



Web conferences on Climate change and Energy Security for NATO Nations

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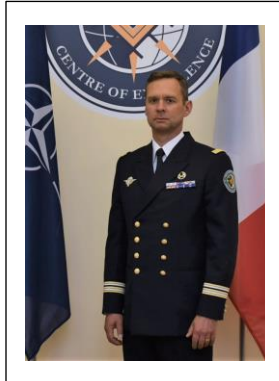
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INTRODUCTION

By LTC Christophe Nave,

Deputy Director, NATO Energy Security Centre of Excellence



With this series of conferences, we wanted to explore the link between climate change, energy security and their consequences for NATO action. To do this, we have gathered over twenty researchers and experts from different organizations each holding various perspectives. Utilizing their collective expertise enriching the discussions related to this subject, compare their points of view and share their analysis to bring out new ideas and underline the unanimous forecasts.

The summary of these discussions should provide you with the gist of these debates to give you the opportunity to quickly collect the main ideas and enrich your reflections on this upheaval that awaits us. It is also our Centre's contribution to spread the awareness among NATO Alliance leaders of the need for international cooperation on this subject and a review of the long-term strategic context.

SPEAKERS' BIOGRAPHIES

PANEL 1: CLIMATE CHANGE AND ENERGY RELATED SECURITY CRISIS



Dr. NICOLAS MAZZUCCHI

Dr. Nicolas Mazzucchi is Research fellow at the Foundation for Strategic Research (FRS) where he is in charge of the energy, primary goods and cyber issues. Dr. Mazzucchi is the chair of the Paris Conference organization committee; his works focus on the nexus energy-cyber, energy security for the military, innovation in energy and ICT. Scientific advisor in foresight for Futuribles International, he is lecturer at Sciences Po Paris and at the French War College. Dr. Mazzucchi is author of numerous scientific paper; his last book *ENERGIE, RESSOURCES, TECHNOLOGIES ET ENJEUX DE POUVOIR* was edited by Armand Colin in 2017.



Col. R. PETKEVICIUS

Col. R. Petkevičius graduated from the Military Academy in Riga, Latvia in 1990 with a degree in engineering. He joined the Lithuanian Air Force in 1992 and held various positions from Chief Engineer at First Airbase in Šiauliai, Lithuania to Chief of the A4 branch of the Lithuanian Air Force. In 2000, Col. Petkevičius was appointed Director of the NATO Department at the Ministry of National Defense of Lithuania. His responsibilities included interaction with NATO and national institutions in order to ensure Lithuania 's preparation for NATO membership.

Later in his career, Col. R. Petkevičius was appointed to the position of Defense, Military, Air and Naval Attaché to the United States and Canada. Next, Col. R. Petkevičius served as National Military Representative (NMR) of Lithuania to the Supreme Headquarters Allied Powers Europe (SHAPE). Before his latest assignment Col. R. Petkevičius held the position of Director of Lithuanian National Liaison Officer to NATO HQ SACT in Norfolk, VA.



Dr. JENNIFER COLE

Research fellow, royal Holloway university of London.

The Biological anthropologist interested in how humans influence and adapt to changing environmental conditions, particularly in the context of the human-induced changes of the Anthropocene.

Also: The Northern Europe Hub Co-ordinator for the Planetary Health Alliance (<https://www.planetaryhealthalliance.org>)

A member of the Editorial Board of the Global Journal of Medicine and Public Health (<https://gjmedph.com>)

A World Health Organization Infodemic Manager

Geography Recorder for the British Science Association

Research interests: (continued) Human health and behavior, Resilience, Evolutionary biology, information spread



Mr. JAMES GRABERT

Mr. Grabert has worked for the United Nations Climate Change Secretariat (UNFCCC) for more than 20 years. He heads the Mitigation Division of the UNFCCC, leading the work on market-based approaches to climate change mitigation. In addition, he also currently leads the secretariat's Communication and Engagement Division.

Prior to 2006 he served as a greenhouse gas emissions specialist and worked in numerous expert groups of the United Nation's Intergovernmental Panel on Climate Change. Before joining the United Nations, he was an industry and regional analyst for the World Economic Forum in Geneva, Switzerland.

Mr. Grabert holds a B.A. in Economics and International Relations from Wheaton College, Masters of International Economics from the Institut de Hautes Études Internationales in Geneva, and has undertaken post-graduate studies in Management at Stanford University, University of Navarra (IESE) and London Business School, and in Development at Harvard University.



Mr. MICHAEL RÜHLE

Michael Rühle is currently Head of the Hybrid Challenges and Energy Security Section, in the Emerging Security Challenges Division in NATO's International Staff. Previously he was Head, Speechwriting, and Senior Political Advisor in the NATO Secretary General's Policy Planning Unit. Before joining NATO's International Staff in 1991, Mr. Rühle was a Volkswagen-Fellow at the Konrad-Adenauer-Stiftung, Sankt Augustin, Germany, and a Visiting Fellow at the Center for Strategic and International Studies (CSIS), Washington, D.C. Mr. Rühle has published widely on international security issues in, among others, Asia Times, Comparative Strategy, International Affairs (Chatham House), NATO Review, Parameters, Politico, and The World Today. He is an Honorary Ancien of the NATO Defense College and a recipient of the Star of Lithuanian Diplomacy and the Bene Merito Medal bestowed by the Republic of Poland.

PANEL 2: REGIONAL RISKS OF CLIMATE CHANGE AND LESSONS LEARNED



Dr. THIERRY TARDY

Head of the Research Division, NATO Defense College

He develops the annual research plan, budget, and policies for the Research Division, oversees ongoing projects, and supervises and coordinates the activities of the Division personnel, including managing the various fellowship programmes. He is a member of the NDC Academic Council, Command Group, Civil Staff Association, and multiple other College committees. He represents the NDC in international fora, creates and maintains a network of connections with international institutions and the think tank world, and develops close relations with NATO Headquarters, NATO agencies and military commands.



Mr. LUCAS FRANZA (key speaker)

Luca Franza is the Head of the Energy, Climate and Resources Programme at Istituto Affari Internazionali (IAI). He is also an Associate Fellow at the Clingendael International Energy Programme (CIEP) in The Hague (The Netherlands) and a lecturer in the Energy Master of the Paris School of International Affairs (PSIA) – SciencesPo. He is also a member of the sustainability advisor board at Edison and the co-chair of the T20 task force on sustainable energy. He earned a PhD at the University of Groningen (The Netherlands), with a thesis on the political-economic impact of transformations in long-term gas contracts between the EU and Russia. He graduated in Political Science at LUISS (cum laude) and in International Security with a specialisation in International Energy at SciencesPo (summa cum laude).



Dr. LUCAS BERGAMASCHI

Luca Bergamaschi is co-founder and Executive Director of ECCO, a climate-change related think-tank based in London, He was previously Associate Fellow in the Energy, Climate and Resource programme at the Italian Institute of International Affairs (IAI). He provides analyses and stakeholder engagement on climate change and the energy transition, with a specific focus on the geopolitics of climate, European policies and the climate risk impacts on security and the economy.

Luca is also Senior Associate at the climate change think tank E3G where he worked on assessing risk factors of instability in the Middle East and North Africa region, with a focus on the intersection between climate, energy and

resource security in the aftermath of the Arab Spring. During the 2017 G7 Italian Presidency, Luca was responsible for the energy and climate negotiations of the G7/G20 Sherpa Office in the Italian Prime Minister’s Office.



Dr. CRISTINA D’ALESSANDRO

Associate professor Cristina D’Alessandro is a Member of the Centre on Governance of the University of Ottawa (Canada), a Senior Research Fellow at the Research Centre PRODIG (Université Paris 1 Panthéon Sorbonne, CNRS), Paris, France and an Affiliate Associate Professor at Riara University in Nairobi, Kenya. Economic and political geographer with more than 20 years of teaching and research experience in prestigious institutions such as Sciences-Po Paris, the University Bordeaux Montaigne in France, Sciences-Po Grenoble, the University of Bergamo, the University of Milan in Italy, and the University of Cyprus among others. With expertise in political and economic subjects and in public policy, she serves as an international consultant with various organizations and institutions, including the World Bank, the African Development Bank, UN-WOMEN, the United Nations Economic Commission for Africa, the BMW Foundation, and the Qatar National Research Found.



Colonel PHILIPPE Le CARFF

He was educated in the French “École polytechnique” military academy (class 1992) where he completed his military education in the Navy as chief of the watch aboard a patrol boat. He was commissioned on 01 September 1995 and joined the Army and the Cavalry.

He was posted to NATO SACT HQ in Norfolk, Virginia, USA on 16 August 2005. He was jointly chief planning and operations officer of NATO counter-IED integrated project team and ACT joint urban operations working group land subject matter expert, then drafted NATO asymmetric warfare concept, became ACT counter terrorism working group deputy leader and eventually a member of ACT NATO peace establishment review tiger team in the frame of France reintegration within the NATO command structure. He was promoted to lieutenant colonel on 01 July 2008.

In 2020, he was assigned to the Defence staff within the private office of the Vice-Chairman of the Defence Staff.

He is knight of the Légion d’Honneur, officer of the National Order of Merit and holds the Cross for Military Valour with two bronze stars, the Combatant Cross, the exceptional National Defence Golden Medal with a silver star, the regular National Defence Golden Medal, the US Army Commendation Medal and several other foreign awards.

PANEL 3: CLIMATE CHANGE AND ENERGY SECURITY ISSUES IN THE NATO ARMED FORCES **SPHERE**



Lieutenant General RICHARD NUGEE (key speaker)

Richard Nugee was a career soldier until retiring from the Army earlier this year. Since Feb 20 he has concentrated on providing the Ministry of Defense with a strategy and plan to embrace the effects of Climate Change, first as a serving soldier and latterly as Defense’s first Climate Change Non-Executive Director. Prior to this, he served on numerous operational tours and on the staff in the Army and Defense, culminating as the Chief of Defense People (Global HR Director). He is also Board Chair, Strategic Advisor, Patron and Trustee of a number of profit and non-profit organizations.



GenLt. SCHONEWILLE

BrigGen Schonewille is Director of Support within the Army Command. He is responsible for the Army related Material (this contains logistical chain as well as the life cycle management for the military platforms), CIS/C4I, Processes, Facility management and Infrastructure (included basing). He has built up a broad experience in the logistical domain as: Commander of the Material, Logistic Command, Program manager ERP Material Logistics, Various functions within the Defence Material Organisation.



Dr. SHERI GOODMAN

Sherri Goodman is a proven leader with 35 years' of experience in national security, energy and climate security, including service as the first Deputy Under Secretary of Defense (Environmental Security), first female professional staff member on the Senate Armed Services Committee, and pioneer in the field of climate security, organizing and founding numerous organizations dedicated to the nexus of climate change and national security.

Sherri is currently Secretary General of the International Military Council on Climate and Security, Senior Strategist and Advisory Board member at the Center for Climate and Security, and Senior Fellow at the Woodrow Wilson International Center's Polar Institute and Environmental Change and Security Program.

Sherri has received numerous honors and awards, including an Honorary Doctorate from Amherst College in 2018, the Department of Defense Distinguished Service Award in 1998 and 2001, the Gold Medal Award from the National Defense Industrial Organization in 1996, and the Environmental Protection Agency's Climate Change Award in 2000.



Brigadier General DIDIER POLOME

Brigadier General Didier Polomé started his fighter pilot career in 1988 at the Belgian Royal Military Academy followed by ENJJPT in Sheppard AFB. He joined the 350th Fighter Squadron in Florennes in 1997, and subsequently participated in NATO operations above former Yugoslavia. In 2004, Brigadier General Didier Polomé was appointed as an A3 staff officer in NATO HQ AC Ramstein. His duties included the coordination of Baltic Air Policing and the operational planning of multiple NATO large-scale flying exercises. In 2006, he was deployed to ISAF HQ in Kabul as Mission Director in the ASOC. In 2007, Brigadier General Didier Polomé assumed command of the 350th Fighter Squadron and led the first Belgian F-16 detachment to Kandahar in support of ISAF in 2008. Upon completion of his command tour in 2009, he was selected for the U.S. Air War College in Maxwell AFB.

Brigadier General Didier Polomé was assigned in 2010 as Chief, Crisis Response Planning in the Belgian Joint Staff. This gave him the opportunity to lead the operational planning for the Belgian contributions to different operations such as ISAF, Unified Protector in Libya, Serval in Mali, and Baltic Air Policing. Three years later, he attended the U.S. National War College in Washington D.C. During the following two years, Brigadier General Didier Polomé fulfilled the duties of Commander of the Air Ops Division (A3) in the Belgian Air Force staff. His responsibilities included the planning and preparation of all Belgian air combat, transport, helicopter, and ISR assets for operations such as Operation Inherent Resolve (OIR) above Iraq and Syria. In June 2016, Brigadier General Didier Polomé became the commander of the 2nd Tactical Wing at Florennes Air Base. During the three following years, the wing participated in numerous operations both abroad, as in Jordan, in the Baltic States and in Mali, and on the national territory, with the contribution of its unit to the reinforcement of the police in the fight against terrorism. Finally, after a three-year mandate as base commander, he was appointed to become Assistant Chief Of Staff Strategic Plans and Policy and Defense Planning (ACOS SPP / DP) at the NATO Supreme Allied Command Transformation (SACT) HQ in Norfolk, USA.

Dr. REINER ZIMMERMANN



Dr. Reiner Zimmermann is currently the Head of the Research and Lessons Learned Division at NATO Energy Centre of Excellence. There, he investigates energy security related technological, political and ecological developments with relevance for the military and civil societies. Focus is on renewable energy production and distribution, energy efficiency, reduction of carbon emissions, carbon capture options, and climate change effects on energy security for NATO nations and partners.

He is an experienced scientist with a demonstrated history of working in research and teaching at internationally renowned research institutes and universities. He is the leader of the Forest Ecology and Remote Sensing Group at the University of Hohenheim-Stuttgart, Germany. He is a visiting Professor at the City University of New York, Earth Sciences Department and the Universidad LaMolina in Lima at the Facultad Forestal. Previous assignments were with the Max-Planck Institute for Biogeochemistry in Jena, Germany and the California Institute of Technology CALTEC at the Jet

Propulsion Laboratory Radar Sciences Group in Pasadena, California. His academic publication record includes 110 peer-reviewed publications in international journals and more than one hundred technical reports.

His active military career was with the German Army Paratrooper's Long Range Reconnaissance Special Forces and later as an infantry unit commander and liaison officer to the US Forces. He then moved to the German MOD and is currently serving as Subject Matter Expert and Deputy Director (Colonel, OF-5 R) for Environmental Matters at the German Ministry of Defense.

PANEL 4: TECHNOLOGICAL ADVANCEMENTS IN THE SPHERE OF MILITARY ENERGY IN COMBATTING CLIMATE CHANGE



Dr. PANIAGOTIS KIKIRAS

Head of Unit Technology and Innovation, European Defence Agency

Dr. Panagiotis Kikiras is Head of Unit Technology and Innovation at the Research Technology and Innovation Directorate at the European Defence Agency (EDA). He has more than 20 years of experience in computer and network engineering with strong emphasis in IoT, wireless sensors architectures and analytics, embedded systems, wearables, cyber defence, security and privacy and in mission critical C4ISR systems.

Prior to EDA, Panagiotis hold a number of leading positions in industry, governmental agencies and in academia. From his tenure in governmental agencies he gained significant expertise in managing complex European and National projects in the areas of homeland security and defense and in the design, development and management of large scale sensor based mission critical IT Systems. In Academia he is Adj. Assoc. Professor at the department of Computer Science of the Univ. of Thessaly in Greece, where he created, and was the Technical Director, of the Wireless Sensor Sensing Laboratory. In industry he hold a leading management position at a research center of a leading innovative multinational company with track record of creating value both to customers, by delivering turnkey innovative solutions, and to research excellence by managing a research team which created new intellectual property and scientific knowledge in terms of patents and scientific publications.

Panagiotis has published more than 50 papers in scientific peer-reviewed journals and conferences in the areas of IoT architectures and analytics, cyber defence, security and privacy and is a Senior Member of the IEEE.

He is a graduate of the Hellenic Army Military Academy and holds an MSc in Management and Economics of Communication Networks from the Univ. of Athens and an MSc and PHD in Electrical and Computer Engineering from the National Technical University of Athens.

Dr. BRYAN WELLS



As of 1 July 2019, the North Atlantic Council (NAC) appointed Chief Scientist is **Dr. Bryan Wells** (UK). In this role, he has three major responsibilities. First, he serves as Chair of the NATO Science and Technology Board (STB). In this context, he serves as the STB's representative to the Secretary General and the NAC and is responsible to the STB for the effective coordination of NATO's Science and Technology (S&T) program. Second, he serves as the senior scientific advisor to NATO leadership, ensuring that appropriate and timely S&T based advice is provided to NATO senior decision makers. Finally, he leads the Office of the Chief Scientist at NATO Headquarters. Prior to his appointment as Chief Scientist, Dr. Wells was the UK Ministry of Defence's Head, of S&T Policy, Strategic Research and International Engagement. His responsibilities included the provision of strategic policy advice on the international and research aspects of the Ministry's science and technology programme. Additionally, he has recently completed a three-year term (2016-2018) as Chair of the European Defence Agency's Research & Technology Steering Board. Dr Wells joined the UK Ministry of Defence in 1988. He served as Assistant Private Secretary to the Secretary of State for Defence 1989-1992, and has held a range of other posts, including Deputy Director of NATO Policy 1997-1999, and Director of Counter-Proliferation and Arms Control 2002-2008. During 1999-2002 he was on secondment to the Lord Chancellor's Department (now the Department of Justice) as Head of Administrative Justice. Dr Wells was educated at St Catherine's College, Oxford (1978-85) and Merton College Oxford (1985-1988). He graduated BA(Hons) in Chemistry in 1982 and was awarded a DPhil in 1985. He conducted three years post-Doctorate research at Oxford University as a Junior Research Fellow at Merton College.

Dr. ANA GOGORIELANI



Subject Matter Expert NATO Energy Security Centre of Excellence

Ana Gogoreliani joined NATO ENSEC COE in 2020 as a permanent representative of the Ministry of Economy and Sustainable development of Georgia. She works as a Subject Matter Expert of the Center's Doctrine and Concept Development Division.

From 2021 Ana holds the position of Consultant to the CEO of the JSC "Georgian State Electrosystem".

During 2017-2020, she served as a Chief Specialist at the Analysis and Planning Division of the Energy Policy Department of the Ministry of Economy and Sustainable

Development of Georgia.

In 2012-2017, Ana was a Chief Specialist at the Analytical Department of the Ministry of Energy of Georgia.

Ana Gogoreliani holds a Master's degree in Hydraulic Engineering Management from the Georgian Technical University. At the Ministry, she actively participated in different working groups, working on the Country's Energy Security issues and whose analytical support many energy projects has been developed or are in various development stages, including HPPs, which positively influence the country's energy security level.



Tend. Col. PASQUALE PORCELLI

LtCol (OF-4) of Italian Air Force.

1998-2004 attended the Air Force Academy in Pozzuoli - Naples where obtained degree in civil engineering, and some post-degree masters regarding airport engineering, business management, leadership and strategic analysis, and energy efficiency.

Since 2018, he is a certified energy manager.

For about a year, he has been working as Energy Security Section Head of the cabinet of the Italian Defense Minister in Rome.



Dr. PINAR IPEK

Pinar Ipek is Associate Professor in the Department of Political Science and International Relations, at TOBB Economics and Technology University in Ankara, Turkey. She holds a B.A. from Faculty of Political Science, Ankara University and a M.B.A from Indiana University of Pennsylvania. She completed her PhD in international affairs at University of Pittsburgh in 2003. Her research interests include energy security, the EU's energy policy, geopolitics of the Eastern Mediterranean hydrocarbon resources, political economy of oil and gas in the Central Asia and the Middle East regions, energy transition in developing countries, and Turkey's state-business relations within the context of local modalities of capitalist development in global political economy. Her articles is published in scholarly journals such as Foreign Policy Analysis, Europe-Asia Studies, Middle East Journal, Middle Eastern Studies, Turkish Studies (to be published), Middle East Policy, European Integration online Papers, and Perceptions: Journal of International Affairs. She has also two book chapters on Turkey's energy security.

PANEL 1: CLIMATE CHANGE AND ENERGY RELATED SECURITY CRISIS

Key Panel Questions:

- What level is the interaction between climate change and defense considered enough inside and outside the military?
- Are defense and security organizations prepared to conduct missions related to climatic events?
- How to manage the role of the armed forces in adapting to and mitigating climate change (in terms of technology R&D, civilian-military operations, evacuation operations, etc.)?

Summary of Speakers

How to address the resilience issue in case of major climatic event? What should be the role of armed forces in supporting the populations hit by major climatic events? How to model climate related “black swan” in military training? - by Dr. JENNIFER COLE

Climate change will be NATO's main adversary. National economic and military activities bringing about climate change can cause floods, droughts and pandemics. The climate change situation is forcing countries to cooperate. The threat of climate change is becoming a traditional threat to countries, that forces NATO countries to seek answers - how to act correctly and how to adapt to the current political and economic situation.

Explaining what determines the principles of flexibility - how to get better results, how to build the resilience of civil society using military forces.

The most significant threats as a result of climate change are:

- Food safety
- Migrants
- Diseases

NATO forces as executors of a mission to curb these threats, because today they are the ones most capable of curbing these threats provided by the organization's structure and approach to resolving this type of conflict. This is ensured by the ability to quickly build infrastructure, expand communications at the international level, limited threats. The speaker outlines the winners and losers who are at the forefront of climate change: the winners are the north; the south is the loser in terms of food productivity, which increases migration and can lead to war.

How include the security effects of climate changes better in global analysis and negotiations? Should the military have a role in analyzing/mitigating the effects of climate change? By Mr. JAMES GRABERT

Climate change perpetuates global insecurity by increasing organized crime, migration and food insecurity. Due to the instability of internal conflicts, many countries lack the financial resources or the capacity to attract foreign investment, which in turn would allow them to prepare for climate change. A vicious circle appears. To destroy this vicious circle, we need to invest in these countries.

Also when analyzing Private companies. The author believes that it is imperative for companies to adapt their skills and products to climate change. The current laws covering environmental issues will lead to some companies not being able to continue their activities (e.g. environmental pollution). Environmental innovation will bring new benefits and create new skills and jobs.

There are conflicts that arise in the control of natural resources, especially in the extraction of water resources. Military forces should control to ensure that countries have equal access to their essential resources

Do you think that defense ministries and armed forces are ready to address climate change related issues? How can the culture of the armed forces adapt to better address this issue? Is it climate risk enough considered in training, capacity development and mission planning? By MICHAEL RUHLE

The population of industrialized western countries think that climate change is the greatest threat before cyber-attacks and terrorism. It is the reason why army forces come to security discussions. The concept of the environment has become relevant in the army since the 1970. The aim was to reduce fuel and energy consumption in the army to ensure greater autonomy. Climate change is important, but it have to take in account that NATO's main goal is to protect its member states. Army forces must promote the development and use of new energy resources to reduce fossil energy consumption. There is a need to learn new technologies that are always more effective than existing ones in reducing CO2 emissions. The author emphasizes the need to return to the concept of resilience, as climate change will increase the participation of NATO troops in extreme areas such as the jungle, the desert where the functioning of people and equipment is hamper. We need a training process that takes into account climate change. With these new exercises, NATO will be able to build a stronger and more efficient army.

How to draw an EU common policy in Energy to tackle climate change issues efficiently? How to manage the balance between member-states sovereignty and the need of a common policy? Which synergies between the global EU energy policy and the EU developments in defense technologies and military integration? By CLAUDIA CANEVARI

There was recalled the EU's Green Deal, which calls for investment to reduce CO2 emissions, which would lead to carbon neutrality by 2050.

Energy efficiency is a priority of EU environmental policy. Not only civil companies but also the defense industry needs to change. The defense industry can increase energy efficiency by almost renovating buildings. Defense companies can develop more integrated and optimal systems for all defense technologies. The defense and security sector has a role to play in the fight against climate change.

EU Ministries of Defense and Energy are working together to find solutions and innovations by funding a research program for promising companies.

PANEL 2: REGIONAL RISKS OF CLIMATE CHANGE AND LESSONS LEARNED

Key questions of Panel:

- Could you describe the specific climate risks in your region?
- Are defense and security organizations drawing doctrines or undergoing specific training to face these risks and the potential climate-related crisis?
- Can it be considered that the interaction between military and civilian authorities are sufficient to address climate related crisis?

Summary of speakers

Is there a specific regional policy of cooperation regarding climate-related risks (e.g. multinational exercises)? Are the development of new important maritime logistical highways and new oil and gas exploitation game-changers in terms of climate related potential crisis? By MARK IANTAY

The weather in the Arctic is changing very rapidly, so it is the best region in the world to analyze climate change. The Arctic Council (Russia, USA, Norway, Iceland, and Denmark) is discussing climate change in the Arctic, setting what to put on its agenda. In a few years, Russia and the United States have developed a real Arctic policy on climate change.

The Arctic is a rich region, so there are many economic opportunities in the Arctic, but there are many environmental threats, especially for oil and gas. In addition, tourism is starting to grow.

At the same time, maritime and commercial routes have been open up due to climate change, which is favoring the country's economy. However, maritime safety is becoming increasingly important as much of world trade passes through North Asia to join Europe. There are also conflicts between countries such as Russia, Canada and the United States over the exploitation of the territory and their political interests.

Finally, the Arctic Council discusses how these new economic opportunities will affect the environment.

Is there a real risk of conflict regarding the attribution of water resources in the Mediterranean and Middle East regions? Is a "climate refugees" crisis foreseeable in the region? By LUCA BERGAMASCHI

Comparisons of the GDP loss of all African countries during the COVID epidemic (-2.7%) and the potential GDP loss due to climate change (-2 to -5%). It is about the same.

Africa projects to have a severe water shortage of around 60% as water levels in rivers and lakes decline. This is due to a decrease in precipitation and an increase in temperature. In order to survive in this terrible environment, cooperation between African countries will be essential, as they share most of the lake and river system (Lake Victoria, Nile, etc.). If such cooperation is not developed, it will lead to major conflicts. Climate change will increase the risk of internal conflicts in the Mediterranean countries, such as the refugee crisis, the depletion of water resources, and so on. In this situation, army forces will be important to resolve future conflicts. However, for military forces to be more effective, they must be more resilient to climate change.

Do you think that the desertification in Maghreb and Sahel regions could lead to an increase in conflict situations? Is the action of foreign military forces and organizations such as UN or EU relevant to help mitigating climate change effects (e.g. in terms of financing new infrastructure or in post-conflict reconstruction)? Could it be considered that some African countries are in extreme climate risk? By Dr. CRISTINA D'ALESSANDRO

There are put focus on Africa, which has been most affected by climate change. Due to colonization, most large cities are located along the coast, and a large proportion of Africa's lives depend on sea level. This means that Governments must draw up an urban and coastal plan. With climate change and rising sea levels, large numbers of Africans may lose their homes and become refugees.

The direct effects of soil desertification are putting pressure on food production and natural resources, especially water resources and thus agriculture. Most of the population lives on subsistence production. This means that without water there is no agricultural production, which in turn leads to food shortages.

The possibility of building hydropower plants caused conflicts because creates inequalities between countries. For example, with the inflow of the Nil into Ethiopia, Sudan and Egypt. There is a debate about the beginning of the river: do we prefer hydropower to agriculture or something else?

In this case, military forces could enable countries to develop further by ensuring peace and preventing conflicts between them

Could you explain us which military forces were involved in the post-crisis support to the West Indies population after the Irma storm? How using military means and equipment has been consider as decisive contribution? What was the articulation between military and civilian authorities during the Irma crisis? By Colonel PHILLIPPE Le CARFF

The French military operations have fundamentally changed. As military units are involved in crisis prevention, the emphasis is on the humanitarian mission. In these circumstances, the French military has shown that it is better able to deal with such crisis situations than civilian organizations, as assistance to the local population has been provide through the army's planning and logistical capabilities. In addition, French army forces must protect the environment by preventing environmental damage (Operation Ephesus and Harpie). Finally, the French army must resolve conflicts over the use of natural resources and migration.

In such operations, militarists face challenges such as fluctuations in air temperature, rising sea levels, water shortages, and floods, which put additional strain on soldiers. As a result, the sustainability of soldiers and equipment decreases. Diseases also come with tiger mosquitoes (chikungunya, zyca, etc.).

Therefore, we need to provide these conditions in order to better prepare our soldiers and be more efficient and resilient.

PANEL 3: CLIMATE CHANGE AND ENERGY SECURITY ISSUES IN THE SPHERE OF ARMED FORCES OF NATO NATIONS

Key questions of Panel:

- What are the key national concerns regarding defense capabilities in context of climate change? What are the strategic implications of climate change for militaries of NATO Nations?
- What is the level of preparedness within NATO regarding climate change and energy security in a long-term perspective?
- What kind of challenges are national defense institutions facing while addressing energy security and/or climate change issues?

Summary of speakers

What is the level of preparedness within NATO Nations regarding climate change and energy security from a long-term perspective? By DIDIER POLOME, Brigadier General

The conflicts arise where natural resources are lacking, migrant crises develop, etc.... Energy security is part of NATO and national resilience. As a result, NATO needs to invest more in energy infrastructure. SACT monitors and researches new technologies that will be available to the military in the future, including work on a new energy source. The aim is to use these new resources for the forces of all NATO nations. It is important for ENSEC COE to standardize all these new technologies.

These challenges will allow us to use new technologies in crises. In this situation, cooperation between the private and public sectors is important to ensure the most effective adaptation of technology to military objectives. However, we need to raise energy awareness in order to secure energy supplies and maintain our energy autonomy, which would be an operational advantage in crises.

What are the strengths of the Operational energy concept when it comes to climate change issues? By Dr. SHERI GOODMAN

There are plenty risks for NATO security.

- Impact of climate change on population: hurricane, flooding, COVID, etc...
- Extreme weather have an impact on military infrastructures and equipment.
- Climate change exacerbates states instability due to lack of natural resources for population.
- Climate change contributes to geopolitical competition: arctic, sea, Africa, etc...

NATO needs to invest in infrastructure resilience, promote energy security and integrate all energy data

The energy dimension of action: It is difficult to deliver water and fuel to a soldier in the field. That is why we need to continue to improve both logistics and new energy technologies. Standardize fuel so that it is compatible in all NATO countries.

Finally, we need to encourage military innovation, as much as innovations used in the civilian field, such as GPS, new fuels, etc. This will contribute to the sustainability of our environment throughout society.

What are the key challenges that national armed forces are facing in transition to RES? What impact on military capabilities it makes? By Dr. REINER ZIMMERMANN

Climate Change is one of the most important threats for NATO forces. Focusing on political and social consequences of climate change. He defines resilience that is for NATO the capability to resist negative impacts and regain structural functionality after any sort of disturbance. Migrations in MENA and Mediterranean region will be the most important topic.

Two topics for energy about climate change:

- Replacement of fuel with hydrogen and electricity. In addition, these new energies will create new addictions and threats for the military. If electrification increases and the army replaces fuel vehicles, the army will be dependent on civilian technology. These new trends (battery autonomy, reliability, natural resources, etc.) could jeopardize military capabilities.

- The army must produce, store, and transport these new energies. That is why the army needs to protect new critical energy infrastructures.

All of these new technologies need new experts to repair and care for, so we need to make sure that the army has qualified staff to use these technologies. Therefore, we need well-informed and well-trained staff so that we are ready to change technology quickly. We do not yet know what forms of energy we will use and develop in NATO (electricity, hydrogen, nuclear energy, etc.). NATO is now fully open, but we simply need to prepare the army for all the challenges.

What kind of challenges are national defense institutions facing while addressing energy security and/or climate change issues? By Gen Lt. SCHONEWILLE

The audience was introduced to the Dutch experience of being sustainable. The Dutch government is investing in all infrastructure and buildings to increase energy efficiency.

The army must be the engine of energy transition. The main goal is to develop new technologies in cooperation with civil industry and use them in all public sectors to prepare the country for sustainability and reduce carbon impact. The most difficult thing is to justify the use of money for technological development. In fact, the army must justify the important interests of both the state and the army in developing each program.

The transition to new environmental protection cannot be achieved within one year by replacing all old fossil energy vehicles. When launching a new armaments or construction program, military forces and civilian companies take into account environmental objectives.

PANEL 4: TECHNOLOGICAL ADVANCEMENTS IN THE SPHERE OF MILITARY ENERGY IN COMBATting CLIMATE CHANGE

Key questions of Panel:

- What are the opportunities for NATO Nations to promote and exchange best national practices in tackling energy security and climate change issues within NATO?
- How energy efficiency/management technologies and policies can enhance military capabilities and mitigate climate change?
- Why national initiatives in tackling climate change and enhancing energy security should be NATO's concern?
- What are the challenges with applicability of innovative technologies for military energy?

Summary of speakers

What are current opportunities for NATO Nations in light of innovative solutions? By Dr. BRYAN WELLS

There are 6,000 scientists who working in NATO, we have the opportunity to innovate and find new technologies. Scientists are important to NATO because they are working to keep NATO at the forefront of global innovation.

What is National initiatives in energy efficiency, mitigating Climate Change? By Tend. Col. PASQUALE PORCELLI

The IEA is part of the Italian army and has two responsibilities: infrastructure and energy and environment.

The IEA provides new technology development and funding that provides a link between military forces and civilian authorities. The IEA aims for competitiveness, security and the environment in line with Europe's 2030 and 2050 targets.

To achieve its goal, the institution has set up a network system with a complete management system. The goal is to create smart neighborhoods with urban and military space. The network in this area connects all the buildings together. This system ensures energy consumption for each building. We can reduce energy waste, protect civilian buildings from cyber-attacks and improve security in the area.

Finally, this project will allow energy and security management (analysis of consumption data, detection of unwanted access, etc.).

Why national initiatives in tackling climate change and enhancing energy security should be the NATO's concern? By PINAR IPEK

The most important economic threat is global climate change. A natural disaster can cost states and citizens a lot of money. In addition, some countries are highly dependent on oil and gas for their production. It will be less

resilient to climate change. All of these threats affect NATO countries, as they will need more troops to protect their citizens and their interests around the world.

Militaries' support and responsibility towards climate change and energy security by Dr. ANA GORGORIELANI

NATO countries would like to reach carbon neutrality by 2050. Therefore, military must change their habits and involve to new sustainable energies.

There is a lot of positive impact for sustainable energy for military:

- These energies can be built and deployed far more quickly than traditional fossil generation
- These energies are silent
- There is no risk of explosion
- These energies are free and self-replenishing resources.

Technically, army forces may solar panel and energy storage to produce energies. Military must use new materials as hybrid tanks and drones. All of these innovations will permit NATO to build a more resilient and respectful force.

PANAGOTIS KIKIRAS introduced with European Defense agency priorities.

The European Union have to get a higher agenda of environment energies. The EU has identified important ways to fight against climate change: Operational dimension, capability development and partnerships. To work on this ways of thinking the EU has created four groups of thinking. Three working group work on new energies and new army technologies. The last one transversal working group has to find financial solutions. For instance, they have developed hydrogen energy solutions for portable equipment for soldiers. Finally, sustainable energy and green transition matter for EU defense sector.

Conclusion words of the webinar on “Climate Change and Energy Security for NATO Nations” by Dr. Nicolas MAZZUCCHI, FRS, Research Fellow

Climate change and energy security constitute major challenges for NATO Nations and their armed forces. Even if these two topics are not new, their growing strategic dimension however, has to be taken in account for the preparation and conduct of our future military activities.

On initial examination, the numerous types of impact on various domains (politics, society, economy, security, defence) can be split into two different but complementary approaches.

The first approach tackles the impact on global security as climate changes can deepen current crisis or even trigger new ones. The worsening of the overall security situation, the increase of the number of humanitarian catastrophes and induced destabilization due to uncontrolled immigration are likely to lead to more and more armed forces interventions, sometimes with heavy means. This could become a challenge in both the training and the reactivity of the military capacities and in developing more engineering capabilities. In the future, good coordination with civilian emergency response could become a key point as well.

The second approach addresses the necessity for armed forces to take their share of the overall effort to diminish the footprint in terms of sustainable development, even if armed forces are the last guarantee of a state to survive an aggression are supposed in this case to be paramount of all other consideration. For armed forces are also involved in contributing to the global effort to reduce its impact on the environment, more particularly the greenhouse effect. Anyway, the need to replace fossil fuels or at least to spare these resources as they become scarce is coherent of this approach. But, the challenge questions clearly here how to “greenwash” the capacities and, in the same time, keep them effective. That concerns both the activities, mainly the training, and the design of equipment, including infrastructure.

Large reflections about climate change and energy security for NATO Nations and their armed forces have already lead to capstone analysis documents. This is now to be continued within the framework of the NATO objectives in order to build military capabilities able to address the consequences of climate changes.