ED-PT WG 4 - "Dynamics of Conflict associated with the Global Technological Society and Climate Change"

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SECURITY AND DEFENCE IN THE ENERGY AND ENVIRONMENTAL AREA - A STRATEGIC MATRIX -

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INTRODUCTION

The global challenges posed by climate change to our current and future societies and the necessary energy transition that arises, are imperatively reflected in all political, strategic and scientific programs in progress, in particular from the beginning of the 21st century and specifically in Europe. The EU aims to achieve global leadership in the field of new environmental policies, with deep decarbonisation and climate neutrality, with the widespread use of renewable energies, setting very precise goals and objectives for its Member States (EU could become a *standard-setter* for energy transition). The impact of the energy transition model in Europe and in the World over the next few decades will lead to several advances in the fields of technology and science. This new cycle will focus on the fields of digital transformation and Artificial Intelligence (AI), the identification of innovative energy models, new efficient industrial components, communication processes, mapping of electrical networks and data management, and a whole use of resources and skills that can (hopefully) give to the society, people and the planet, a more balanced and sustainable alternative.

Security and Defence as an intrinsic component of modern states, will be conditioned by the evolution of this emerging innovation cycle and by the multiple elements of the society in which it is included. Security and Defence is not a restricted issue in itself, but rather is part of the vast field of technical and scientific components that societies seek to achieve for the future of their economies, within the framework of a broader integrated development. It is therefore with the notion of this complementarity effect that we will approach the triangle, 'Energy, Environment, Security and Defence'. The beginning of a new decade has accelerated this debate, where the aporetic messages predominates, exposed by the unexpected shock that Covid-19 brought to the world, forcing the creation of synergies, calling for resilience and anticipating technical proposals. This reflection allows us to raise two questions that will guide us in the development of this theme:

(i) How and in what way is it possible, in the complex scenario of 21st century European geopolitics, to fully introduce models of energy and environmental development, that address the security and defence component?

(ii) How can we look at an adjusted model (2030), which meets the criteria for energy efficiency, renewable energy and new technologies towards a 'greener and more sustainable defence'?

All of this, from a perspective focused on the future and in the context of means and operational capabilities appropriate to the defence and security missions of our responsibility, and the commitments inherent to the geostrategic scenario in which we operate.

THE ENERGY AND ENVIRONMENTAL AREA (EEA)

Energy resources and energy in general have assumed significant importance over the years in the organization of human life, making it still inseparable from the well-being of society, as well as for its model of organization and the global progress of humanity. Today's energy systems are built with shared resources, more efficient technologies, new scientific capabilities, in a space of complementarity and interdependence. They are determinants in any of the maritime, land, air and cyberspace circulatory axes, all of which are necessary for human beings and the world, in constant activity and development, creating the comprehensive concept of Energy and Environmental Area.

The articulated development of the economy, factors of innovation and environmental support must be carriers of combined strategies adapted to the challenges of the future. The dichotomy that always exists between economic growth and energy consumption is not a deterministic reality. Factors such as market changes, new energy models and efficiency gains in the transport, residential, industry and agriculture components can make all the difference.

The reflexive analysis carried out by renowned authors in the field of energy and by experts of international geopolitical issues and in the field of security and defence, has been focused on two variables, somehow controlled and complex: the ability to obtain energy and the component of energy security. From this debate, the elements of national sovereignty and the strategies directly inherent to states will necessarily be aggregated.[1]

Some sense of realism and evidence has resulted in the last decades by the introduction of a new variable, also of great global impact – the climate; in particular the part resulting from anthropogenic activities. Based on these three elements listed here: energy capabilities, energy security and climate, we will be in a better position to discuss the issue of energy and environmental challenges that the European Union and the States in particular face, and their reflective effects in the area of security and defence. Europe is no longer the 'centre of the world' and will have to find a matrix that is favourable to it in the context of international relations. Taking on the fight against fossil fuels and investing in renewable energies is now the basis of any environmental and energy strategy, making Europe the *standard-setter* of this process of transition to carbon neutrality.

'CLIMATE CHANGE' - THE THREAT MULTIPLIER FACTOR

Global warming factor and climate change have raised the concerns of a large part of the international community. These reactions of a different nature, have in turn, conditioned many of the political decisions of states, international organizations, consequently, increased the political pressure from environmental groups, particularly in Europe. This widespread movement has had direct repercussions in all sectors of Europe's economic, political and social life. As Arlindo Vicente, Distinguished Professor at the *Lisbon Instituto Superior Técnico*, says[2] "(...) of all the impacts, perhaps none deserve as much attention today as the issue of global warming, precisely because it is a problem that knows no borders. One way to achieve and prevent global warming from becoming a dramatic

1 Nicolas Mazzucchi; «Énergie - Ressources, technologies et enjeux de pouvoir». Paris. Aemand Colin.
2 Arlindo Oliveira, «Science, technology and the future of the planet», in Público, December 7, 2018.

problem is to develop revolutionary new technologies that can minimize the overall impact of our lifestyle."
This problem proves to be quite serious to be minimized. The climate crises and their growing evidence through multiple interference in ecosystems, the forecast of large-scale population relocations and uncontrolled migration have forced the various «public condominiums» (especially politicians) and even large multinationals in the energy field to reformulate their medium and long-term objectives and readjust business strategies and financial investments. The perception of the importance of the "climate threat effect" and the fear associated with it is even similar to the nuclear threat that hovered over humanity during much of the Cold War period. The extreme consequences of nuclear danger that pointed to the destruction of humanity ended up instilling in the populations the stigma of permanent fear.
The general warning that states should rapidly change current energy policies and save the world from this growing threat was a message that has been internalized on all continents, although at times with some resistance, doubts or hesitant political and economic positions or even self-protection. The introduction of the climate element in the geopolitics of the energy matrix was quickly understood by politicians and has been assumed as a nuclear factor in the consolidation of their own strategies. It has also been used to accelerate long-term gains in the complex international scenario. It is very pertinent here to include the "distinct element of strategic thinking", as General Loureiro dos Santos defined it, highlighting its dialectical character and its eminently rational essence, as addressing the implications of climate change is also, in fact, a political strategy that is being talked-about.
The introduction of the climate theme necessarily drew unique outlines in the development of cleaner, greener and more sustainable alternative energies. There is no point in thinking about future energy models today, based on existing data from the past!

INTERACTION OF SECURITY AND DEFENCE WITH THE ENERGY AND ENVIRONMENTAL AREA

Challenges and constraints

Security and Defence is a strategic sector with an impact on the land, sea, air and cyberspace domains. It is, therefore, a global model that implies shared planning and programming with other sectors of civil society, and it is with this level of ambition that it must be articulated. Current strategic thinking requires more and more holistic parameters, regardless of the angle of approach used. This synergy and the integrated energy system should result in an energy and climate-orientated plan that covers the field of Security and Defence. In addition, specific contingency and energy security plans should allow for strategic communications networks, support systems, considering the risks of disruption or elimination of a supply chain and energy distribution circuits, to ensure that eventual failures in the energy fuel cycle are restored in time in the face of threats and risks created. Particularly in critical sectors, such as strategic reserves and critical infrastructures.
The continued race of states in the dispute and control of raw materials and energy resources of a strategic nature, new technologies and supply chains, is not a theme of the past. The commercial expansion of liquefied natural gas, geopolitical mapping of pipelines, existing projects for the scale production of green hydrogen, the control of critical and strategic minerals, including rare earths, competition and appropriation of renewable energies and new nuclear and hydrographic modules, are some of the multiple examples that are already very well visible in the current EEA.

The control of the main energy reserves and raw materials is a well-known story of international trade, the involvement of regional powers and international organizations. For decades, many conflicts have been generated in a cycle that still promises to remain, especially in regions of the globe more prone to territorial disputes or areas and straits of priority passage of commercial hydrocarbon flows (choke points). Fossil fuels will also continue to have a predominant expression, at least until the next decade. And the new paths of energy security will certainly be arduous ones.

The use of large maritime spaces for the transport of liquefied natural gas (LNG) has globalized energy commercial circuits, but also the geopolitical dispute. The gas trade is no longer restricted to regional blocs by existing pipeline links and extends to the entire global energy field. The use of the maritime environment, access terminals and logistics ports guarantee diversity and flexibility in the complex trade processes between states, regions and continents. Moreover, terrorist attacks and conflicts located in certain regional areas, extreme actions resulting from climate or geological changes, structural deficiencies and serious upstream or downstream energy accidents, can lead to blockages of unexpected proportions that generally have a devastating effect on populations.

Renewable energies generally do not depend on the security and defence issues. Onshore or offshore wind energy technologies, photovoltaic solar, biomass, renewable gases, green hydrogen and power-to-gas, geothermal and the strong expansion of electrification are among the main alternatives pointed out for the coming years. Probably its use could lead to a scenario with less external dependencies and less logistical and security problems. But energy storage processes are one of the greatest difficulties and still far from optimized solutions in the global decarbonization process.

On the other hand, the so-called wind and solar photovoltaic fields and dispatchable energy storage due to it dispersion and large occupation area hamper their physical security. These fields, especially “wind farms”, sometimes extend across offshore platforms, which will add new difficulties to their security perimeter. So far there has been no cause for special concern, but time and its growing importance will require the study and implementation of actions to be taken to ensure the overall security of these areas, in particular in the productive energy infrastructures of strategic relevance. Besides, energy networks, the increasing complexity of network management and the interconnection of systems, represent a weakness in the face of another novel type of threat: cyberattacks. As the new integrated energy production and distribution systems have a decentralised and integrated mode, their control and control platforms become more vulnerable. Control protocols such as Supervisory Control and Data Acquisition (SCADA) with access permissions to multiple energy centers and production systems, become themselves remunerative targets and very exposed to security breaches, disruptions and continued cyberattacks. In this way, transport, power distribution and their storage technologies, as well as the areas of management and control are elements that can be seen as strategic in the elaboration of integrated security plans, which cover the civil component, but which can and should extend to the state's more general security.

Hydrogen production based on renewable energy could be a success in the coming years. The transport and storage of the hydrogen are determining factors in the commercial and competitive process. Hydrogen, like the natural gas, will be certainly very prone to geopolitical disputes in its production cycle and in the inherent commercial strategies. With science and technology paving the way for the 21st century, the emerging and disruptive technologies that are being developed (see NATO Science & Technology Trends 2020-2040), will enable new concepts in robotics, Artificial Intelligence, hypersonic technology (weapons systems), space, semiconductors, quantum computing technologies and bio & human enhancement. In view of this extraordinary developments that we have seen in recent years and in a more electrified, digitalized and decentralised future energy scenario,

it is natural that the geopolitical dispute and the focus of the major global powers will also rise for the control of emerging and disruptive technologies.

A GREENER AND MORE SUSTAINABLE DEFENCE

Strategic sector with a focus on the future

When we talk about innovative energy systems or even integrated systems, emerging and disruptive technologies, we have a sense albeit partial, of their future implications for the security and defence component and in the military and operational capabilities to be raised within the framework of state-defined priorities. In the same perspective are the technological projects to be developed through the civil industrial complex, with the aim of being applied in the defence area in close correlation with new energy models and in line with environmental safety standards. As is well known, the great innovative energy plans point to basic maturation models with ranges of 10 to 20 years. This scenario also applies to the development of state-of-the-art projects to be used in the field of defence. The Defence Economy can also play a major role here.

Military operational components, however, require a complex logistics process, in line with the military capabilities raised and the equipment to be procured. The parameters to be considered need a large-scale effect, increased capacity, performance and technical complexity. At EU level, this process will generally require a compromise between different Member States and organisations such as NATO.

The introduction of new energies will certainly be more and more visible in the conduct of logistics operations and in the deployment activities of the military forces. It also highlights investment in the construction of military vehicles with 'eco-design and energy efficiency requirements', with a view to energy consumption and its own life cycle. Concerns about so-called 'energy sobriety' and better consumption are considered key points of current government policies. All of this seeking to make energy a clear 'operational advantage' in the field of defence.

The greater European plans and the economic recovery funds (Next Generation EU), after the health pandemic that has plagued Europe, will necessarily represent a considerable financial effort to support European countries. These Recovery and Resilience Plans will have a strong focus on the green and digital economy. That is why the National Energy and Climate Plans for 2030 and all energy transition programs should have an agile and active partner in the security and defence sector and in the defence economy, taking into account the priorities to be anticipated in this critical area of national sovereignty. The World and Europe are currently facing a health pandemic with serious repercussions, but other threats of a different nature will need to be foreseen and taken into account through appropriate and necessary preventive strategies, to be carried out both by states and international organisations directly involved. As the history of countries have always shown, the Security and Defence component has always played a decisive role in combating the countless adversities and threats, in support of the society to which it genuinely belongs

FINAL REMARKS

The risks and threats that loom on the horizon will always be very present. The energy transition itself may contain uncertainty factors in its implementation path in the near future. The area of Security and Defence is a strategic sector that entails a shared planning and programming model; and it is with this level of ambition that it must be articulated. Current strategic thinking requires the use of parameters of holistic nature, whatever the angle of approach, namely in terms of the operational and logistical effectiveness of forces, within the scope of defence economics, or even in the integration/assimilation of adequate energy systems (strategic matrix). It is therefore imperative to strengthen Europe's

technological advantage and support its defence industrial base, thereby creating added value in the internal use of new energy sources and vectors.
The use of European recovery funds for the coming years will allow articulating a concrete space for participation and growth in the Defence Economy sector, valuing the interaction between companies in the Defence Industries area (National Defence Technological and Industrial Base - NDTIB) and companies in the energy sector. The Security and Defence area has the potential to generate synergies in the field of Research, Development and Innovation (R&D&I) of projects that integrate small and medium-sized national companies, with the capacity to broaden strategies at the international level (especially those that are framed by the EU). Allocating projects to our industrial and technological fabric, supporting industry, creating synergies in the use of new climate-friendly technologies and, at the same time, working with the academia, will be a factor of strong development and dynamism in the Defence Economy sector.
In order to contribute to a broader debate, some lines of reflection are suggested below.

GENERICAL PROPOSALS

The National Security and Defence Strategy should take into account and shape the following domains:

i. The integration of energy and environmental area concept in the National Security and Defence Strategy, as well as in other strategies considering the energy sector;
ii. The challenges and implications of climate change at the national level and its geopolitical implications;
iii. The direct and indirect implications of climate change (threat or risk?) in the context of national security and defence;
iv. The energy transition and the efficient and sustainable use of energy resources as a security and defence enabler;
v. Identified energy vulnerabilities (mapping of energy vulnerabilities);
vi. The economic and strategic enhancement of energy models and capacities available in the national territory, including its maritime area.

Energy and Environmental Security Plan in the area of Defence (medium and long term) - (Generic elements that should be included):

i. Generic approach to the role of Defence in environmental and energy management (Energy and Environmental Security issues);
ii. Energy Sustainability in the Operational and Logistic domains; Research, Innovation and Competitiveness; Renewable Energy; Circular Economy and Energy Efficiency; Combating Pollution in the Defence Sector and others issues;
iii. Ensure coherence with main national structuring projects: (National Security and Defence Strategy; National Energy and Climate Plan 2030; National Investment Plan 2030; Roadmap for Carbon Neutrality 2050; Military Programming Law; National Hydrogen Strategy).

Roadmap for a Greener and More Innovative Defence:

i. Alignment with the Roadmap for Carbon Neutrality Plan 2050 (net-zero emissions roadmap);
ii. Focus and definition of objectives for energy efficiency, new energies, public green procurement and priorities established in this area through security and defence policies;
iii. Promote an environmental and sustainability culture with all actors;
iv. To promote best practices (e.g. reducing energy, logistical and environmental footprint).

The Military Programming Law and other programs (military weapons, vehicles and equipment) must integrate new energy requirements and challenges such as (eco-design, new fuels, energy efficiency, circular economy and electrical architecture, etc.).
(interoperability, flexibility, adaptability, dual use and material life cycle).

Modernization (green buildings) of Defence constructions areas; requalification of the military forces infrastructures and management of real estate through thermal adequacy and energy-efficiency, (low-consumption buildings and smart grids); (To reach the reference target - Near Zero Energy Buildings (NZEB).)

Personnel structures have to be adjusted to new technological, energy and digital challenges (Development of specialized skills).

Education and Training Programs should be able to integrate the new Energy challenges, in Research, Development and Innovation (R&D&I), especially in the areas of Science and Technology; new equipment and weaponry; e.g. hydrogen (fuel cells vehicles), FV solar energy, storage technologies, batteries and smart grids.

Encourage and define the incorporation, development and support of priority energy programs, related to collaborative projects within the scope of the European Defence Technological and Industrial Base (EDTIB):

i. Development and incorporation of new cross-cutting energy models in national and international strategic partnerships within the European Union - European Defence Agency (EDA) and NATO structures;
ii. Participation in the different actions and activities promoted by EDA in the energy field;
iii. Programmed and entrepreneurial participation in the different Community funding instruments (e.g. EDIDP, European Defence Fund, PESCO and Horizon Europe).

Development of Specific Energy Plans: (Strategic Reserves / Storage Capacity /Stocks of Security / Resilience, Operational Energy, Transport, Critical Structures and Infrastructures, Supplies Chains and Support to other entities, Energy and Consumption, etc.).

(Coordination Center for Security, Energy and Environmental Sustainability) in the Defence Sector with extended valences of technical, logistical and operational matters, in the area of supervision, control and support to the incorporation and development of energy and environmental systems.

Regular Technical Inspection Center, with different levels of intervention and audits. (Established parameters for the control of energy efficiency, matrix of energy consumption, decarbonization indicators and implementation of new processes related to the new energies).

(Develop an Operational Concept) - In the context of military operations and operational performance, issues related to key environmental factors and energy sustainability should be included in the main operational documents (e.g. Operation Guidelines, Standard Operating Procedures (SOP) and Operations Plan (OPLAN)).

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