fresh water available, as storm water can cause uncleaned sewage to enter surface water.

1.2.4. Floods

1. CC is expected to lead an increase of precipitation in many areas. Increased rainfall over extended periods will mainly lead to fluvial (river) flooding, while short, intense cloudbursts can cause pluvial floods, where extreme rainfall causes flooding without any body of water overflowing.

2. River flooding is a common natural disaster in Europe, which has, along with storms, resulted in fatalities, affected millions of people and incurred massive economic losses in the last three decades. CC is likely to increase the frequency of flooding across Europe in the coming years.

3. Heavy rainstorms are projected to become more common and more intense due to higher temperatures, with flash floods expected to become more frequent across Europe.

1.2.5. Rising Sea Level

1. The sea level rose over the course of the 20th century, and the tendency has accelerated in recent decades. The rise is mostly due to thermal expansion of the oceans because of warming. But melting ice from glaciers and the Antarctic ice sheet is also contributing. It is predicted that Europe will experience an average 60 to 80 cm sea-level rise by the end of the century.

2. Around a third of the EU's population lives within 50 km of the coast and these areas generate over 30% of the Union's total GDP. The economic value of assets within 500 m of Europe's seas totals between EUR 500 billion to 1,000 billion.

3. Alongside other climate change impacts, sea-level rise will increase the risk of flooding and erosion around the coasts, with significant consequences for the people, infrastructure, businesses and nature in these areas. Moreover, sea level rise is projected to reduce the amount of available fresh water, as seawater pushes further into underground water tables

4. It will also affect biodiversity in coastal habitats and the natural services and goods they provide, while many wetlands will be lost.

1.2.6. Biodiversity

1. CC is happening so fast that many plants and animal species are struggling to cope.

2. CC is also leading to indirect impacts on biodiversity through changes in the use of land and other resources. These may be more damaging than the direct impacts due to their scale, scope and speed. The indirect impacts include: habitat fragmentation and loss; over-exploitation; pollution of air, water and soil; and the spread of invasive species.

1.2.7. Soils

1. CC may aggravate erosion, decline in organic matter, salinization, soil biodiversity loss, landslides, desertification and flooding.

1.2.8. Inland Water

1. CC is predicted to lead to major changes in water availability across Europe, due to less predictable rainfall patterns and more intense storms. This will result in increased water scarcity, especially in southern and south-eastern Europe, and an increased risk of flooding throughout much of the continent. The resulting changes will affect many land and marine regions, and many different natural environments and species.

2. Water temperature is one of the central parameters that determine the overall health of aquatic ecosystems because aquatic organisms have a specific range of temperatures they can tolerate. The changes in climate have increased water temperatures of rivers and lakes, decreased ice cover, thereby affecting water quality and freshwater ecosystems.

1.2.9. Marine Environment

1. The impacts of CC, such as increasing sea surface temperatures, ocean acidification and shifts in currents and wind patterns will significantly alter the physical and biological make-up of the oceans. Changes in temperatures and ocean circulation have the potential to change geographical fish distribution. An increasing sea temperature might also enable alien species to expand into regions where they previously could not survive. These changes will have unavoidable impacts on coastal and marine ecosystems, resulting in major socio-economic consequences for many regions.

1.3. The Social Threats of Climate Change

CC poses threats at the societal level, which are as follow [7]:

1.3.1. Health

1. CC is a significant threat not only to human health but also to animal and plant health. While a changing climate might not create many new or unknown health threats, existing effects will be exacerbated and more pronounced than currently seen. Among other things, a study suggests that CC is exacerbating more than half of the infectious diseases on Earth. [8]

2. The most important health effects from future CC are projected to include:

   a. Increases in summer heat-related mortality (deaths) and morbidity (illness);

   b. Decreases in winter cold-related mortality (deaths) and morbidity (illness);

   c. Increases in the risk of accidents and impacts on wider well-being from extreme weather events (floods, fires and storms);

   d. Changes in the impact of diseases e.g. from vector-, rodent-, water- or food-borne disease;

   e. Changes in the seasonal distribution of some allergenic pollen species, range of virus, pest and disease distribution;

   f. Emerging and re-emerging animal diseases increasing challenges to European animal and human health by viral zoonotic diseases and vector-borne diseases;

   g. Emerging and re-emerging plant pests (insect, pathogens and other pests) and diseases affecting forest and crop systems;

   h. Risks in relation to change in air quality and ozone.

1.3.2. Vulnerable Population

1. People living in low-income urban areas with poor infrastructure, and, generally speaking, population groups with lower incomes and assets are more exposed to climate impacts. They have less capacity to cope with these impacts.

2. CC has also already started to have an impact on displacement and migration. Although climate is only of several drivers of displacement and migration, many partner countries on their path towards sustainable development are among the most affected. People living there often depend heavily on their natural environment and they have the least resources to cope with the changing climate.

1.3.3. Employment

1. The impact of temperature increases, changes in precipitation regimes or sea-level rise will affect – directly or indirectly – the productivity and viability of all economic sectors in all EU Member States, with labour market implications.

2. CC may affect workforce availability due to a decrease in the health conditions of the population and additional occupational health constraints (higher temperature at work, more frequent and intense natural hazards keeping people from reaching their workplace).

3. Additionally, several economic sectors are highly vulnerable because of their dependence on regular climate conditions. Sectoral production shifts – in agriculture and tourism for instance – are expected as a consequence of CC.

1.3.4. Education/ Information/ Dissemination of Information

1. Reducing vulnerability and implementing adaptation measures is not only the task and responsibility of governments. The severity of CC requires public and private actors to work together in reducing vulnerability and adapting to the impacts. However, not all stakeholders are aware and informed about their vulnerability and the measures they can take to pro-actively adapt to CC. Education and awareness-raising is therefore an important component of the adaptation process to manage the impacts of CC, enhance adaptive capacity, and reduce overall vulnerability.

1.4. The Threats of Climate Change to Business

1.4.1. Infrastructure & Buildings

1. The impacts of CC are particularly pertinent to infrastructure and buildings given their long lifespan and their high initial cost, as well as their essential role in the functioning of our societies and economies.

2. Buildings and infrastructure can be vulnerable to CC because of their design (low resistance to storms) or location (e.g. in flood-prone areas, landslides, avalanches). Indeed they can be damaged or rendered unfit for use by any changing climatic condition or extreme weather event: rising sea level, extreme precipitation and floods, occurrences of extreme low or high temperatures, heavy snowfalls, strong winds.

3. Consequences of CC for buildings and infrastructure will differ from region to region.

1.4.2. Energy

1. Climate threats for the European energy system already exist and are projected to increase. CC is expected to reduce demand for heating in northern and north-western Europe and to strongly increase energy demand for cooling in southern Europe, which may further exacerbate peaks in electricity demand in the summer.

2. More intense and frequent heatwaves will shift energy supply and demand patterns, often in opposite directions. Further increases in temperature and droughts may limit the availability of cooling water for thermal power generation in summer (lowering energy supply), whereas demand for air conditioning will increase.

3. CC also brings increased uncertainty in weather patterns across Europe. This has a direct negative impact in the long term on the production of renewable energy. Some immediate examples would be less sun or wind in areas where there is usually more or heat and droughts affecting the crops intended for the production of energy from biomass.

2 CLIMATE CHANGE AND SECURITY

1. It is now clear that the consequences of CC pose a security threat. Floods, fires, pandemics and natural disasters threaten the livelihoods of the human race and lead to unprecedented environmental migration, which causes tensions in already politically stressed areas. In addition, the depletion of natural resources (food, water, minerals and energy) is leading to intense competition between states, causing economic disruption and the threat of conflict. [9]

2. The convergence of climate change and other risks creates compound security threats for states and societies. As the COVID-19 pandemic has so starkly demonstrated, many countries are unprepared to manage multiple crises simultaneously. For example, the confluence of COVID-19 lockdowns, subsequent economic shocks, and climate change-related droughts and flooding increased food insecurity globally, risking greater instability and conflict in many parts of the world. [[10] (p. 7, paras 1-2)]

3. Climate security risks will continue to intensify across all regions, with new disasters hitting before societies can recover from or adapt to the impact of previous ones. Fragile regions of the world will continue to face the most severe and catastrophic security consequences of climate change, yet no region is immune, as demonstrated - for example - by the unprecedented wildfires in the United States and Australia in 2020.

2.1. Climate Change as a Hybrid Threat

1. The impacts of CC, as discussed in Chapter 1, burden human health and threaten societies' existence and harmonious functioning as we know them.

2. An essential feature of CC, however, is that the magnitude and intensity of natural changes/disasters cannot be predicted, nor can the type and range of the resulting impacts be estimated. Consequently, an environment of precariousness and uncertainty is created, in which citizens must survive and governments are called to respond, plan and act.

3. The European Space Agency (ESA) argues that continuous heat waves, mega fires, shrinking rivers and rising soil temperatures, as measured from space, leave no doubt about the consequences for agriculture and industrial activities. [11] Moreover, it states that the evidence so far indicates:

a. Over 572 km^2 have been reduced to ash by fires in France in the summer of 2022 - almost six times the annual average.

b. In Spain, a prolonged drought made July 2022 the hottest month since 1961.

c. Utah's Great Salt Lake in Utah, USA and Italy's Padus River are at their lowest recorded levels.

4. These new risks from extreme events are testing human security. Moreover, the limited resources will intensify the pressures to exploit them, contributing to a profound change in the global geopolitical landscape, leading to conflicts and strifes. [[12](Annex.1,p.1-1,para.1-3)]

5. Limited access to resources and changes in the intensity and frequency of extreme events and conflicts (due to countries seeking to control strategic and resource-rich areas) will cause forced and, in many cases, violent population movements. For example, according to a recent White House report [13], an average of 21.5 million people per year were forcibly displaced between 2008 and 2016 due to CC.

6. The «climate» migrant data will pose a new challenge to an already security-stressed environment. In addition, irregular migration flows may be instrumentalized by malicious actors seeking to cause social uncertainty [29]. Many will settle in cities and large urban centres, increasing cities' pressure and sustainability needs. [14]

7. In conclusion, the climate crisis is a risk multiplier [[12](p.4, para.1)], which, when combined with other crises (food, energy, pandemics, wars), threatens human security [[10](p.7, para.1)]. This leads to an effect on the cohesion of states due to the impact on critical infrastructure on the one hand, and the threats to the rights and jurisdiction of states over their territorial integrity, on the other. CC will lead to new challenges for states and increasingly shape security conditions and national security policies.

2.2. Climate Change and Defence

1. AF are expected to face more significant challenges and pressures as CC intensify. As the pace and intensity of extreme weather events increase, countries will increasingly rely on their AF, which are called upon to play their role as rapid response actors. [[10](p. 7, para. 1)] The immediate effects of CC often pose a risk to military infrastructure and threaten to reduce the readiness of forces. However, the most pressing security threats will come from disruptions to the social fabric.

2. CC affects the functioning and well-being of the AF at three (3) different levels:

a. Military installations, infrastructure, weapon systems and vehicles/means are at risk from the direct consequences of severe natural phenomena resulting from CC. An example is the partial destruction of Tyndall Air Force Base in the USA by Hurricane Michael in October 2018 [15]. It is estimated that the cost of replacing the 17 F-22s affected alone amounted to $5.8 billion [16].

b. The uninterrupted operation of critical facilities/means and the availability of personnel uniquely determines the operational readiness of the AF. The indirect effects of CC may affect the operation and activities of the AF. Severe weather events, operations in an ever-changing environment, material, equipment, and means failures, costs for increased operation and maintenance needs and an increase in days with high discomfort index and disinclination to work outdoors are just some of the influencing factors. [[17](p. 10)]

c. New threats to the security of society may further undermine operational readiness through increasing demand for community service. According to the records of the HNDGS, the AF are increasingly called upon to provide humanitarian assistance, logistical support and health assistance or to conduct search and rescue operations, whether at home or abroad. The consequence of the above is the fatigue of personnel and the strain on the AF assets.

3. Mitigating the effects of CC, adequate preparation/training and enhancing the resilience of the military infrastructure are essential for the AF to ensure their sustainability and high level of readiness.

2.3. The Hellenic Armed Forces Against Climate Change

1. Unconventional borderless threats, global challenges and long-term trends increasingly define today's security environment. CC is a complex national security challenge, with strategic implications on HMoD's work and activities.

2. Both natural hazards and CC can directly and negatively affect the infrastructure, equipment, supply chain, health and welfare of AF' personnel and infrastructure and utilities used by them.

3. Moreover, the military capability to carry out the mission of the HMoD is also indirectly undermined. Increasingly, the AF are involved in humanitarian assistance support and natural disaster relief roles, both nationally and internationally, and the number of such operations is expected to increase due to CC.

4. CC and its impacts do not concern a single Department or Directorate of a Branch or Staff of the HMoD. As the environment changes, the HMoD must ensure operations continuity through sustainability and adaptation of all its capabilities - areas of operation.

5. The areas of the HMoD affected by CC, which interact with each other, are presented graphically in the following figure:

Image from 1: The areas of the HMoD affected by Climate Change

6. CC affects the way each sector operates, as follows:

a. Strategy, Policy and Capacity Building

Defence Planning and Policy, Evolution, Armaments, etc.

(1) In a changing environment, where the Global and Regional geostrategic background is being changed, strategic options for optimizing military and developing new interdisciplinary capabilities, doctrines and fundamental concepts based on informed CC decision-making process will also determine success in the transition to Sustainable AF, ready to respond to any climatic conditions anytime.

(2) Climate – oriented decision – making process through standardization and interoperability of the AF will contribute to implementing national commitments at EU or NATO level by taking the necessary actions and measures.

b. Operations

Operational Design & Doctrines, Exercises, Participation in Disaster Response & Providing Humanitarian Assistance, Operations Research & Rescue etc.

(1) The climate crisis will affect how the AF plan and operate. Extreme weather events will require a response to emergencies and will affect the operations while at the same time making surveillance and reconnaissance work more difficult.

(2) To enhance their combat capability and readiness, operational training of units takes place in the land, sea and air that reproduces the operational environment. Extreme weather conditions or a fire hazard may lead to suspending a unit's operational training in a particular location.

c. Personnel

Human Resources & Education

(1) Human resources are the most critical force multiplier of the AF. Through targeted training at all stages of their career development, the staff will be able to understand the impacts of CC and adapt their attitudes and behaviour to contribute to addressing the causes of CC.

(2) The adoption of sustainable lifestyles and the strengthening of environmental responsibility through the development of skills and critical thinking will be the means for the AF personnel to take action and contribute - to their extent - to the adaptation to CC.

(3) Particular emphasis will be given to personnel training on subjects related to the involvement/cooperation of the AF in response to natural disasters, epidemics, and illegal migration flows.

d. Support

Logistics, Environmental Protection, Procurement and Supply Chain, I.T., Health Support, etc.

(1) CC will seriously impact the ability of the HMoD to support the maintenance of its infrastructure and equipment and thus maintain its combat capability. Damage to military and national road infrastructure, the need for adequate energy and water supplies due to high demand, and damage to infrastructure from erosion and flooding are just some of the impacts.

(2) The supply chain, logistics, procurement and the use of new technologies to meet current and future needs will also be affected.

(3) In addition, «clean» forms of energy without a negative impact on the environment are needed. Therefore, exploring alternative fuel utilization in the means and facilities/conveniences of the AF, is currently being promoted as particularly important.

e. Information

Security, Intelligence and Information Collection and Exploitation

(1) CC touches every aspect of international Security and constitutes an all-encompassing threat. It affects seemingly unrelated challenges and multiplies existing threats. National Defence and Security challenges are now at the centre of attention. The AF, society, our territorial integrity, economic prosperity and military capabilities are affected by CC.

(2) Providing adequate and reliable long range forecasting will enhance the work and mission of the HMoD, at the predictive level of climate change impacts, by providing the General Staffs with the information they need for decision-making process.

(3) This ability, through the analytical art, will collect, process and present objective assessments to decision-makers. At the same time, it will be a critical contributor to climate-shaping opinion within and outside the military.

7. It is obvious that adaptation aimed at risk mitigation, active participation and enhancement of resilience to CC are now critical factors in fulfilling the mission of the HMoD and the operational continuity of the AF regardless the climatic conditions. For this reason, initiatives are being undertaken that aim, on one hand, at fulfilling the task of the AFs concerning the environment and, on the other hand, at sustainability and enhancing operational capability in the new reality set by climate change.

2.3.1. The Concept of the «Green» Armed Forces of the HMoD

1. The concept of Sustainable Development encompasses the balanced situation between the economy, society and the environment and contrasts with unconstrained development. Governance plays a key role in achieving sustainable development, as a framework for decision-making and central direction, supported by the technology pillar and the Life Cycle Analysis (LCA) approach.

2. The HMoD's Vision for sustainability in the AF is to maintain the ability to fulfil their mission in the future without causing degradation of the environment. The success of military operations, as well as the contribution of the AF to society, depends directly on the availability of resources such as energy, air, soil and water, as well as on the resilience of buildings, weapon systems and personnel to cope with new climatic conditions. [[18](p. 5)]

3. In the context of the international conference «Sustainability in Defence» (SiD), which took place in June 2014, the need to extend the model of sustainable activity to the Defence Forces was formulated for the first time. Human resources, infrastructure and financial resources are the main components that constitute the driving force for the development of «Smart» objectives that are Specific, Measurable, Achievable, Realistic, Achievable, Realistic, Time-bounded [[18](p. 7-8)].

4. The application of mature technologies with the efficient use of existing financial instruments (national, European, and allied) aims at developing resilient infrastructure in the AF, which in combination with the cultivation of an environmental culture among the personnel, will lead to the success of a double effect. Firstly, the timely and adequate adaptation of the AF to new environmental and climate conditions, turning inherent weaknesses and emerging threats into strengths and opportunities for evolution and modernization. Secondly, the preservation and conservation of the territory's ecosystems, natural resources, flora, and fauna. [[18](pp. 7-8)]

2.3.2. «Environmental – Energy and Climate Change Adaptation Policy (EECCAP)» of the HMoD

1. In 2007, the HMoD issued its Environmental Policy, aiming at an integrated and rational approach to all environmental issues of the AF and the Defence Industry, based on four fundamental principles: harmonization, prevention, restoration, and conservation. [19]

2. In 2014, the Environmental Policy of the HMoD was revised and the second edition aimed to minimize the environmental impact of all activities of the HMoD and implement the principles of sustainable development. [20]

3. In the context of the proclamation of 2020 as the year of «Research, Technological Development, Innovation, and Environmental Protection» following the approval of the political leadership of the Ministry of National Defence, the task of revising the Environmental Policy of the Ministry of National Defence was undertaken. This second revision, entitled «Environmental – Energy, and Climate Change Adaptation Policy (EECCAP),» was issued in December 2020 and is an update of the operational framework of the AF to the challenges posed for our country and not only by CC. Therefore, the AF are called upon to fulfil their mission, taking into account the principles of sustainable development while at the same time upgrading their capabilities in terms of dealing with the consequences of extreme weather events.

4. This EECCAP [1]:

a. Aims to minimize the environmental impact and energy consumption of all activities of the AF, by applying the principles of sustainable development.

b. Is a commitment of the Political and Military Leadership of the AFs to support the following five key pillars:

(1) Compliance with community and national legislation and Allied agreements.

(2) Rational management of natural resources and energy.

(3) Avoid creating pollution.

(4) Continuous improvement of environmental performance.

(5) Complete staff commitment.

c. Is based on the following fundamental principles:

(1) Prevention.

(2) Prophylaxis.

(3) Proximity/prevention at source.

(4) «The polluter pays».

(5) Transparency/graduation.

d. Covers the following areas of interest:

(1) Climate Change

(2) Energy.

(3) Air.

(4) Soil.

(5) Marine Environment.

(6) Inland Water Resources.

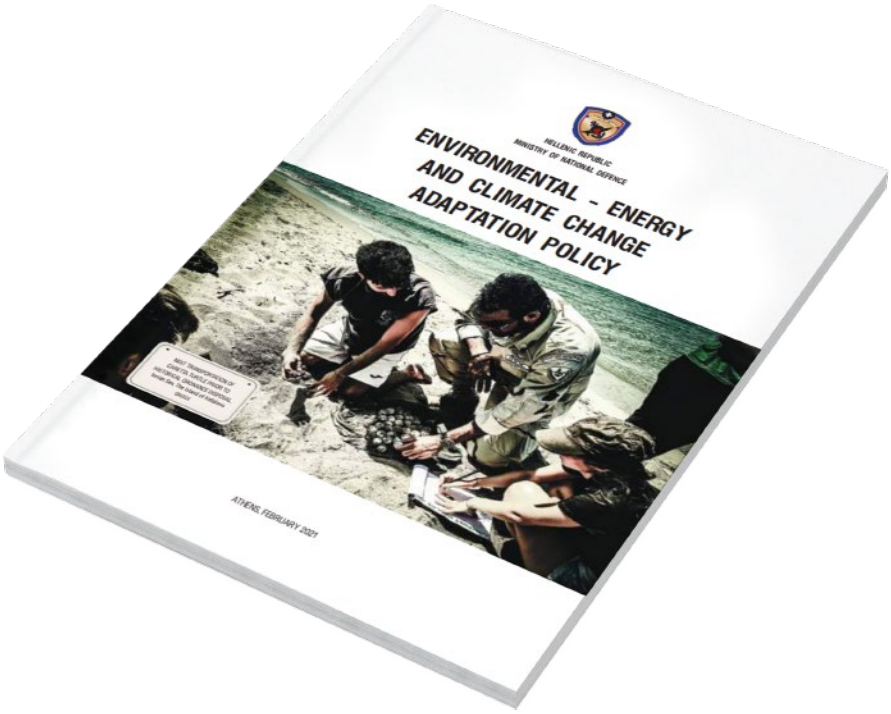
(7) Nature & Biodiversity.

(8) Acoustic Noise - Vibration.

(9) Hazardous Substances & Materials.

(10) Waste.

(11) Cultural Heritage.


HELLENIC REPUBLIC
MINISTRY OF NATIONAL DEFENCE
ENVIRONMENTAL - ENERGY
AND CLIMATE CHANGE
ADAPTATION POLICY
ATHENS, FEBRUARY 2021

3 CURRENT INSTITUTIONAL FRAMEWORK & INITIATIVES AGAINST CLIMATE CHANGE

3.1. The Hellenic Reality

1. Mitigating the effects of CC is one of the fundamental priorities at the national level.

2. Actions to address CC involve changing the existing development model towards a sustainable, green, low or zero-carbon economy using modern technology. The development of this model should be based on the horizontal coordination of mitigation and adaptation policies in the domains of energy, industry, agricultural production, etc.

3. In this direction, the National Energy and Climate Plan (2019) and the National Climate Law (2022) have been published, setting clear energy and climate goals in sustainable development in order to address the burden on the natural environment. The abovementioned institutional texts are briefly presented below:

3.1.1. National Energy and Climate Plan (NECP)

1. The National Energy and Climate Plan (NECP) [21] was ratified by Decision No. 4/23.12.2019 of the Government Council for Economic Policy (Government Gazette B' 4893).

2. The NECP is a Strategic Plan for Climate and Energy and presents a detailed roadmap for achieving specific Energy and Climate Targets by 2030 [22]. These targets, among others, relate to the following:

a. The reduction of GHG emissions to a rate of more than 42% compared to 1990 emissions and more than 55% compared to 2005 emissions.

b. The participation of RES in at least 35% of gross final energy consumption.

c. Improving Energy Efficiency to achieve a lower final energy consumption in 2030 than in 2017.

d. In addition, a flagship target is set for the complete withdrawal of lignite from the domestic electricity generation system by 2028.

3. The NECP presents and analyses Policy Priorities and Measures in various development and economic activities to benefit Hellenic society, making it a reference document for the next decade.

3.1.2. National Climate Law

1. Law no. 4936/2022 (Α΄ 105) «National Climate Law – Transition to climate neutrality and adaptation to CC « aims to create a coherent framework for improving the country's adaptive capacity and climate resilience and ensuring the country's gradual transition to climate neutrality by 2050, in the most environmentally sustainable, socially equitable and cost-effective way.

2. In order to achieve this long-term climate neutrality objective, interim climate targets for the years 2030 and 2040 are set at a reduction of net anthropogenic GHG emissions by at least fifty-five percent (55%) and eighty percent (80%), respectively, compared to 1990 levels, taking into account the projections of the NECP.

3. Law no. 4936/2022 establishes measures and policies for the country's adaptation to CC and ensuring the decarbonization pathway up to 2050 [23]. In particular, the following are established:

a. Measures and policies to enhance adaptation to CC at the lowest possible cost.

b. Interim anthropogenic emission mitigation targets for the years 2030 and 2040.

c. Indicators to monitor progress towards the achievement of the relevant objectives.

d. Procedures for evaluating and adjusting targets and taking additional measures.

e. Measures to mitigate emissions from the power generation, building, transport and business sectors.

4. It also foresees the creation of a carbon budgeting mechanism for critical sectors of the economy and the governance and participation system for climate action.

3.2. European Union – Roadmap on Climate Change and Defence

1. The European «Green Deal» [2][3], presented by the European Commission in 2019, recognizes global climate and environmental challenges as significant risk multipliers and sources of instability. The transition to a new «ecological reality» is expected to reshape geopolitical realities, with direct consequences in the areas of global economy and trade and international Security. These challenges could trigger conflict, food crises, population movements and forced migration.

2. Obviously, the defence sector will not be unaffected. Therefore, it has become necessary to draw up a Climate Change and Defence Roadmap [24], focusing on actions and measures to adapt the European Armed Forces to the new realities of CC.

3. The EU's "Climate Change and Defence Roadmap" focuses on three areas for action:

a. **Operational Dimension:** The EU CSDP missions and operations will increasingly have to operate in an environment affected or influenced by climate change. This requires an increased awareness of the current situation but also an understanding of the impact on European defence and security priorities, including over the long term.

b. **Capacity building:** CC is not just a conflict and security risk multiplier. It introduces new operational challenges, including the need to provide missions and operations with equipment that is effective under extreme weather conditions and technology that is more energy efficient.

c. **Strengthening Multilateralism and Partnership:** Effectively responding to the impact of CC and environmental factors on Security and Defence, requires a truly global approach. There is a clear need and global demand for the EU and its Member States to continuously show leadership in international climate and environment policy and actions in various formats, notably in the UN. This is also an objective under the European Green Deal and hence requires a joint-up and coherent approach among EU actors in multilateral fora. Opportunities for closer cooperation within the context of Security and Defence with international organizations and multilateral partnerships, such as UN, NATO, OSCE and the AU, as well as bilaterally with partner countries - including in the multilateral context - need to be explored.

4. The actions/actions per field are divided according to their implementation time into:

a. Immediate/Short-term (2020 – 2021).

b. Medium-term (2022 – 2024).

c. Long-term (2025 and beyond).

5. A mid-term review of the Climate Change and Defence Roadmap is foreseen until 2025, followed by a general review of the overall objectives until 2030.

3.3. NATO – Climate Change and Security Action Plan

1. NATO has recognized CC as one of the defining challenges of our time. It is a threat multiplier that affects NATO's Security, operations, and missions and makes it more challenging to carry out its mission. It is also shaping the geopolitical environment, leading to instability and geostrategic competition, creating conditions that may threaten the Security of the Alliance.

2. The Alliance has emphasized related issues, including Climate Change, in the areas of interest of the NATO 2030 process [30], seeking to adapt to emerging security threats. In addition, the Climate Change factor is also considered in NATO's new Strategic Concept, adopted in June 2022 [31].

3. NATO's Climate Change and Security Agenda (Mar 21) provides a holistic approach to the issue and includes measures to raise awareness of the security implications of climate change, straightforward Adaptation and Mitigation measures and enhanced outreach while ensuring its deterrence and operational effectiveness.

4. The NATO's Climate Change and Security Action Plan (Jun 21) [12] sets the framework for implementing the NATO mentioned above Agenda in the short, medium, and long term to guarantee the Security of the Alliance. In addition, the Action Plan includes specific objectives, as set out below:

a. Increasing Allied Awareness: NATO will conduct an annual Climate Change and Security Impact Assessment, which will analyse the impact of CC on NATO's strategic environment and its assets, facilities, missions and operations.

b. Adaptation to Climate Change: Based on the abovementioned assessments, NATO integrates climate change considerations into its work on resilience, political preparedness, defence planning, capability development, assets and facilities, procurement, standards, innovation, training, exercises, and disaster response. It also assesses how CC may affect its deterrent capability, defence readiness, and operational effectiveness.

c. Contributing to Climate Change Mitigation: NATO is developing an analytical methodology to record GHG emissions from military activities and installations, which is intended to contribute to the formulation of voluntary targets for the reduction of GHG emissions. In addition, energy needs and consumption data could be used in investment decisions and operational planning to help define the role of innovative, energy-efficient, and sustainable technologies.

d. Strengthening of Extroversion: NATO strengthens cooperation with partner countries, as well as with international and regional organizations active on climate change and security issues (EU, UN, etc.). It will strengthen dialogue with society, academia, and industry on related issues to support its work and contribute to the global effort to address climate change.

5. In June 2022, in line with the Action Plan timetable, NATO issued the first "Climate Change & Security Impact Assessment" [17]. The assessment, among others, includes:

a. Determining the impact of CC on the military infrastructure and operational readiness of the Alliance. The impacts are shown schematically in the figure below:

Image from 2: The impact of Climate Change on the functioning of NATO [[17(p.10)]

b. The definition of the Allies' actions against the impacts of CC, adapted along two axes:

(1) Mitigation: refers to actions to reduce carbon emissions from military activities.

(2) Adaptation: refers to actions to address the impacts of CC on military activities.

These actions are shown schematically in the figure below:

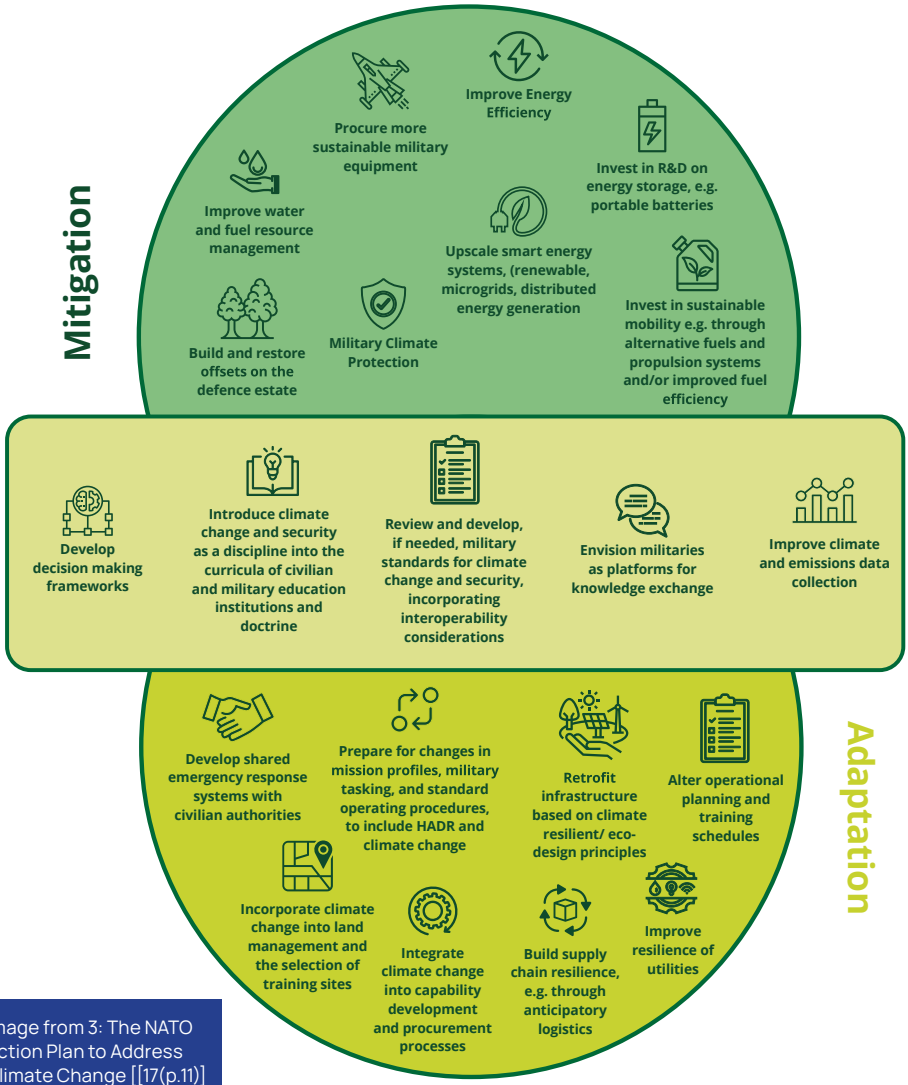


Image from 3: The NATO Action Plan to Address Climate Change [[17(p.11)]

II.

THE WAY TO RESILIENCE

4 THE HOLISTIC METHODOLOGICAL APPROACH

1. The HMoD, bearing in mind that natural and cultural heritage is considered indivisible, encourages its branches and services to take all the necessary measures to strengthen climate resilience, contributing to the national effort and ensuring the smooth transition of the country to climate neutrality.

2. To this end, the HMoD shall establish guidelines for implementing specific actions included in this Roadmap.

3. These actions:

a. Strengthen resilience in the areas of interest of the Environmental – Energy and Climate Change Adaptation Policy (EECCAP), which are listed graphically in Figure 4 below.

Image from 4: The areas of interest of the HMoD affected by Climate Change (EECCAP, 2020)

b. Contribute to the achievement of the UN (SDG) [25], which are relevant to the responsibilities and role of the HMoD.

4. The procedure aligns with the terms of international agreements and National and European climate targets.

4.1. Principles for the Development of a Methodological Framework

1. The methodological framework for the preparation of this Roadmap is based on the principles and procedures of operational design.

2. For this reason they are determined in advance:

   a. The Vision.

   b. The Strategic Assumptions.

   c. The Design Principles.

   d. The Final Desired State.

   e. The Objectives.

4.1.1. Vision

1. The vision for strengthening resilience to the challenges of CC is summarised along the following lines:

The HMoD to be fully capable of fulfilling its mission and activities, minimising the negative impacts they may have on the environment, people and the economy, maintaining a high level of flexibility, capacity, and effectiveness under any climate conditions, while actively contributing to national requirements to address climate change.

4.1.2. Strategic Assumptions

1. The State recognizes that the global climate is changing and the attitude of the HMoD regarding CC is integrated into the Hellenic Government Policy.

2. This Roadmap is aligned with the measures and policies of the National Climate Law, which incorporates the EU guidelines for achieving climate neutrality by 2050 (European Green Deal).

4.1.3. Principles of Design

1. The planning principles taken into account in the preparation of this Roadmap and in the design of the actions are the following:

a. «Energy Efficiency First" Principle

(1) Maximum consideration, in the context of energy planning, policy, and investment decisions, of alternative and cost-effective energy efficiency measures to increase efficiency in energy demand and supply [26].

(2) Energy efficiency should therefore be recognized as a critical element and priority for future decisions on investments in the Union's energy infrastructure.

b. "Do No Significant Harm" Principle

(1) No measure included in a recovery and resilience plan should cause significant pollution as identified for the following environmental objectives [27]:

(a) Mitigating climate change

1/ If an activity leads to significant greenhouse gas emissions.

(b) Adaptation to climate change

1/ If an activity leads to an increased negative impact of actual and expected climate conditions on the activity itself, people, natural resources, or assets.

(c) Sustainable use and protection of water and marine resources

1/ If an activity harms the excellent status or ecological potential of water bodies, including surface water and groundwater, or the good environmental status of water and marine resources.

(d) Circular economy, including waste prevention and recycling

1/ If an activity leads to significant inefficiencies in the use of materials or the direct or indirect use of natural resources, or if it significantly increases the generation, incineration, or disposal of waste, or if the long-term disposal of waste is likely to cause significant and long-term damage to the environment.

(e) Pollution prevention and control

1/ If an activity significantly increases emissions of pollutants to air, water, or land.

(f) Protection and restoration of biodiversity and ecosystems

1/ If an activity is significantly detrimental to ecosystems' good status and resilience or the conservation status of habitats and species, including those of EU interest.

4.1.4. Final Desired State

The HMoD to be fully capable of responding to changing climate conditions by enhancing sustainable performance - on land, sea and air , reducing climate vulnerability and the amount of emissions released, ensuring its mission and actively contributing to national and international requirements related to Climate Change. It should be recognised as a valuable partner in inter-ministerial and international activities in addressing the challenges of Climate Change.

4.1.5. Objectives

Objective 1

The integration at all decision-making stages (Strategic, Operational and Tactical levels) of enhancing resilience, improving adaptive capacity, reducing emissions, increasing removals of GHG and reducing vulnerability to CC.

Objective 2

Strengthening the capacity of the MoD to operate effectively, efficiently and environmentally responsibly in all expected climatic conditions.

Objective 3

Protecting biodiversity and the natural and cultural environment by maintaining a consistent and environmentally responsible attitude and respecting values will inspire the adoption of healthy behaviour patterns.

Objective 4

Strengthening two-way cooperation, information exchange and implementation of joint actions with other governmental institutions, the EU and NATO, the academic community and stakeholders, scientific bodies and institutions, NGOs and environmental protection bodies, to improve the effectiveness and reduce the costs of adaptation in the transition to a climate-neutral and climate-resilient society.

4.2. The Pillars

1. The climate neutrality is achieved through the implementation of actions that fall under two main pillars:

   a. Adaptation: Includes measures that address the impacts of climate change.

   b. Mitigation: includes measures to reduce GHG gas emissions.

2. The pillars that contribute to strengthening resilience are graphically illustrated in the following figure:

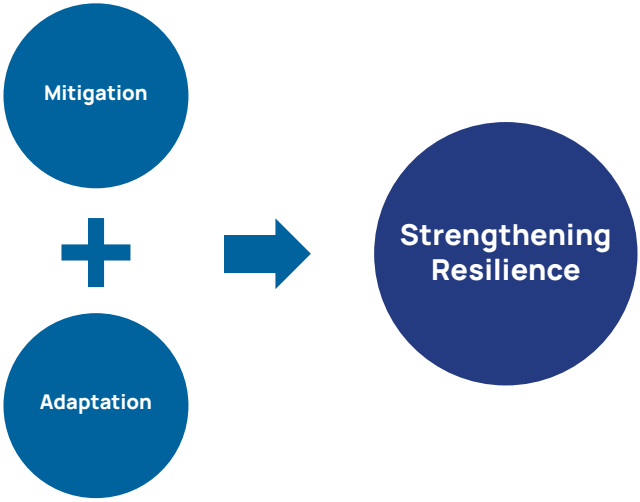


Image from 5: The pillars that contribute to strengthening resilience

4.2.1. Adaptation to Climate Change

1. Adaptation to climate change means adapting natural and man-made systems to current or expected climate events or their impacts, which mitigates damage or takes advantage of opportunities. [23]

2. This pillar aims to reduce vulnerability, which is the tendency or predisposition of a system or sector to be adversely affected by CC.

3. To adapt to CC, measures, and actions are being implemented, including:

   a. Enhancing resilience and reducing vulnerability

   b. The creation of green infrastructure.

   c. The protection of the natural environment and biodiversity.

   d. Sustainable development planning, considering social, economic, and environmental strategies.

   e. The protection of vulnerable ecosystems, including the coast and small islands.

4.2.2. Climate Change Mitigation

1. Mitigating climate change means anthropogenic intervention to reduce emissions of anthropogenic greenhouse gases into the atmosphere from sources or increase their absorption by sinks. [23]

2. In this sense, a source is any process, activity, or mechanism that releases a greenhouse gas, aerosol, or greenhouse gas precursor into the atmosphere. By contrast, it is a sink when it absorbs these substances from the atmosphere.

3. In order to achieve the goal of zero greenhouse gas emissions (climate neutrality), measures and actions are implemented, including:

   a. Energy saving;

   b. Increasing energy efficiency;

   c. The installation of RES;

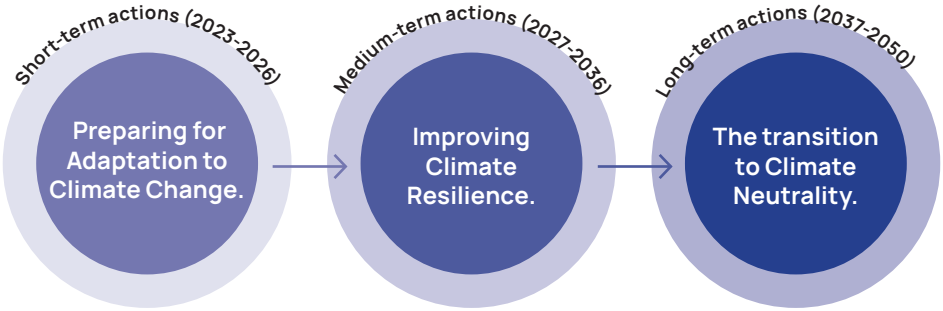
   d. The gradual elimination of fossil fuels;

   e. Improving the carbon footprint of buildings and infrastructure;

   f. The reduction of GHG emissions from waste management and the promotion of the circular economy.

4.3. Time horizon for the implementation of the actions

1. The programming of the actions of the two pillars in question follows the following structure in terms of the time horizon for their implementation:



4.4. Areas of Interest

1. The areas of interest of the planned actions should overlap the areas of operation/capacities of the HMoD affected by CC, as pointed out in section 2.3.

2. Therefore, the areas of interest of the actions to be implemented are defined, as follow:

a. Operations.

b. Security.

c. Support, which is divided into subsectors:

(1) Infrastructure;

(2) Transportation;

(3) Logistics/Procurement/Energy;

(4) Waste Management;

(5) Personnel Care/Health.

d. Training/Partnerships.

III. THE ACTIONS

5 DEFINITION OF THE ACTIONS

1. The following Tables set out the actions to be undertaken by the entire command structures of the AF, classified under the two pillars - Adaptation and Mitigation - and the three-time axes - short, medium and long term.

2. All the actions are immediately put into mandatory implementation, except for the actions included in the category « Logistics/Procurement/ Energy» of the area of interest «Support». The mandatory implementation of those actions will be examined on a case-by-case basis taking into account the requirements of the State and the current energy crisis.

3. Competent bodies of the administrative structure of the AF will supervise the implementation of the actions.

The actions - Adaptation

	Short-term	
Operations		
Climate Change Impact Assessment & Risk Analysis for AF Operations	Recording and collecting data from the effects of CC on current AF operations in a common database	
	Assessment - risk analysis of CC impacts in the wider Mediterranean basin with the aim of incorporating the conclusions in future operations/ trainings	
Integration of Environmental Parameters during the Planning/Execution of Operations/Trainings	Integration of environmental conditions and climatic parameters in scenarios (demos) of military exercises	
	Analysis of potential environmental impacts and integration of the results of proposed alternative actions into the decision-making process at the operational level	
Review of Procedures, Activities & Institutional Texts	Adoption of broad strategies, so as to achieve the environmental goals but at the same time reduce the costs	
Collect Information on the Response of Friendly/Hostile AF against CC	Collect information on the implementation of CC Adaptation Strategies of neighbouring countries	
Strengthening Operations Resilience against Hybrid Threats	Using Information and Communication Technologies (I&CT) to enhance cybersecurity	

	Medium-term	Long-term
	Continuous assessment and updating of climate crisis impact data on current operations and their risk analysis	
	Recording of new risks during operations by the appearance of new foreign species of flora and fauna due to migration	
	Update military maps with vulnerable areas due to CC	
	Update of the positions of the Campaign Units based in vulnerable areas due to CC	
	Elaboration of scenarios that may arise in neighboring countries due to CC and will affect the positions of the Hel AF	
	Update of the National Alarm System/Plan Actions based on the conclusions of a climate crisis impact risk analysis	
	Continuous review and update of the "Environmental - Energy and Climate Change Adaptation Policy (EECCAP)" of the HMoD	
	Holistic assessment of the impact of the CC on neighbouring countries (potentially posing a threat)	
	Analysis of comparative advantage over neighbouring countries based on results of CC Impact Assessment and implementation of adaptation measures	
	Organization of joint exercises along with other allies to address new CC threats (migration - energy/food crisis - etc.)	

	Short-term	
Protection of Sites of major Cultural & Environmental Interest	Mapping of cultural heritage monuments and Natura2000 protected areas on military maps - manuals	
Security		
Ensuring Physical Security of Camps	Increased preparedness and surveillance measures maintain security against the impacts of CC, e.g. natural disasters, climate migration	
	Training of personnel for facing natural disasters within camps	
	Inventory of required materials and personal equipment - modernization of surveillance and guarding means in and around camps in case of natural disasters/sabotage/interference with networks	
Contributing the Civil Protection	Improvement/Adaptation of the "XENOCRATES/ HNDGS" plan to the impacts of CC	

	Medium-term	Long-term
	Risk assessment - risk analysis of CC impacts on the physical security of camps (flooding, drought, landslides, fire, sea level rise, strong winds)	Construction of soil retention structures to prevent landslide phenomena (slopes, retaining walls, retaining grids, etc.)
	Use of the conclusions of the risk analysis to enhance the resilience of camps (tree planting, etc.)	Construction of erosion and flood protection works to protect against sea level rise
	Update of the National Alarm System/Plan Actions to enhance physical security of camps	
	Briefing of staff about dangerous alien species of flora and fauna during surveillance and guarding of camps	
	Examination of the possibility of cultivating unused areas within the camps (aiming at the cleanliness of the area and the improvement of the microclimate)	

	Short-term	
Support		
a. Infrastructure		
Infrastructure Vulnerability Assessment	Risk assessment - risk analysis of CC impacts on military installations/infrastructure, utility networks, etc., developing a common methodology (sea level rise, drought, flooding, megafires)	
Strengthening the Resilience of Existing Infrastructure	Creation of a database to record maintenance requirements due to ageing/ digitalization of building records/ updating the role of the ad-hoc maintenance manager (infrastructure - facilities, utility networks, aviation fuel pipeline, structured cabling, health services)	
	Checking the adequacy and assessing the operational status of the existing camp protection infrastructure and the operational readiness of the Units (drainage works, fencing, fire-fighting network, road network, lightning protection, R/Ws - T/Ws, parking floors, shelters, water-fluid-fuel supply, air conditioning units of operation centres, anchorages, health services, computer centres and internal computer network)	
	Use of information and communication technologies to enhance communication and data transmission networks	

	Medium-term	Long-term
	Mapping of vulnerable infrastructure/areas due to CC - assessment and mapping of vulnerability (military installations near the seashore, rainwater accumulation)	Consideration of the need to relocate coastal camps and AF' activities to new locations that will not threatened by sea level rise, as well as by intense natural phenomena caused by CC
	Maintenance of main and back-up equipment supporting infrastructure/facilities/utilities (cooling/heating systems, aviation fuel handling/storage system, water supply, electricity supply, fibre optics, structured cabling, back-up energy sources)	Construction of new or maintenance/reconstruction of existing infrastructure to adapt to CC (slopes, retaining walls/grids, water storage tanks for use during prolonged periods of drought, anti-flooding/anti-erosion/soil works to protect camps against sea level rise, lengthening of R/Ws of military A/P, reinforcement of foundations of buildings stressed by subsidence, giving priority to critical operational facilities)
	Preparation of studies for the modernization of existing infrastructure, taking into account the effects of CC (HVAC equipment, air conditioning units, heating and cooling systems)	Carry out works to strengthen the foundations of buildings under stress from subsidence, giving priority to critical operational facilities
	Utilization of the conclusions of risk analysis in the studies to enhance the self-sufficiency - reserve of existing infrastructure - utility networks (water reservoirs, power supply, sub-stations, drainage)	Execution of works to lengthen the R/Ws of the military A/Ps
	Checking the strength of the ground bearing of installations every 5 years	

	Short-term	
New Building Infrastructure	Preparation of a manual with model specifications for the construction of infrastructure/ facilities against CC (utilization of EU technical guidelines on strengthening the resilience of infrastructure to CC in the period 2021-2027, design of infrastructure/facilities with bioclimatic principles, use of construction materials of new technology & higher durability, wastewater management)	
	The incorporation of technologically advanced and innovative solutions in all new constructions of the AF, using RES and bioclimatic design as well as parallel exploration of the use of these principles in applications suitable for campaign conditions	
Protection of Cultural Heritage Monuments	Mapping the monuments owned by the HMoD and create manuals for the protection of cultural heritage monuments in areas where operational activities of the AF are deployed	
b. Transportation		
Driving Safety	Checking, marking and mapping of damages within the road network owned by the AF	
	Limitation of external service routes to the absolutely necessary and with the minimum possible risk (e.g. checking weather reports, alternative routes, etc.) during high intensity weather events (storms, snowfalls)	
Enhancing Vehicle Fleet	Recording of damage to ground transport equipment (mechanical parts, installation of more efficient heating and cooling systems, tyres, lubricants)	
	Progressive maintenance of damage to ground transport equipment (mechanical parts, installation of more efficient heating and cooling systems, tyres, lubricants)	

	Medium-term	Long-term
	Establishment of standard specifications for the construction of infrastructure/facilities/ amenities against CC (design with bioclimatic principles, use of new and more durable construction materials, wastewater management)	Creation of spatial planning and mapping the installations of the AF on a digital basis ("green cadastre"), while identifying the environmental footprint characteristics in the framework of the USARMY "zerofootprint"
	Use of the conclusions of risk analysis for the construction of new reinforcing infrastructure to protect against the impacts of CC or the maintenance of existing ones (flood protection works, raising of embankments against sea level rise, repair of corridor floor joints, checking of building joints)	Construction of new or maintenance/reconstruction of existing infrastructure to adapt to CC (slopes, retaining walls/grids, water storage tanks for use during prolonged periods of drought, anti-flooding/anti-erosion/ soil works to protect camps against sea level rise, lengthening of R/Ws of military A/P, reinforcement of foundations of buildings stressed by subsidence, giving priority to critical operational facilities)
		Restoration of historical buildings - Maintenance of monuments owned by the HMoD and handing them over for use to Units/Services of the AF (e.g. lighthouses)
	Progressive maintenance and restoration of damages to the road network owned by the AF	Creating new roads within the camps, bypassing points of "increased" danger for pedestrians, drivers and passengers
	Organization on an annual basis of schools - seminars to train staff (primarily specialised drivers) in safe driving (eco-driving behaviour, first stage of user maintenance)	Investigation of traffic flow and traffic redesign (evacuation plans - emergency plans, alternative routes)
	Safeguarding ground assets from exposure to the weather (sheds, flood defences, fire-fighting system)	
	Study on the possibility of replacing the old fleet of vehicles with new ones through leasing (small cars)	

	Short-term	
c. Logistics/Procurement/Energy		
Risk Assessment & Deficiency Recording	Recording of deficiencies in materials/parts of the AF described in the "XENOCRATES/HNDGS" plan	
	Risk assessment - risk analysis of CC impacts on the availability of drinking water/ energy/ raw materials/ supply/ procurement (water shortages, fuel supply, electricity shortages)	
Strengthening the Supply Chain	Anticipating legal issues in the area of procurement and supply chain due to delayed deliveries from CC impacts, defining precisely the concept of "Force Majeure"/ Defining a common strategy to address the issue in a harmonized manner for the three (3) branches of the AF and their supply activities	
	Taking additional measures to secure temporary storage areas for usable materials and maintaining safety conditions, taking into account data from the risk assessment - risk analysis	
"Sustainable" Water Supply	Recording of water consumption per Unit on an annual basis	
	Inventory of available water supply sources for each Unit	
Protection of Critical Energy Infrastructure	Control - maintenance of the internal electricity distribution network in cooperation with local HEDNO	
	Checking the proper functioning and readiness to use alternative energy sources (e.g. generators) in case of a generalized black out due to increased electricity demand	

	Medium-term	Long-term
	Creation of additional storage space for usable materials due to delays in deliveries	
	Investigation of the possibility of using 3D printing of consumables - spare parts	
	Development of a Supply Chain Risk Management Plan due to CC	
	Integration of CC elements into defence planning processes, equipment delivery & innovation (definition of resilience indicators against the new climate reality)	
	Ensuring water sufficiency from backup sources (e.g. water tanks, bottled water packages)	Installation of water storage tanks for use in prolonged periods of drought
	Study and pilot implementation of an electrical standby installation (i.e. batteries) supported by energy coming from RES	

	Short-term	
d. Waste Management		
Waste	Risk assessment - risk analysis of CC impacts on waste management (hazardous situations from severe weather events, management mode)	
	Preparation of personnel action memoranda for the proper management of waste (taking health & safety measures for personnel based on manufacturer's safety data sheets, hazardous waste spill response actions, safe temporary storage of waste until final disposal in a licensed company, etc.)	
e. Personnel Care/Health		
Health Insurance	Ensuring comfortable working conditions in all enclosed areas by installing cooling/heating systems, ionizers, etc.	
	Establishment of a more regular compulsory preventive medical examination of the personnel of the AF	

	Medium-term	Long-term
	Construction of appropriate temporary waste storage facilities to eliminate risks to public health	Construction of new sites (aboveground, underground or backfilled) for storage/deposition of hazardous substances/materials (whose behaviour may be affected by CC) in order to ensure the safety of AF personnel and adjacent settlements
	Taking additional measures to secure temporary waste storage sites and maintain safety conditions taking into account data from the risk assessment - risk analysis (use of information technology)	
	Hazard prevention and risk management plan for hazardous waste accidents in camps	
	Investigate the possibility of replacing clothing for AF personnel with other items of breathable material	Research on staff health response to exposure to extreme events
	Gradual removal of asbestos from all facilities	

The actions - Adaptation

	Short-term	
Training/Partnerships		
Partnerships	Collaboration with the FS and other bodies to take measures to prevent forest fires	
	Participation of camps described in the "XENOCRATES/HNDGS" plan in exercises co-organized by the Civil Protection & Fire Service	
	Cooperation with local authorities for timely planning of utility networks' maintenance (road/ water/ sewerage network, connection to biological treatment,etc.)	
	Development of a common platform within AF for sharing and exploiting data from energy management pilot projects, use of RES within camps, replacement of hazardous substances with safer ones, environmental clean-up initiatives	
Research/Innovation	Cooperation with scientific institutions to update data on the impacts of CC in the wider Mediterranean Basin region (promoting training, research and innovation)	
	Gaining access to reliable data and risk assessment tools (Climate-ADAPT) and training staff in their use for operational purposes	
Funding	The maximum use of existing-available financial instruments from national resources or co-funded programmes to promote environmental-energy projects and accelerate the maturity of proposals	

	Medium-term	Long-term
	Cooperation of the Units with their respective Municipalities, Folklore Associations and the Ministry of Culture for the co-organization of cultural events	
	NATO-level cooperation on the adoption of good practices, strategies & policies for climate resilience	
	Cooperation with relevant Ministries for the modernization and adaptation of the General Civil Protection Plan "XENOCRATES"	
	Collaboration with relevant Ministries in order to expand the planning related to Civil Defence, to address the impacts of CC, both in peace- and wartime	Cooperation with relevant Ministries with a view to the participation of the Pallice Defence Forces in addressing the impacts of CC, both in peace- and wartime
	Leveraging research, scientific programmes and communities to support research on the impact of CC on security	
	Investment in applied environmental informatics research (alert networks, digitisation, artificial intelligence for CC, biodiversity conservation, water quality and safety)	
	Adoption - integration of public-private partnership in the construction sector	

The actions - Mitigation

	Short-term	
Operations		
"Green" Operations	Commitment to reduce GHG emissions from military activities without hampering operational work	
	Environmental impact assessment of the operation of firing ranges on the ecosystem and biodiversity of the area	
	Taking measures to avoid natural disasters during operations (e.g. forest fires)	
Security		
Contribution to Security	Enhancement of surveillance - security of camps and the wider area by low-pollutant surveillance - alerting means (use of drones, motion detectors, fencing with low current load)	

	Medium-term	Long-term
	Adoption of additional protection measures in case of military exercises placing next to protected areas of the NATURA 2000 network	Adoption of compensatory protection measures in the case of military exercises taking place in the vicinity of protected areas/cultural heritage sites
	Establishment of procedures during the planning and execution of national/allied operations/exercises on not causing "serious" damage to the natural environment, as well as to cultural heritage monuments	Turning military firing ranges into "islands of biodiversity"
	Biodiversity conservation/use of endemic flora for strengthening the passive defence of camps	

	Short-term	
Support		
a. Infrastructure		
Energy Upgrade	Publication of a roadmap for the energy upgrade of the building stock of the HMoD	
	Promotion of the institution of in-house energy inspectors and certificate them for the energy classification of the AF building stock	
	Compliance with existing and current legislation on energy saving in the public sector (short-term measures)	
	Evaluation of data - evidence from participation in energy management pilot projects	
	Pilot implementation of the financial instrument of Energy Performance Contracts (EPCs) in building infrastructures of the AF	
Reduction of Carbon Footprint	Promoting the institution of Energy Managers	
Water supply network	Recording of water supply network damages	

	Medium-term	Long-term
	Completion of the energy classification of the building potential of the AF by 2030	Partial/Total upgrade of the HMoD's building capacity by 2050
	Mandatory implementation of an Energy Management System (EMS) in all the camps/ units of the AF	Energy study of existing infrastructure and calculation of energy consumption by an appropriate body. Inventory and costing of energy interventions that can be implemented. Calculation of the best possible efficiency for energy savings
	Completion of the replacement of lighting with low consumption luminaires of equivalent efficiency (LED type)	
	Reduction of reactive power of electrical consumptions with appropriate compensation equipment to increase their power factor (cosφ) to a level above 0.95	
	The extension of the creation of Sustainable Development Models, entitled "Green Camps" to as many Camps as possible in the territory	
	Examine the possibility of installing automation to reduce water wastage (e.g. faster detection of pipeline leaks)	
	Examine the possibility of harvesting or reusing rainwater after treatment for non-drinking activities (vehicle washing, WC, etc.)	

The actions - Mitigation

	Short-term	
b. Transportation		
Electromobility	Study and preparation of a roadmap for the gradual transition to electromobility	
	Study on the location of electric vehicle chargers to accommodate the volume of the fleet and the service routes of AF' vehicles (by 2023)	
	Explore available financial instruments for the supply of electric chargers and electric vehicles	
Promoting Alternative Modes of Transport	Promoting walking/cycling/ public transport (incentives)	
	Promoting car-pooling (incentives)	
c. Logistics/Procurement/Energy		
Energy Consumption	Recording the carbon footprint of all AF' activities on an annual basis	
	Intensify efforts to reduce energy consumption in all semi-operational and non-operational activities of the AF	
	Gradual replacement of energy-intensive devices with new ones	
Fuels	Compilation of a roadmap for the gradual replacement of heating oil burners From 1-1-2025 the sale and installation of heating oil burners is prohibited (Climate Law 2022)	

	Medium-term	Long-term
	Gradual replacement of the fleet of small cars with electric vehicles From 1-1-2030 new passenger and light commercial vehicles registered are only zero-emission vehicles (Climate Law 2022)	
	Supply and installation of vehicle chargers	
	Design and pilot implementation of a car-pooling app	
	Reduce net anthropogenic GHG emissions by at least fifty-five percent (55%) by 2030 compared to 1990 levels (Climate Law 2022)	Reduce net anthropogenic GHG emissions by at least eighty percent (80%) by 2040 compared to 1990 levels (Climate Law 2022)
	Revision of the limits for fuel consumption and fuel efficiency	
	Exploring the possibility of using a new type of aviation fuel	

	Short-term	
RES	Exploring the possibility of installing RES for self-consumption or Net-Metering	
Supply	Procurement orientation based on the Life Cycle Analysis (LCA) circular economy, where feasible	
	Harmonisation with Law no. 4936/22 on the procurement of vehicles	
	Informing suppliers on the requirements for the specification of materials - substances supporting ground and volatile media and supply chain with REACH regulation (delivery of a safety data sheet, labelling of substances of high risk to health, safety of workers and the environment to request an exemption for national defence purposes from REACH regulation)	

	Medium-term	Long-term
	Gradual utilization of RES, with priority to the installation of PV on roofs and free surfaces of the camps	
	Legislative initiatives for the inclusion of AF in Law 4513/2018 [Government Gazette 9A/23-1-2018 (Energy Communities)], with the aim of the participation of AF services locating on islands in Energy Communities for the development of RES	
	Cooperation with local authorities or electricity providers for the development of RES within the areas owned by AF	
	Promoting Green Public Procurement under existing legislation	
	Updating the specifications of environmentally friendly materials/services (energy efficiency of appliances, PCs, fuel consumption and efficiency limits)	

	Short-term	
d. Waste Management		
Waste Production Restriction	Awareness-raising of personnel on the importance of proper waste management in the climate neutrality of the AF (conducting seminars on proper waste management prevention, recycling, disposal, circular economy)	
	Recording, where feasible, the quantities and types of waste produced in the AF (recyclable, hazardous, radioactive, with a return on investment)	
Waste Management	Participation in waste management programmes (local authorities, recycling of appliances, packaging)	
	Investigate the possibility of inclusing camps in an organic waste collection programme (biowaste) in cooperation with the local authorities Mandatory separate collection by 31 December 2022 at the discretion of the local authorities concerned, if they have a similar programme in place (ESDA - ESDEA 2020)	
	Investigation of the participation of camps in a four (4) streams collection program (plastic, paper, metal, glass) in cooperation with loval authoritites Target Packaging Waste Recycling 65% w/w by 2025 (ESDA - ESDEA 2020)	
	Introduction of new processes that do not require the use of hazardous materials	
Biological Water Treatment	Investigation of the connection of camps to the inter-municipal biological water treatment network	
	Checking the operation and maintenance the existing biological treatment plants	

	Medium-term	Long-term
	Reducing waste generation through prevention, source reduction, source separation, preparation for reuse and recycling	
	Study - investigation for AF compliance with legislation on the phasing out of hazardous materials and their replacement with safer ones (decommissioning of HALONS, REACH hazardous substances)	
	Investigation of the participation of camps in a four (4) streams collection program (plastic, paper, metal, glass) in cooperation with loval authoritites Target Packaging Waste Recycling 70% w/w by 2030 (ESDA - ESDEA 2020)	
	Search literature/technical guidance on the behaviour of hazardous substances/materials in extreme environmental conditions	
	Connection of camps to the inter-municipal biological water treatment network or building autonomous one	

	Short-term	
e. Personnel Care/Health		
Low Carbon Footprint Staff	Establishment of specifications for the possibility of holidaying within military resorts (obligation to recycle, no need to travel by car within the installations, etc.)	
	Redesign regular staff transport routes to serve as many staff as possible	
	Exploring the possibility of introducing teleworking in specific disciplines and piloting it	
Training/Partnerships		
Environmental Education	Maintain cooperation with EKDAA/INEP for the conduct of environmental seminars to raise the awareness of AF personnel on environmental issues	
	Developing synergies with educational/research institutions to promote training, research and innovation	
	Conducting seminars of environmental content in caxps with emphasis on Military Schools and Recruit Training Centres	
Synergies	Strengthening the participation of AF personnel in international forums (EDA, NATO) related to sustainable energy and "green" AF	
	Cooperation with local bodies for voluntary contribution of AF personnel (tree planting, beach cleaning)	
Research/Innovation	Exploiting existing and future research on alternative fuels, RES, energy storage	
	Develop a framework for cooperation aiming to the provision of unclassified information by the HMoD to scientific institutions for research purposes	

	Medium-term	Long-term
	Obligation of proper energy management and limitation of heating fuel consumption by those living in accommodation for AF personnel	
	Incentivise staff to save energy in private activities	
	Cooperation at NATO level for the adoption of good practices, strategies, climate neutrality policies	
	Working with industry on (i) issues related to potential areas of investment to address CC, (ii) encouraging a "green" approach to procurement , and (iii) understanding challenges and opportunities that CC will create on an industrial basis	

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