Consortium of 4 Research Entities for Study "Energy Efficiency: Cultural Change"

Final Report

of the

Second Part of the Study

Energy Efficiency: Cultural Change

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Table of Contents

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Executive Summary

Introduction

Military operations require energy as a critical mission enabler. The changed landscape of NATO operations from defending Europe from the East to more of protecting the Alliance's vital interests around the world requires a different perspective on access to energy. With the lessons identified and learned during NATO's 11 years in command of the International Security Assistance Force (ISAF) in Afghanistan, access to energy by military units across a wide theatre of operations became a critical logistic function. Involving aspects of force protection, intelligence, political diplomacy, and escalating costs; energy distribution rapidly became one of the top risk missions.

Studies involving energy efficiency, by several NATO nations, highlighted the need for improved technologies such as distributed variable speed generators, solar panels, wind turbines, and thermal tents to improve energy efficiency. Though distribution of energy across the ISAF area of operations (AOR) had increased energy costs throughout the campaign, the funding for the experimental use of the above technologies exceeded the ISAF energy distribution costs due to the initial low economies of scale for each of the technologies.

Though prices of renewable technologies and innovative power generation and storage have continued to decline due to increased economies of scale caused by increasing markets (civilian and military), changing behaviours among NATO military personnel in their use of energy represents an excellent opportunity to achieve and realize a low-cost solution. The idea to change behaviours toward improving energy efficiency (EE) during NATO military training and operations has begun to take hold across NATO. Several nations have already explored this potentiality and have experienced success in reducing energy usage and, subsequently, other factors such as costs, force protection requirements, and loss of life from enemy attacks on fuel distribution networks (i.e. convoys in deployed AORs).

The genesis of this report stemmed from NATO's need to identify solutions to improve EE during its operations. EE has been a discussion topic amongst Heads of Stated during the last four NATO Summits. In addition, the environmental impacts of improving EE will add to the success of deployed military operations due to the decreased impact on foreign soil. This report includes the views of NATO military experts as well as their conclusions, recommendations, and a multitude of survey data suggesting how NATO can accomplish EE in its military training and operational environments.

This report summarises the findings of the first Advanced Research Workshop (ARW) "Towards Energy Efficiency through Behaviour Change in the Military" held in Vilnius in November 2015. The workshop aimed to define the problem space; the need for energy efficiency in the military and potential barriers and solutions. In defining the problem space this paper sets up the second ARW, which aims to bring together examples of

energy efficiency initiatives from across NATO member states. From these examples best practice and lessons learnt can be identified and shared.

This report also contains the preliminary findings from the "Pilot Study on Energy Efficiency in the Military", which collects results from questionnaires distributed at a number of NATO Events and Exercises. The questionnaires evaluate current military awareness of energy efficiency, the appetite for cultural change and any potential barriers.

Aim and Objectives

This report is the second part of the "Energy Efficiency: Cultural Change" project, from the NATO Energy Security Centre of Excellence in partnership with the Consortium of Four Research Entities for Study "Energy Efficiency: Cultural Change". The project aims to provide recommendations on the methods to increase energy efficiency in the military through promoting energy saving behaviours and culture.

The first part of the study "Energy Efficiency: Cultural Change" suggested integrative design for bringing about cultural change in the military, involving both top-down approaches (referring more to external motivation of the military personnel) as well as bottom-up approaches (that account for intrinsic motivation of the military personnel). The second part of the study "Energy Efficiency: Cultural Change" further pursues the primary objective of the study:

> *to identify the different perceptions and behavioural schemes that hinder or promote the efficient use of energy resources within military entities of Euro-Atlantic community, and provide results to be used for preparation of tailor-made recommendations for further actions in order to turn energy into an enabler for military operations and a capability in military power projection in different environments.*

These enabling actions include preparation of relevant toolboxes, education and training courses, and relevant experiments and exercises that enable development of common standards, language, and procedures. Each action will help military entities ensure improved use of energy-efficiency related technology and logistics on a wider scale within Euro-Atlantic community. The Study is expected to help encourage and convince military stakeholders within NATO to integrate energy efficiency best-practises into daily activities. To achieve this, the study will further include suggestions on how to use the relevant toolboxes and incentives recommended for each level to enable and embed energy efficient behaviours in NATO's areas of concern.

The following sections incorporate the initial development of the second part of the study, "Energy Efficiency: Cultural Change," and summarise the research, which intends to:

1. produce a summary of the main findings from the Advance Research Workshop "Towards Energy Efficiency Through Behaviour Change in the Military" ***(2015, Vilnius)*** based on the interactive sharing and consultation among high level

experts from NATO Allies focused on enhancing energy efficiency, including ways to achieve it through behaviour change in the military;

2. probe military stakeholder's views while mapping their level of awareness about energy efficiency issues, motivating tools, and other areas using surveys and analysis of empirical data from responses;
3. evaluate main findings using the theoretical framework produced in the first part of the study, "Energy Efficiency: Cultural Change;" and
4. produce recommendations for identification and defining means of energy efficiency, which may induce and embed changes in military attitudes and behaviour, as well as for bridging the gaps in developing capabilities within militaries of Euro-Atlantic community that would generate enhanced energy efficiency.

This report achieves the aim and the objectives as well as identifies the need for more research on EE in the form of experimentation and follow-on studies. Though this report is based on the views of military and civilian experts during two advanced research workshops (ARWs), it was based on a set of theories involving behaviour change.

Overview and Analysis of Related Theories and Models

An aim of this pilot study involved the detection of how an integrated behaviour change strategy could fit into the context of military training and operations. Given the hierarchical organisational structure within the military, the report's authors chose to align this strategy with Douglas McGregor's theories on human motivation and management, Theory X and Theory Y. These two theories formed the basis of several follow-on leadership theories where leaders need to understand their workers' capabilities, needs, and intrinsic/extrinsic motivations. The two theories play a role in military organisations directly and indirectly.

Associating these two theories in context of the military organisational structure with a sociological approach to behavioural change, the report's authors identified that continuous change would be necessary across the many interrelated, interdependent, and interacting relationships between leaders and followers (i.e. officers and enlisted military personnel). This means that a sociological approach to behaviour change can be used within the military hierarchical organisational structure.

The military context for Theory X involves military leaders directing their subordinates to perform tasks under a more hands-on approach. Military leaders closely manage their subordinates in terms of training, performance measurements, reward/reprimand system, and requiring consistency of work. Examples of this include: training new recruits, managing young enlisted members with little intrinsic motivation or ambition, and the conduct of menial and repetitive tasks.

Theory Y presents a more realistic approach for military leaders given today's more connected and aware society (i.e. political, social, environmental, economical awareness). The advent of the Internet and social media make younger and less experienced military

personnel ask their leaders 'Why?' they need to do something. Theory Y relates more closely to today's military where leaders relate better to their subordinates on a personal and democratic basis.

Application of each of the two theories plays a role in establishing a framework of behaviour change particularly in a military organisation. The situationally dependent nature of military actions requires leaders and managers to maintain constant vigilance on the need for continuous change. Rapid recognition and accurate identification of the changing situation presents a critical challenge for military leaders and managers to successfully implement an effective strategy. This context forms the basis of this report's aim and objectives to assist NATO military organisations achieve improvements in EE through behavioural change.

Overview of Main Issues of Advanced Research Workshops

To achieve this ambitious goal of behavioural change in the military to improve EE, two ARWs were conducted at the Energy Security Centre of Excellence (ENSEC COE) in Vilnius, Lithuania in November 2015 and April 2016. The first ARW included observations and discussions, among the invited military and civilian experts in energy efficiency, focused on EE challenges such as existing gaps, problems, weaknesses, and barriers. The experts presented their ideas, their nations' military operational energy-related projects, conducted a reverse-brainstorming activity on the consequences of not improving EE in NATO military operations, and evaluated several existing EE initiatives. In addition, the experts considered potential opportunities for solutions in the form of best practices as ways to implement the to fill the gaps, treat the weaknesses and overcome the barriers. They focused on three aspects in three separate groups: environmental outcomes of EE, behavioural change in EE, and technical solutions in EE.

The outcomes of the first ARW included:

1. the contribution to energy efficiency that is possible to achieve through potential behavioural changes
2. the definition of soldiers as a specific sociologic group and their particular characteristics
3. the need of a shift of mind-set and capabilities in order to meet a cultural change
4. the necessity of using both Energy Efficiency (EE) and Environmental Protection (EP) tools to achieve the target of the project.

Focused on staffing issues, lack of training on EE & EP, individual attitudes, and several others topics; the experts provided 13 discussions in the areas of the need for change, the barriers to change, and the facilitating factors necessary for change. All of these are included in this report in greater detail.

The second ARW focused on NATO's need to develop a comprehensive approach to ensure NATO military organisations and personnel find ways to improve EE through behaviour change. The experts presented 21 different national and organisational projects

and policies involving aspects of EE that could apply to a behavioural change approach. Throughout the presentations, discussion ensued that evaluated the various EE initiatives and how each could be applied in a NATO context.

The experts discussed their ideas and thoughts concerning development of a NATO Handbook focused on the integration of EE behaviours into NATO military training and operations. They split into three separate workgroups to discuss their proposed injects in terms of the following:

1. environmental outcomes of EE
2. behavioural change in EE
3. technical solutions for EE

The experts provided recommendations for improving EE using behaviour change based on their expertise, observations about existing approaches to improving EE, and their related discussions. They covered a broad spectrum of topics on how NATO should develop this framework by shifting mindsets in terms of sustainability, processes, and analyses. Their critical thinking drove the ARW to develop creative and innovative ways to approach behaviour change for NATO to achieve improvements to EE.

Overview and Analysis of Survey on Energy Efficiency in the Military

In addition to the experts' views on how NATO should improve EE through behaviour change, this report includes the data derived from a 13-question survey completed by more than 1000 NATO military and civilian personnel. The results of the survey point to several areas where NATO needs to improve its capabilities toward achieving EE. Specifically, the survey's objectives included determination of military personnel opinions on EE and to identify their motivations that influence their behaviours related to energy use.

The survey data resulted in helping NATO determine how to accomplish its military missions, including training and operations, using EE best practices while avoiding reductions in operational capacity. A brief summary of the findings includes the following:

1. Operational capabilities affect behaviours
2. Commander's guidance reflects a top-down approach to behaviour change
3. Reward systems for military units could improve EE behaviours
4. An integrated motivational approach is most appropriate
5. A major lack of awareness and training on EE exists in a NATO military context
6. Majority of respondents want to learn more about EE

The resulting recommendations include the following brief summary:

1. A hands-on (i.e. Theory X) approach appears to be the main driver for military EE

2. NATO requires EE training and education programs
3. Cultural differences are inconclusive from the survey; need more participants
4. Future surveys require a greater diversity among military ranks
5. EE habits undetectable in missions need to be reframed
6. More surveys will help identify additional factors for EE behaviour change

The evidence provided via the survey data indicates that more surveys would provide additional thoroughness across diverse cultures and military ranks. Qualitative surveys available online and via manual fill-in procedures in conjunction with a structured interview approach will help achieve a more informed and accurate set of behaviour change mechanisms for NATO to achieve military EE.

OVERVIEW OF THE MAIN FINDINGS OF ADVANCED RESEARCH WORKSHOPS

Towards Energy Efficiency through Behaviour Change in the Military

During two Advance Research Workshops[1] (ARWs) "Towards Energy Efficiency through Behaviour Change in the Military", in terms of enhancing energy efficiency (EE) in the military, the experts provided general observations and indicated a number of challenges (gaps, problems, weaknesses, barriers), opportunities, together with already developed, as well as proposed, solutions (good/best practices, insights) on measures to be undertaken and ways of implementation in order to meet those challenges (to solve related problems, fill the gaps, treat weaknesses, overcome barriers).

The ARW2015 had three kinds of contributions: presentations from the experts (see Annexes A-1 through A-5 and A-8 through A-13); a reverse-brainstorm in two groups (one from military representatives, the other with civilian backgrounds) on the consequences of not enhancing EE in the military (see Annex A-6 and A-7); and an evaluation of the examples of various EE initiatives (see Annex C with case studies distributed to the groups) in three groups (one focusing on behaviour-related environmental outcomes of EE, one analysing behavioural change methods in EE, and one highlighting behaviour-related technical solutions for EE – see results in Annex A-14, Annex A-16 and Annex A-15, respectively).

The ARW2016 had four kinds of contributions: presentations from the experts (see Annexes D-1 through D-21); an evaluation of means used during various EE initiatives during the three workgroups structured in the same manner as during previous ARW2015 (see results in Annexes D-22 through D-24,); proposed injects for a NATO handbook concerning the integration of EE behaviours into military missions based upon the outcomes of three workgroups (see results in Annex Annexes D-22 through D-24); and experts' recommendations during final discussion (see Annex D-25).

During both ARWs the experts stated observations about the topic and listed the challenges that must be addressed. With regard to the general observations, the experts efficiently covered a broad spectrum of themes including:

1. the contribution to energy efficiency and sustainability of the armed forces that is possible to achieve through potential behavioural changes
2. the definition of soldiers as a specific sociologic group and their particular characteristics

[1] Two ARWs encopmpass ARW2015 and ARW 2016, both were held in Vilnius. *Description of the process of experience, knowledge and expertise sharing during Advance Research Workshop (2015, Vilnius): Towards Energy Efficiency through Behaviour Change in the Military, with over 30 participants from different countries, is* in ANNEX A.
Description of the process of experience, knowledge and expertise sharing during Advance Research Workshop2016, Vilnius: Towards Energy Efficiency through Behaviour Change in the Military, with over 50 participants from different countries, is in ANNEX D.

3. the need of a shift of mind-set, behaviours and capabilities as well as the necessity of using both Energy Efficiency (EE) and Environmental Protection (EP) tools to achieve the target of the project

In relation to the challenges, the experts proceeded very well, selecting a wide range of issues related to different areas: staffing issues; lack of training on EE & EP; individual attitudes and actions that could be undertaken for meeting those challenges. They also analysed the impacts on sustainability emanating from achieving EE through behavioural change and necessary steps for moving forward, the EE tools currently in use for meeting highlighted challenges in different frameworks throughout the NATO military, and emerging opportunities for triggering the process of embedding energy efficient behaviours in NATO military operations. In addition, sociologists presented sociological analyses of responses from military and related civilian respondents from various nationalities/age and status categories.

During ARWs workgroup meetings, the experts creatively developed ideas about sets of tools NATO could use to meet the highlighted challenges. Throughout their workgroup discussions, they used brainstorming and the SWOT methodology to select a wide range of issues related to their analysis of the many tools and methods used in various related initiatives, such as experiments, projects, interventions, and policies. Their findings provided injects for a NATO handbook concerning the integration of EE behaviours into military missions.

Finally, experts formulated recommendations for further actions. Mentioned issues and several others are detailed below.

The following section provides a summary of the expert contributions during both ARWs, first highlighting the need for and the benefits of change, then looking at potential barriers to change, before considering the methods of change. The first contribution will highlight the approaches and roles necessary to achieve EE through behavioural change in the framework of critical factors. The Allies must consider behavioural change when addressing the issue of sustainable military capabilities for their Armed Forces. The next contributions describe the need for and the benefits of change, analyses of the various means used in different contextual frameworks, a discussion on the barriers to change, evaluating how to apply behavioural and technological methods of change, and demonstrating the relationship between contextual factors and strengths/weaknesses of applied tools during various interventions together with related opportunities/threats. Finally, the section details recommendations made by the experts about how best to proceed with EE measures (including those related to culture change) for NATO military operations.

The Need for Change

This section details factors identified by the experts, which highlight the need for energy efficiency in the military, and its potential benefits.

1. Behavioural change can contribute to energy efficiency in the military with multiple positive consequences:
    a. Improves effectiveness and mobility of forces
    b. Self-sufficiency reduces deployment time, and increases flexibility of force
    c. Morale increased with lighter loads for infantry
    d. Reduce risk to/need for combat logistics patrols (CLPs), and their need for force protection (FP)
    e. reduction of the logistic footprint;
    f. increase in the operational capabilities of the troops (e.g. by reducing the need for fuel and water convoys and, consequently, decreasing escorts and casualties);
    g. increase in the level of energy security of the operation (e.g. by reducing risk related to reliance on fuel delivery);
    h. reduction in the cost of the energy supply chain;
    i. limiting the carbon footprint of NATO armed forces; and
    j. other related environmental protection and resource conserving benefits (Col G. Bagdonas).
2. Cultural change challenges in the military are common to both Energy Efficiency (EE) and Environmental Protection (EP); EE and EP are interrelated: increase in EE in many cases results in decrease in environmental footprint of military operations; and successful implementation of NATO EP policy requirements rely (to large extent) on enhancing EE. (LCol L. Chubbs, see Annex A-9)

3. EE initiative on enhancing EE through behaviour change and technology can produce positive results in terms of EP, such as reducing emissions and environmental footprint of military operations, e.g. the project of the Oeiras Military Compound (Reduto Gomes Freire, RGF) which was initially designed to reduce electricity consumption (to reduce cost of electrical bill) by changing consumption practices, produced the following significant environmental benefits: saving 1.362.181 kWh (204.892,36€, or 43%) yearly equates to planting 438 hectares (ha) of cork trees or 165 ha of eucalyptus. (A. Fuzeta, Captain, PRT-Navy (OF-5): Annex A-10)

4. Shortfalls in our current approach to base camps that presents risks to war fighters and mission success. We need more integrated solutions to these existing shortfalls in order to yield such benefits as: a) more effective support to operations; b) enhance force protection; c) save money, d) provide greater energy security. (LTC(R) E. Lefler: Annex A-11).

5. Fuel Concerns (Camp ISAF HQ example) (S. San Miguel: Annex A-12) include:

a. Fuel Storage Capacity: fuel storage takes up valuable space, limitations on expansion of the generators or fuel storage.
b. Force protection: it is one of the biggest concerns when it comes to fuel delivery at the camp. When remote re-fuelling of the generator tanks is not possible (when fuel cannot be delivered into tanks from outside the gate), local fuel trucks have to be allowed on camp on a regular basis to refill the tanks supplying the generators. This creates a concern due to the potential for a bombing or other threat. Anytime flammable liquids are used and stored, there is always a concern that it poses a fire or explosion hazard.

6. Concerns about sustainability of military capabilities amongst NATO military forces. According to strategic analyst Mehmet Kinaci (NATO, Headquarters Supreme Allied Commander Transformation, Strategic Plans and Policy Directorate, Strategic Analysis Branch), the stability and reliability of energy supply, diversification of supply routes, and availability of alternative suppliers and energy resources are the factors of critical importance for the Allies when addressing the issue of sustainable military capabilities for their Armed Forces. (M. Kinaci: Annex D-1). He described examples of evidence from past and contemporary deployed military combat operations:

   a. The great tank commander, U.S. Army General George S. Patton, found out the hard way how important oil was (in the form of gasoline) to the war effort during World War II. His tanks were moving fast so as they approached the Siegfried Line of Germany, they all ran out of gasoline. To get more fuel as quickly as possible, it had to be airlifted from Normandy.
   b. Examples from current NATO military operations in Afghanistan include: the southern supply route through Pakistan was blocked in November 2011. For eight months, more than four thousand supply trucks were halted at the border. While essential supplies were still able to reach coalition troops, it comes at a cost. "According to a U.S. Pentagon official, the cost of moving supplies into Afghanistan is now $104 million per month. That's $87 million per month more than the $17 million it originally cost to transport supplies when the border crossings were open."[2] The situation for NATO military forces could have worsened if Pakistan had closed its air corridor given to the US. The costs associated to supply troops in Afghanistan would likely have continued to increase due to this blockage. Hence, based on this historical lesson, the need to reduce the vulnerability of unstable fuel prices forms a mission critical factor essential for operational success. Mitigating unstable fuel prices would contribute to a reduction in NATO military defence spending and reduce dependency on the world's unstable oil regions or on a single supplier. (M.

[2] Luis Martinez, "NATO Supplies to Afghanistan Keep Flowing, But at a Price," *ABC News online*, January 20, 2012, http://abcnews.go.com/blogs/politics/2012/01/nato-supplies-to-afghanistan-keep-flowing-but-at-a-price/

Kinaci: Annex D-1). The enormity of the scope regarding energy challenges can be illustrated by examples from the ISAF mission in Afghanistan:

i. ISAF needed more than 4 million litres of fuel per day in Afghanistan.
ii. For each gallon of fuel used in Afghanistan, up to 4 gallons are consumed for transport. In some cases, delivering of a gallon fuel costed as high as $400.
iii. 3000 US soldiers were killed or wounded from 2003 to 2007 in attacks on fuel and water convoys in Iraq and Afghanistan.
iv. On average one soldier dies in every 24th fuel convoy of the US military in Afghanistan.
v. Delivering fuel via truck over dangerous roads has led to heavy-lift helicopters often being used to deliver fuel to bases in Afghanistan.

c. To reduce dependency upon fossil fuels in the combat theatre, the NATO Nations have begun implementing innovative methods such as: adding solar panels to tents and backpacks, sealing tents with an insulating coating so cooled air does not leak, improving generators, installing battery storage facilities, and erecting smart grids to camps and forward operating bases. NATO Nations must continue to find innovative ways of resourcing, sustaining, and effectively utilizing energy to support its military operations. (M. Kinaci: Annex D-1)

d. The role of supporting elements for their sustainment of combat troops has increased due to changing the nature of warfare since the beginning of this century. NATO Nations now deal with state and non-state actors as well as other state proxies. Dealing with insurgency continues to prove costly and requires more time to defeat adversaries. In order to address challenges posed by the changing security environment, NATO's equipment has changed significantly. NATO military operations require a "right-sized" logistics footprint as one of the key tenets necessary to support the Forces.

e. Historically, during World War I, combat forces comprised over fifty percent of the personnel while the logistic and life support footprint remained rather small. During WW II, the logistics footprint increased more than 25 percent, which has continued trending upward over time.

f. During the First Gulf War and the Iraq War, this "tooth-to-tail" ratio (so called the proportion between the combat troops and the rest of supporting elements for their sustainment) has reached 1 to 4. This significant change (the increased logistics requirements) is a result of increasing demand for supplies and in particular fuel. Providing energy to enable combat troops - fuel to forces - comprises the largest portion of this demand.

g. NATO operations in Afghanistan moved the tooth-to-tail ratio to a new level. The landlocked nature of the country and extremely long lines of communications through non-friendly and non-benign terrain made logistics

more difficult. In Afghanistan, the tooth-to-tail ratio increased to 1-9. Several illustrative examples show the scope of the change:

vi. 250% increase in the number of radios;
vii. 300% increase in the number of IT/computers;
viii. 200% increase in the number of vehicles;
ix. 75% increase in vehicle weight; and
x. 30% decrease in MPG across the tactical vehicle fleet.

h. Each of these examples creates implications of increased fuel dependency resulting in reduction of operational effectiveness measured by a reduction in range and limitations of speed and freedom of movement. This means potential delays to execute missions due do challenges on the supply lines providing an explanation for why the Taliban attacks fuel convoys along the southern supply route in Pakistan and Afghanistan. (M. Kinaci: Annex D-1).

i. The threats to the mission to resupply troops in theatre with fuel and water can be reduced through increased use of EE related measures, access to renewable energy, and on-site water production in theatres of operations. (LTC C. Achte –Annex D-14)

Barriers to Change

This section highlights any potential barriers to achieving energy efficiency in the military, which will need to be overcome in order to be successful in meeting energy saving goals.

1. In terms of oversight and implementation of achieving energy efficiency as an enabler for meeting EP goals through behaviour changes in the areas of concern to NATO, LCol L. Chubbs provided the following challenges:
   a. Staffing - issues of EE & EP are not covered adequately by staff in current NATO Command Structure – need in increase in dedicated personnel to "monitor" and provide "oversight" on compliance
   b. Training - lack of training on EE&EP issues: need to organize general, specialist and leadership training
   c. Individual mind-sets/attitudes should be changed toward more focus and awareness on EE & EP issues, elimination of cultural stigma, elimination of negative "tradition" of neglecting EP issues on the basis of improper perception of "conflict" between EP and operational performance, based on statements such as "Mission First" and "Primacy of Operations"
   d. EE & EP is very much personality driven
   e. Lack in awareness on EE&EP issues, in negative consequences of not solving EE & EP issues ("you don't know what you don't know") (LCol L. Chubbs: Annex A-9)
2. S. San Miguel provided the following additional challenges:

a. Shortfalls in current NATO Common Funding approach: theatre only identifies the requirement/need – it does not identify the solution or set the standard, it does not specify the design, including the need for energy efficiency for the building's systems. The request goes up the chain of command to Europe for approval and action. The specifications are prepared and the contract awarded by NSPA in Europe. Construction is overseen by NSPA in theatre. There is therefore little ability to influence the specification at the theatre level, which means that any requirements for energy efficiency must be built-in to the NATO contracting process "from the top down."

b. Barriers related to Force Protection (FP) - non-negotiable - requirements drive ability to implement technology in theatre:
    i. may not allow for some initiatives (e.g. skylights and windows);
    ii. suitability of technology for different FP levels may be unproven;
    iii. FP levels will determine what can/can't be implemented on any given site in theatre. For example, recommendations to maximize natural lighting through the use of skylights and windows were simply not supportable at ISAF due to the FP level. Windows were actually minimized in order to improve blast protection in buildings. Recommendations need to be realistic based on the nature of these kinds of missions; and
    iv. technology may need to be proven to meet certain FP levels in order for them to be included in designs. (S. San Miguel: Annex A-12)

c. Shortfalls in operational planning: planning challenges include operational realities, stovepipes and blind-zones. During Operation TRILLIUM RESPONSE 2016 (The Canadian Army Experience) EE/Conservation issues have not been addressed directly. Indirectly they were addressed through Air Quality, Noise and Vibration, and Spills. (S. San Miguel: Annex D-9).

Facilitating Factors for Change

The experts identified a number of considerations, experiences and solutions to be taken into account when developing behavioural change initiatives.

1. Operational military personnel should be regarded as a specific sociologic group in a specific context (see figure 1): while remaining also ordinary citizens with their previous background and contextual factors, the special contexts to consider during the operation include being away from home; taking and being exposed to risks; details of each specific mission; being abroad; and other such specific factors. However, their interrelationships and similarities within other contexts, which also influence them, should be taken into account.

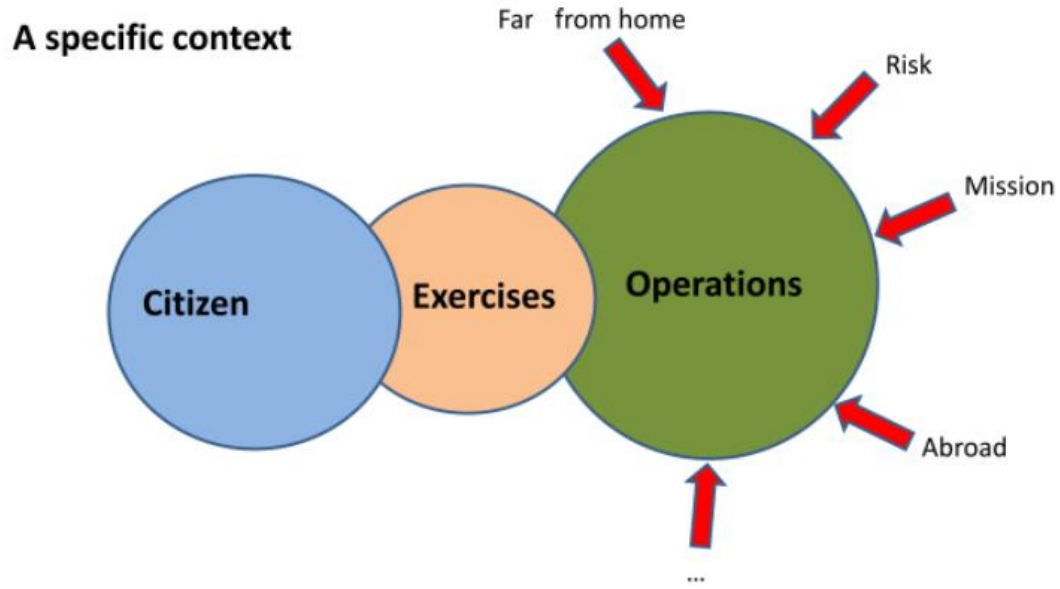

Figure 1: Operational military personnel as a sociological group: specific contexts (LTC Henry, see Annex A-1).

2. Characteristics of a group of operational military personnel should be taken into account:
    a. military environment
    b. organized and structured group
    c. young
    d. male dominated[3]
    e. living in a closed environment (LTC N. Henry, see Annex A-1)
3. Meeting cultural change challenges implies changing collective practices including behaviour, mind-sets, and capabilities, in line with changes in such aspects as materials, competencies, and meanings. Changes take place in a dynamic system, consisting of key elements (knowledge, shared-meanings, rules, values, technological and environmental structure, skills, and habits), which are integrated by relations and communication. (Dr. T. Roosalu, see Annex A-3)
4. According to LCol L. Chubbs, Culture related measures favourable for EE&EP are being developed by: (1) Awareness: promotion campaigns, surveys, lectures, media displays; (2) Training: general, specialist, leadership training; and (3) Resources: manpower, financial.
5. In addition, the following current processes/initiatives have potential to support EE&EP: (1) Political will exists (Political guidance, summit declarations); (2) Review of NATO establishment positions, (3) NATO initiatives [4] (SENT, CL15,

[3] Ratio of Armed Forces male to female personnel is about 85% in France and 90% in the UK.
[4] Description of listed NATO and multinational/national initiatives is in ANNEX C.

SPS projects), and (4) People are talking and asking questions; we need to seize the opportunity. (LCol L. Chubbs: Annex A-9)

6. Including additional means that ensure required combat power: mind-set change is needed that such elements as EE&EP considerations on ensuring water, waste treatment, etc. were included in the chain of elements necessary to ensure proper combat power. – such as:
    a. generation of water on site - filling water resupply gap
    b. grey & black water recycling – achieving 80-95% water resupply reduction
    c. smart power grid management – achieving reduction of total fuel consumed by 20%
    d. power efficient heating & cooling systems (coverage of ~70% of demand) – achieve reduction of total fuel consumption by 20
    e. Gaps in taking into account elements in the chain of understanding of the process of developing combat power (Expectations- Standards – Enforcement) – such elements as efficient management of water, waste, energy, and others
    f. combat power diverted from counter insurgency (COIN) tasks to convoy/base security, base ops & maintenance
    g. lack of standardization, robustness, systems architectures, interoperability & scalability
    h. total life cycle costs are prohibitive (LTC(R) E. Lefler: Annex A-11)
7. Audience to be targeted in the framework of NATO Allies. M. Kinaci indicated the following areas as targets to foster positive changes for reducing EE related vulnerabilities (M. Kinaci: Annex D-1):
    a. Senior management commitment: Nations, NAC, MC IS, IMS; ACT, ACO – NATO Command Structure; NATO Force Structure; NATO Standardization Office; Leaders to soldiers; International coordination and collaboration; International Energy Agency, European Union, Industry, and Academia
    b. Need to conduct stakeholder analysis which should: Identify potential critics; Identify key players and focus on getting their support; Address their concerns and highlight their interests for the success of the project (M. Kinaci: Annex D-1)
8. Actions to be undertaken in the framework of NATO Allies (what needs to be done?). M. Kinaci indicated the following actions:
    a. Identification of factors affecting attitudes and behaviour (including Leadership's priorities, such as: mission first vs EE, creating shared perspectives – Patton's Third Army)
    b. Maintaining interaction between leadership, users and experts
    c. Measuring consumption per soldier, unit, installation – establishing baseline
    d. Developing education and training: creating a toolbox, including individual training, distributed learning, apps, etc.

e. Learning from other institutions and examples - for getting a better picture of attitudes and behaviours through surveys and other observations, understanding physical, technological & cultural context (uncovering a resistance to change); following an interdisciplinary approach (integrating experience from military, civil, scientists from energy and environmental fields as well as social scientists); identification of ways to deal with complexity (developing strategy and policies; focusing on commonalities, talking incremental steps); identification of roles and responsibilities – at every level of supply and demand; avoiding mix messages – establishing priorities, concerns, developing a systemic approach, maintaining focus on objectives, creating incentives – e.g. US Navy Energy Conservation (ENCON) Award program(M. Kinaci: Annex D-1).

9. Ways and means in the framework of NATO Allies (how can we achieve behavioural change?) M. Kinaci indicated a number of means such as:
   a. Selecting behaviours having significant impacts, and assessing the feasibility of behaviour changes
   b. Identification of groups to be targeted, and assessing baseline levels of target behaviours
   c. Identification of the factors determining the relevant behaviour (e.g. motivational factors such as perceived costs and benefits, moral and normative concerns, affects)
   d. Interventions such as informational interventions (for increasing situational awareness and distributing lessons learned) and structural interventions (through developing policy and strategy, and creating shared vision embedded in commander's intent and regulatory changes)
   e. Developing Strategic Communication Plan using printed materials (pamphlets, posters, etc.), internet-based products (e-news, blogs, social media), public channels (displays, word of mouth), promotional items
   f. Establishing a feedback mechanism, including direct feedback (inputs from leaders and users), Indirect feedback (data analysis over time) , energy audits. (M. Kinaci: Annex D-1)
   g. Behavioural change should be perceived as a continuous effort with a long term vision and clear objectives. (M. Kinaci: Annex D-1)
10. European Defence Agency (EDA) Energy & Environment Project Officer, Sharon McManus highlighted the ways to improve behavioural change include: data collection, establishing KPI's/ energy performance indicators (EnPIs), performance vs usage, not making energy an extra job, training: energy using behaviours & energy using target groups, budgets – getting some flexibility, opportunities register, energy part of training and planning, operational control, finding sources of opportunities, cross-functional energy management: having a cross-functional energy management team that goes beyond just operations or

engineering means that energy management becomes a shared responsibility, and that makes it much easier to incorporate significant changes in energy use. (S. McManus: Annex D-12).

11. Essential/critical factors for achieving cultural/ behavioural change

    a. According to the European Defence Agency (EDA) Energy & Environment Project Officer, Sharon McManus, essential factors for achieving cultural versus behavioural changes should include: Strategic drivers, Top Management Support – Senior Energy Executive, getting it right at home – then overseas, leaders or champions (S. McManus: Annex D-12).

    b. According to Ricardo Energy & Environment Principal Consultant Nigel Griffiths, NATO should consider the importance of identifying the critical factors for achieving behaviour change in energy use. For example, NATO should take the following factors into account: (1) the non-domestic environment where motivation to engage in EE behaviours is very different, (2) note that "rationally" may mean different things to different people, (3) absence of a profit motive, (4) little or no scope for dynamic demand control, and (5) forward operating bases.

12. Remaining critical factors include such measures as feedback, audit and community based initiatives as well as structural factors (N. Griffiths: Annex D-16).

13. Building a framework of mandatory good practices: According to ESS France – Consulting expert Geoffroy de Labrouhe, EE is *a must* and energy management is one of the quickest and most cost-efficient ways of addressing it, while improving energy security and environmental challenges. The application of an internationally recognised Energy Management System can provide quantitative energy savings. ISO 50001 Energy Management System standard is a worldwide standard making it the most widely accepted system to manage energy. The concept (a guide with shared constraints) is based on reaching the objective to build a framework of mandatory good practices in managing energy (shared by all NATO Nations). The energy management concept is based on: military Commander buy-in; identification of an Energy Officer responsible for energy performance of the Deployed Force Infrastructure (DFI) with a network of correspondents; a set of compulsory tasks to perform; good energy practices; compliance with a set of procedures; records to log as in a file of evidence of improvement; and application of the Plan Do Check Act cycle as the Energy Management System (EnMS) Backbone.

    a. Role of Energy Officer (EO) and Chain of Command

        i. Joined Task Force Commander to nominate a staff "Energy Sponsor"
        ii. Chief of Staff or Deputy Commander
        iii. Energy Sponsor to nominate a Joint Operations Planning Group (JOPG) Energy Officer (EO) by order

iv. EO should be part of JOPG-3 Operation
v. EO to be supported by the chain of command through a network of Correspondents in other JOPG Groups and by DFI Referents
vi. EO in charge of preparing EnMS before DFI erection
vii. EO in charge of EnMS continuous improvement of DFIs and report to Energy Sponsor

b. Tool kit for the Energy Officer

c. Socio-technical Tools:
   i. Change Management
   ii. Challenges associated with the adoption of any new standardized process
   iii. DFI Energy Officer at the front line
   iv. Socio-technical tools: energy skills
   v. Analyse the report and give recommendations to improve the situation

d. Positive results, including positive effects to behaviours from an analysis of the practices of energy management of 78 organizations certified ISO 50001 in France, Germany, Taiwan, the United Kingdom, others:
   i. 95% A tool to identify energy consumption usages better
   ii. 75% A lever to increase margins
   iii. 46% A lever to negotiate energy purchase
   iv. 35% Facilitator to get investments decision
   v. 85% Ensure continuous and sustainable improvements
   vi. 80% Help to rank strategic moves
   vii. 76% A lever to increase personnel skills
   viii. 62% An opportunity to benchmark to other
   ix. 62% Legal texts monitoring opportunity
   x. 57% Trigger innovation on activity process
   xi. 53% Trigger new services and solutions
   xii. 36% Health, safety and comfort improvements (G. de Labrouhe: Annex D-13)

14. Experience with EE issues in the framework of implementing a balanced triple net strategy: According to Dr. Sirkku Juhola (Department of Environmental Sciences, University of Helsinki), Triple Zero Net Energy Water and Waste Models Applications focus on knowledge transfer from civilian initiatives to military compounds. The knowledge transfer process spans theory, methods, and applications in a holistic approach to energy, water, and waste management that could be used at military installations. When a systemic view is adopted already in the planning phases, it is possible neutralize and minimize potential negative outcomes in the long run. In order to achieve this, energy planners and users can use different approaches for dialogue and communication to create shared understanding. Without significant political backing and appropriate policy

measures and incentives, transition toward overall sustainability proves unlikely. (S. Juhola: Annex D-7).

15. Experience in dealing with *EE and Cultural change within Power* Forward Operating Base (*FOB) Programme approach:* The UK created an open system approach based on a number of principles, including cultural and behavioural changes, to allow the integration of management, storage, and renewables. The PowerFOB Programme exemplifies this approach in an effort to gain maximum benefit. The open architecture allowed the UK to utilise the emerging Generic Base Architecture standard, which reduced the complexity of potential solutions through a 'plug and play approach'. Another aspect to the approach includes minimum human intervention after installation of the system. For example, the system could be programmed to automatically load-share, or to maintain power for critical functions within the FOB during fuel shortages without a user's input. However, maximisation of EE requires cultural change that makes people recognise fuel as a rare commodity when embarking on military operations. (J. McMenemy: Annex D-8).

16. Experience in using holistic approaches to EE *in Military*, peacekeeping, development aid, and humanitarian aid within different climate zones: Swedish Defence Research Agency expert, Annica Waleij, highlighted human factors as important facilitators when properly used through different aspects such as:

    a. performance monitoring,
    b. awareness training,
    c. performance evaluation,
    d. existence of mature guiding policy,
    e. integration EE issues early in the planning process,
    f. need in change of mind set/behaviour and champions to facilitate it,
    g. leveraging energy or environmental issues with other topics making it easier to offset them at the operative level,
    h. proving that suggested means work, and
    i. taking into account that capability to choose the right solution/tool at the right time is paramount (see Annex D-9).
    j. Planning challenges include operational realities, stovepipes, and blind-zones requiring key functions and roles for EE to be identified, defined, and championed. Then EE should become "part of doing business." (A. Waleij: Annex D-9)

17. Experience in using a Comprehensive Approach to Military Energy Management: *The* EDA representative, Energy & Environment Project Officer Sharon McManus, highlighted this approach focusing on how to effect behavioural and cultural change. EDA plays the role of an interface between EU Policies and EU Armed Forces using different means such as the Consultation Forum on

Sustainable Energy in the Defence and Security Sector; conducting projects/experiments in the field, data collection, sharing & analysis; Energy management systems training; and others. The EDA focuses its activities on EU Energy legislation and funding mechanisms, and how they apply or could apply to the military sector to achieve practical implementation. (S. McManus: Annex D-12)

18. Experience with "Behavioural Energy Operations Demonstration (BeyOnD)": *BEyOnD* relies on the critical concentration of more than 20,000 scientists, engineers, and technicians with over 550 PhDs. The BEyOnD Team includes Resource Sponsors, Program Management/Execution Lead, Requirements - Expeditionary Energy Office, Contracting Consultant, and Behavioural Change SME. BEyOnD phases include:
    a. gathering all prior human behaviour studies surrounding energy within the U.S. Department of Defense (DOD), and targeting missing data through a collection effort (observation, interviews) during training exercise(s),
    b. use of energy-focused human behaviour experts to analyse data from prior studies and from training exercise(s) in order to design experiments that evaluate the efficacy of potential solutions,
    c. conducting design of experiments that measure the impact of those solutions, and
    d. transition of evidenced-based solutions to the appropriate requirements, acquisition, training, and operational communities.
    e. User behaviour transitions may take the form of software upgrades, Force Structure Changes, TTP changes, Engineering Change Proposals, MIL-STD changes, Incentive Programs (E. Shields: Annex D-6).
19. Experience with Irish Defence Forces (IDF): The IDF has gradually developed a system for home-based military organisations, which will have to further application within the overseas environment. Main features of Energy Management include a balance of three key elements (organisational, technical, and people) and six main steps under three main focus areas:

Focus Area	Steps
Commit	(1) Secure support from top management; (2) Collect, track, and analyse energy data;
Analyse	(3) Identify key energy uses; (4) Establish a baseline;
Act	(5) Identify energy-saving opportunities; and (6) Prioritize opportunities.

The IDF had previously established an Energy Management System and, in order to achieve ISO 50001, they concentrated on and developed three key areas:

a. Senior Energy Executive (SEE): Establishing the SEE brought together key Defence Forces leaders in energy using areas, brought discussion of energy from a low level to a high level. Deputy Chief of Staff Support (D COS Sp) from the IDF General Staff provided enthusiasm, interest, and authority as a crucial aspect of moving this forward. Corps Directors ensured their AORs were included and they were accountable for energy use. Very important to have a strong management rep to lead meetings, i.e. Defence Engineer (DEngr) in Irish case.
b. Opportunities Register – first time to do this. The shared drive and this register means that all ideas will now be captured and considered. There are difficulties here especially with quantifying energy savings – more work needed here but is the most useful tool (IMO) and most relevant requirement out of all the ISO 50001 requirements.
c. Operational Control coefficients of performance (COPs): Establishing COPs and energy performance indicators (EnPIs) provides a key to energy savings a basis to work from. Identifying the operational control aspects for energy using areas proves essential to achieve energy savings and was relatively easy to establish and implement. Oversight is important. (S. McManus: Annex D-12).

20. United States' experience from *Smart And Green Energy (SAGE), BeyOnD, Net Zero Operations, Energy Command and Control (Energy C2)* initiatives: once data is automated it is easier to manage - use the automation to sort the data, provide the user the correct amount of data, use the automation to provide a visualization, and use the data to impact behaviour change. (T. Decker: Annex D-15)

21. Experience with energy management ISO 50001 at La Valbonne' barracks (3000 pers. on site). In 2012 the French MoD's five-year energy strategy (2012-2017) defined five major trends, all including energy performance: security provision, service quality, environmental impact, economical efficiency, and EE in five 5 main efforts directions: purchasing, knowledge, governance, rationalization, and autonomy. Reasons for implementing ISO 50001 energy management system includes everybody takes their share on the same basis and energy management becomes a new common culture. Implementation of the IM 500052 directive includes simple actions for users/agents with little instructions or tools and regular infrastructure state supervision rounds. Energy Performance Indicators established brought positive results ("If you can't measure it, you can't improve it"- Lord Kelvin). "Resupplying troops in theatre with fuel and water is a mission in which personnel vulnerability can be reduced through increased use of EE, renewable

energy, and on-site water production in theatres of operations." Conclusion: success is based on everybody's engagement, all levels commitment, and continuous action for an unlimited length of time. Every Soldier is an Energy Manager. (LTC C. Achte –Annex D-18)

22. Smart application of accumulated and newest knowledge on behaviour change in energy and sustainability domain includes a current understanding of behaviour change in energy and sustainability domain, which helps to highlight the importance of:
    a. Multi-level, inter-disciplinary, mixed-methods and cross – conceptual approaches,
    b. Taking into account contextual factors,
    c. Cross-organisational thinking,
    d. Integration of various kinds of intervention means,
    e. Understanding of target groups awareness, perceptions, practices, behaviour and attitudes to energy,
    f. Ascertaining awareness, perceptions, practices, behaviour and attitudes to achieving energy efficiency, and
    g. Engagement of stakeholders and energy users in the transformation process.
23. According to University College Cork representative Mr. Niall Dunphy (Annex D-20), focus on the built environment and energy includes efforts of inter-disciplinary teams involving: engineering, science, architecture, political science, sociology, and psychology. Providing an example of the current understanding of behaviour change, Mr. Niall Dunphy pointed out that recently the scientific community has seen a significant shift from a cognitive model of human behaviour to perspectives, which seek to situate energy-related behaviours in their wider social context. In this way human practices are seen as shaped by a complex interplay of technological systems, infrastructures, institutions, social norms, and individual perspectives. This embraces the inter-related literature on habit, practice theory, socio-technical systems, and transitions management. Therefore, the perspectives which combine a practice approach with the concept of socio-technical systems and the insights of transitions management theory offer considerable promise. The consolidated approach focuses onto exploring human factors in energy systems through an integrated and mixed-methods approach, centred on practice and behavioural aspects in particular. Additionally, the approach leverages newly developed knowledge and insight on the technical, policy, and socio-economic aspects of the energy system to inform innovation and widespread stakeholder engagement. The European ENTRUST Project provides one example of such an approach to energy transition on the bases of the developed concept and objectives.[5] (see Annex D-20). The Greek military project "Sustainability in Defence," presented by Major Konstantinos Papapetridis is

[5] ENTRUST Project: http://www.entrust-h2020.eu/the-project/.

based on a comprehensive multi-level approach and includes 5 target groups and various kinds of intervention means (see Annex D-21).

24. Key functions and roles for EE need to be identified, defined and championed. EE should become 'part of doing businesses'. (S. San Miguel: Annex D-9).

Experts' Recommendations

This section details recommendations made by experts at the advanced workshop for the best ways to proceed with implementing Energy Efficiency measures in the military.

1. EE&EP measures are to be developed and implemented:
    a. within Sustainable Camps framework (LTC(R) E. Lefler: Annex A-11);
    b. by following logic model/theory of change for development and implementation of EE&EP measures; by focusing on key, achievable initiatives; by establishing link to NATO and mission strategic, operational and tactical goals (S. San Miguel: Annex A-12);
    c. by using integrated energy consumption management system based on spiral development methodology constant monitoring and control of energy efficiency (A. Fuzeta, Captain, PRT-Navy (OF-5): Annex A-10); and
    d. by considering field expedient methods; more enduring methods and future methods (LTC(R) E. Lefler: Annex A-11).
2. Raising awareness of best decision making practices is important (e.g. which contextual factors to consider in making decisions related to using disposables versus non-disposable) and their impact on solid waste generation, power requirements, water requirements, grey water generation, fuel/transport for resupply.
3. Transform EE&EP considerations into an order: make them a part of policy, doctrine, standards, OPLANs, SOPs, directives.
4. Raising awareness about multiple benefits and existing requirements related to implementation of EE&EP measures in the framework of Sustainable camps (those listed in the "Benefits of Change" section).
5. Transform barriers into enablers:
    a. Address shortfalls in respect of Contracts & Specifications:
        i. seek buy-in of contracting agencies to include energy efficiency standards in all contracts (e.g., construction, equipment, services);
        ii. identify specifications for all lifecycle stages and include in relevant contracts (e.g. O&M, services); and
        iii. Identify consistent, achievable performance standards (i.e. beyond NATO-member capability).
    b. Address the following shortfalls within Force Protection:
        i. harmonise with existing NATO FP Guidelines;

ii. prove technology for different FP levels;
iii. develop 'mix and match' options for different FP levels; and
iv. built-in flexibility to adapt to conditions (i.e. scalable, modifiable).

6. A Logic Model provides a helpful tool to guide program development and evaluation by asking the following questions: What outcomes/impacts do we want to achieve? What outputs will be produced? What activities/inputs are needed? What assumptions, resources and other items are needed to enable change?
7. The focus should be on key achievable initiatives and establish the link to NATO and mission strategic, operational, and tactical goals. (S. San Miguel: Annex A-12)
8. Recommendation to use national/multinational initiatives on enhancing energy efficiency through behaviour change, which could produce tangible results for raising awareness, training, resource generation and other activities targeted to change mind-sets and behaviours, and to develop additional capabilities for enhancement of energy efficiency in the military. (Dr. S. Kavaliunaite: Annex A-2)
9. Recommendations on measures to be undertaken in order to avoid negative consequences of not supporting enhancement of energy efficiency in NATO (see Table 1 and Annex A-7).

Table 1 lists measures to be undertaken in order to avoid negative consequences of not supporting enhancement of energy efficiency in NATO as Group Discussion Results from the Vilnius ARW 2015 (see Annex A-7; compare to Annex A-6, which lists some of the consequences of not supporting enhancement of EE)

Table 1: Measures Required for Positive Consequences of Enhancement of Energy Efficiency

Policy and Strategy (Interoperability and Standards)	1. Approved NATO Policy and Strategy on energy efficiency 2. Level of ambition of operations will be increased/enhanced 3. Budget efficiency based on a strong energy policy
Resources and Technologies	1. Enhanced operational resiliency due to optimization of financial costs 2. Less effort required on providing energy and logistics to operations 3. Set the example on energy efficiency/role model for society.
Security	1. Mission effectiveness enhanced due to better energy efficiency 2. Force protection improved due to decreased logistic footprint 3. Advantage over adversary due to energy efficiency
Environmental Protection	1. Decreased environmental footprint 2. Environmental sustainability and stewardship

10. Recommendation to use the following principles to develop models for behaviour change interventions in military compounds:
    a. Include a focus on user-behaviour (e.g. attention to human behaviour as the driver for change);
    b. Use a holistic approach (e.g. combine technological and behavioural solutions) OR follow a simple and replicable methodology;
    c. Consider communicating the need for change through word-of-mouth (e.g. 'activity through person to person communications') – this tends to be a low cost activity;
    d. Identify gaps before identifying the best way to address the problem, and conduct a cost-benefit analysis;
    e. Wherever possible, use a 'partnership' approach (e.g. civilian, military, industry); and
    f. Wherever possible, use an internationally recognised standard / measures for energy management (see Annex A-16).
11. Recommendations for monitoring and optimizing energy usage in deployable camp:
    a. US (SAGE) and UK (FOBEX) project leads should be contacted by NATO ARW to obtain project data for further analysis and comparison with other projects in order to produce a decision aid for Commanders;
    b. Interoperability and force protection concerns should be discussed with the NATO OPRs to determine suitability of technology for accepted standardization by NATO member nations; and
    c. Conduct targeted study to define impacts on human behaviour from use of these technologies (e.g., how the technology influences human actions). A second study can consider the impact on the technologies from human behaviour (e.g., how human actions affect the technology) (see Annex A-15).
12. Recommendations on using Best Practices for achieving environmental benefits through behaviour change that enhances energy efficiency:
    a. Awareness and promotion campaign focused on global benefits (financial, environmental, social, etc.) of the project of the Oeiras Military Compound (RGF) (target audience - senior management);
    b. Top-down approach;
    c. Use education and training tools;
    d. Early incorporation of environmental considerations to entice further investment;
    e. Use this project as a case study for educational program; and
    f. Use this project as a blue print for the future implementation (see Annex A-16).

13. Recommendations to use NATO ENSEC COE project "EE: Cultural Change" as a facilitator:
    a. This project is an important initial step in the right direction for a long journey to improve EE of military forces. Completing this report should not be perceived as mission accomplished. Findings and recommendations should provide tangible action items and lay out a long term plan to achieve behavioural change.
    b. A stakeholder analysis would help to identify how this report could be operationalized. A champion should be identified. Other stakeholders' needs should be incorporated. In addition, education and training tool box needs to be further defined to answer the questions: Who? What? How?
    c. Opportunities such as exercises or experimentations should be used to establish a baseline.
    d. A comprehensive program should also be developed by NATO Science and Technology Organisation/Collaboration Support Office (STO/CSO) for coordination. (M. Kinaci: Annex D-1).
    e. This project provides tools for addressing the challenges related to tactical and operational vulnerabilities from a logistics perspective and in terms of human capital on NATO level. The aim should focus on changing how members of military organisations view and use energy. This should result in lasting behaviour change across many different levels for NATO Nations and Partners based upon developed recommendations, tool-boxes, and successful experiments (for creating energy efficient habits, practices, and competencies) leading to common standards and policies. (S. Kavaliunaite: Annex D-2)
14. Recommendations for triggering the process by creating opportunities based on the potential synergistic effects (e.g. for politicians of the Euro-Atlantic community) for solving other security related issues of high importance to NATO. NATO could explore the efficacy of establishing troop EE training sites on a rotational basis prior to military deployments, which could help minimize the security threats in vulnerable regions (indicated in Readiness Action Plan (RAP) agreed by NATO in 2014 Wales Summit). Vulnerable regions (partly overlapping with those indicated in RAP) are also indicated in the "Ambiguous Threats and External Influences in the Baltic States" study by the NATO Asymmetric Operations Working Group conducted in 2015. The Study states that Russia's strategic objectives to discredit and dismantle NATO and undermine the EU by using the Baltic States, includes scenarios involving a deliberate and sudden Russian conventional attack on the Baltic States, and possibly Gotland Island. (S. Kavaliunaite: Annex D-2)
15. Recommendations in Respect of Consistency of NATO Doctrine and Policy on EE

According to Military Engineering Centre's of Excellence expert LtCol Stephane Cauderan, while considering Military engineering **(**MILENG) and EE in NATO versus "behaviour change in the Military" it is important to take into account current status of NATO doctrine and policy in this field in order to follow principles of modularity, interoperability and sustainability. A number of NATO publications tackle these issues in a consistent manner: AJP-3.12 (Allied Joint Doctrine for Military Engineering), ATP-3.12.1 (Allied Tactical Doctrine for Military Engineering), ATP-3.12.1.4 (Deployed Force Infrastructure), publications on Environmental Protection (EP) doctrine, logistics doctrine, and other related initiatives and projects. The NATO Military Committee (MC) Policy 0626 contains a number of guiding provisions on the issues of achieving EE involving human factors including the implementation of an effective energy awareness campaign plays a key role in the success of any energy conservation program.

By influencing individual actions and behaviours it is possible to reduce overall energy consumption. The two elements to achieve awareness include 1) the provision of training to inform all personnel on the best practices needed to minimize energy consumption and 2) reinforcement of feedback within training highlighting successes or potential areas for improvement. In order to validate the impact of energy awareness campaigns and conservation programs, senior military engineers should establish performance measurement criteria to both guide decision making and provide focus for further conservation efforts. Most importantly, the support of the chain of command, beginning with the commander, is essential to instil a true "energy conservation ethos down to the lowest level."

The Joint Forces Engineer (JFENGR) at the operational level and the Chief Engineer at the tactical level advise the commander on operational energy concerns such as energy conservation programs, awareness plans, and training objectives. Several NATO entities create publications regarding EE in the military such as: NATO Military engineering working group (MILENG WG), NATO MC Joint Standardization Board (JSB) Environmental Protection Working Group (EP WG), NATO Allied Command Operations (ACO), Environmental Protection, and the EE Working Group (EPEE WG). (LtCol S. Cauderan: Annex D-4)

Furthermore, considering the aspect of doctrinal consistency, it is useful to take into account experience of US Army Energy Efficient Operations efforts for base camps, garrisons and installations. According to the Head of Directorate of Environmental Integration of US Army Engineer School, Mr. Edward Lefler**,** environmental considerations and sustainability issues are prevalent across all types and sizes of base camps. They rely on changes in mind-set. One of latest initiatives of this kind "Behavioural Energy Operations Demonstration (BeyOnD)" described in detail by Mr. Eric Shields, Deputy Branch Head, Code 636 Advanced Power & Energy, Naval Surface Warfare Centre Carderock) seeks

to reduce ground-based USMC fuel consumption in austere environments by over 10%.

The program's leaders intend to achieve this by leveraging modern human behaviour modification techniques, currently applied in the commercial world, at little to no cost through four focus areas: (1) vehicle idling, (2) vehicle operations, (3) environmental control units, and (4) electrical equipment usage. BEyOnD will provide behavioural analysis based recommendations to increase Marine Corps operational reach and effectiveness through review of prior human behaviour studies surrounding energy within DoD, conduct targeted collection efforts to fill in the gaps, have expert analysis of the data, conduct experiments to measure the impact of potential solutions and then transition evidenced base solutions into appropriate requirements. (E.Lefler, E. Shields: Annexes D-5, D-6)

16. Recommendations to use national and international surveys and workshops results related to achieving EE through behaviour change in defence sector:

Findings of Baselining Energy Behaviours across UK MOD Survey (presented by J. Doran – Annex D-17) include:

1. Awareness of requirement is not widespread across defence:
    a. 44% of those without official responsibility for energy management not aware;
    b. Disjoint between energy policy writers / managers - vs - energy users.
2. Awareness of energy reduction targets and initiatives not widespread in largest users:
    a. e.g. largest users 55% - vs - support/admin 75%.
3. Attitudes of military personnel generally not substantially different to civil servants (after controlling for official energy roles).
4. Awareness does not ensure appropriate behaviours, but without awareness appropriate behaviours are unlikely.

Findings of Baselining Energy Behaviours across UK MOD Workshop (presented by J. Doran – Annex D-17) include:

Intervention Options: Lessons

1. Intervention – vs – Incentive:
    a. use of rewards, even large ones, may be insufficient to motivate change
    b. financial incentives are limited
2. Social norms are influential:
    a. 'we' is the most important word in behaviour change
    b. co-design interventions
    c. staff engagement

3. Emphasise any secondary effects:
    a. e.g. not using the lift (elevator) can make the staff fitter as well as saving energy
4. Timing - windows of opportunity
5. Information is important but not sufficient for behaviour change
6. Senior management support:
    a. empower individuals and teams to innovatively explore energy savings
    b. don't be too prescriptive
7. Use a variety of communication tools:
    a. the right message via the right messenger
    b. local resources increase relevance
    c. make it personal
8. Transform the goal: distant objective (e.g. comply with energy consumption targets)-vs –proximal goal (e.g. specific energy task completion)

Intervention Options: Behaviour Change Top 10:

1. Identify the discrete behaviour you want to change and understand the context.
2. Interventions must be tailored to the context.
3. Successful behaviour change uses a multi-intervention approach.
4. Align the intervention with non-financial goals (e.g. environmental, safety).
5. Behaviour change interventions need to be designed collaboratively with staff.
6. Identify who is likely to be the best messenger for providing the behaviour change message.
7. Financial incentives are NOT the only interventions available to change behaviour - incentives can drive anti-behaviours.
8. Split-incentives make changing behaviour more challenging (e.g. bill payer vs. energy user).
9. If you can't measure energy use, measure energy behaviours.
10. Successful behaviour change relies on the trio of capability, motivation, and opportunity.

Findings presented by dr. Jurate Cerneviciute, dr.Triin Roosalu (see Annex A-8 and D-3) of this this study's surveys, which were designed with the purpose of understanding and ascertaining of military target groups awareness, perceptions, practices, behaviour and attitudes to achieving energy efficiency in defence sector. The methodology and results of survey are presented in the next section.

Findings of SWOT Analysis of Measures of Projects/Experiments during two international Advanced Research Workshops

Experts during group discussions within three syndicates (in the framework of two workshops in Vilnius: ARW 2015 and ARW 2016), analysed various behavioural interventions that were implemented in different national and international frameworks.

Analyses of sets of measures used during various projects and experiments showed that though they were conducted in various contextual frameworks requiring different sets of measures, a number of measures with positive outcomes (e.g. metering and monitoring of energy usage, commitment of top leadership and management, regular training as a principle of continuity, raising awareness, visualization of data, performance monitoring, awareness training, performance evaluation, existence of mature guiding policy, and integration of EE early in the planning process) can be detected in different settings. For each combination of a particular set of measures and contextual factors, specific strengths, weaknesses, opportunities, and threats have been indicated. (Annexes A-14 through A-16 and D22 through D-24)

Experts' Recommendations for Handbook on EE Behaviour Facilitation in Military Operational Environment:

The handbook should include information on a variety of best practices from numerous interventions and experiences on different levels of the military community for raising awareness, training, creating motivation, and enabling adequate approaches by applying measures that facilitate EE behaviours in military installations. (Annexes D- 22-D-24)

Experts' Recommendations as Outcomes of ARW2016 Final Discussion

What is the (military) EE Roadmap?

1. Eliminate cognitive burden of soldiers by limiting energy-intensive activities to the major areas
2. Planning and adapting electrical grid to maximize utilization
3. Use vehicles efficiently
4. Manage environmental controls, other major areas
5. Part 1 – Behavioural (today – leaders, middle management, soldiers)
6. Part 2 – Technology
7. Part 3 – Management (life cycle, business model)
8. Identify achievable actions
9. Determine End Goal
10. Determine if applied to fixed installations AND deployable forces or not
11. Develop a coordinated, interactive, and adaptive implementation timeline

12. Identify Energy Savings (per Dr. Yamina Sahe's presentation) – need indicators tailored to requirements
13. What is the need to achieve military EE?
14. What happens if fuel availability reduces rapidly?
15. Determine if a multi-pronged or faceted approach
16. Should EE focus on individual or leadership or multiple areas?
17. Identify NATO Partners' EE activities

Who should be the EE Champion(s)?

1. Political Level: NATO IS – ESCD (Emerging Security Challenges Division)
2. Operational Level: ACO and ACT (Strategic Plans & Policy (SPP) – RADM Gumataotao)
3. Logistics
4. Operations
5. Plans
6. Engineers
7. NATO HQ: Standardization element
8. Adopt and comply ISO standards that apply to NATO Military needs
9. ENSEC COE and MILENG COE

What opportunities can we use to trigger military EE?

1. Low energy prices without a crisis equates to lack of opportunities? And, externality out of our control.
2. Triggering point: missions and objectives
3. Avoid focusing strictly on energy crisis but more holistic thinking
4. What crises provide opportunity to escalate the EE roadmap?
5. Hybrid threats (e.g. occupation of Ukraine = increase in vulnerability of other regional states)
6. Refugees issue: Nations' militaries asked to support security and other requirements
7. Humanitarian relief contingency missions from disasters or other factors
8. Identify key positions championing EE to build enthusiasm
9. Don't spend "energy" on non-enthusiastic areas
10. Look at intercontinental planning for future operations (logistics challenges)
11. Identify EE aspects that provide tactical advantages

12. Significant technology development
13. Military exercises and experiments to get forces thinking about EE and highlight tactical advantage

What other methods can we use to progress this effort?

1. Collaborative space
2. Nations provide at least 10 pieces of data for collection, comparison
3. Standardization of data collection and metrics (measurements)
4. Energy required for camps
5. Civilian metrics as a comparison
6. Reports on NATO exercise outbriefs
7. Develop social network profile
8. ENSEC COE LinkedIn profile and other social media
9. ENSEC COE send data collectors to exercises
10. ACT experiment (2017) could be data collection plan to establish a baseline
11. Sharing Lessons Learned
12. Bi-annual meetings of stakeholders (ENSEC COE or NATO HQ or Nation or other organisation) (Annex D-25)

Survey on Energy Efficiency in the Military

The survey on energy efficiency in the military was conducted from June 2015 to May 2016. Questionnaires were distributed and pinions of military and related civilians were collected during several rounds in different settings in different countries with respondents from various nationalities and sectors of Armed Forces (Army, Navy and Air Force). Results were analysed by 2 sociologists - authors of this (Second) Part of this Study (members of Consortium of 4 Research Entities): Dr. Jūratė Černevičiūtė and Dr. Triin Roosalu. Both of them presented intermediate results of the Survey during both ARWs. (see Annex A-8 and Annex D-3)

The main goal of the pilot study was to determine the opinion of officers and soldiers on issues on energy efficiency and identify the motivators influencing their behaviour in different cultural contexts. More than 1000 responded to a questionnaire designed to gain an understanding of how military personnel view energy efficiency issues. One of the major questions was to determine if currently prevailing practices (based on attitudes, behaviours, and developed capabilities), as well as national cultural differences in the military, were considered as serious obstacles for developing energy efficient behaviours.

The results from the survey helped determine how to accomplish military missions using energy efficiency best practices that avoid limiting operational capacity. This is important for identifying the scope of supporting factors as well as possible obstacles for implementing strategies aimed at changing attitudes and behaviours for improving military energy efficiency.

Relying on literature review and theoretical models, the results of the first phase of the study "Energy Efficiency: Cultural Change" suggested that the most efficient strategies of bringing about cultural change in military have to pay attention both to the extrinsic as well as intrinsic motivation of military personnel. The first report suggested the integration of top-down approaches (usually regarded as responsive to extrinsic motivation) with bottom-up approaches (that adds to and builds intrinsic motivation).

In order to test the suggestion, one of the aims of this pilot study was to detect to what extent the use of such an integrated strategy would be desirable in the context of contemporary military organisations. In sociological approaches, the organization is depicted as a number of interrelated, interdependent, and interacting subsystems undergoing continuous change. Despite its hierarchical organisational structure, the military is an organisation where sociological methods can be used. However, due to the military's particular motivational factors as compared to civilian organisations it was decided to operationalise these dimensions for the survey. This follows the approach whereby traditional organizations are based on either of two sets of assumptions about human nature and human motivation, which can be as suggested by McGregor called *Theory* **X** and *Theory* **Y**[6]:

[6] See: McGregor, Douglas.1960. The Human Side of Enterprise. New York: McGraw-Hill; Selznik, Ph. 1966.*TVA and the Grass Roots: A Study in the Sociology of Formal Organization*. NY: Harper; Shafritz,

- *Theory* **X** assumes that most people prefer to be directed; are not interested in assuming responsibility; and are motivated by money, fringe benefits, and the threat of punishment.
- *Theory* **Y** assumes that people can be basically self-directed and creative at work if properly motivated.

While McGregor's theories retain relevance in basic approaches to management and leadership, military leaders understand the more contemporary approach to organizational management where management and leadership approaches require tailoring to fit the situation. Within this situationally dependent context, the success or failure of planned change depends on the correct identification of the problem and on recognition of the military person's potential resistance to change. Recognizing the need change presents a critical challenge to successfully implementing the most effective change strategy to achieve organizational development efforts.

Modern leaders in various types of organizations recognize the importance of communicating their goals in order to motivate employees to follow them. Leaders' goals should consist of fitting people into situations in such a manner as to motivate them to work together harmoniously and to achieve a high level of productivity, while also providing psychological satisfaction.

The survey allowed us to test the relevance of both types of motivations in the military contexts when energy efficiency is the considered goal.

Method

The original questionnaire was used to measure energy efficiency attitudes, awareness, and experiences among the military. It consists of 13 simple questions and can be filled in on paper or online. The results of the 1013 respondents to each of the 13 questions are included in this section. The questions concerned include:

- personal awareness on energy efficiency means
- experience in energy efficiency initiatives
- behaviour habits regarding energy saving during missions
- the existing attitudes to energy efficiency

There are English, Lithuanian, and Estonian language versions of the questionnaire. The online survey has option for open comments to all questions.

Sample

A convenience sample was used, based on voluntary participation of army-related persons (both military and civilian), contacted directly by NATO ENSECCOE and by Tallinn

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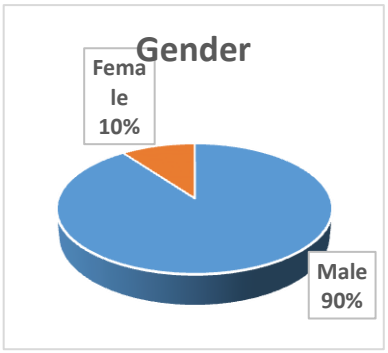
J.M.2010. *Classics of Organization Theory.* Boston, Cengage Learning; 7th ed.; Segal, R.D., Segal, M.W.1983.ChangeinMilitaryOrganization. *Annual Review of Sociology.* Vol. 9 (1983), pp. 151-170.

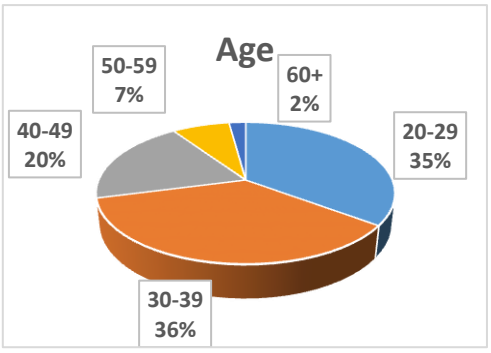
University. The majority of respondents answered on paper and 24 percent provided answers to the online questionnaire. The following analysis is based on 1029 fully filled in questionnaires. (NOTE: Not all questions were answered by some of the respondents, which makes the number of responses to some questions less than 1029.)

Demographic composition of the respondents is the following:

Gender

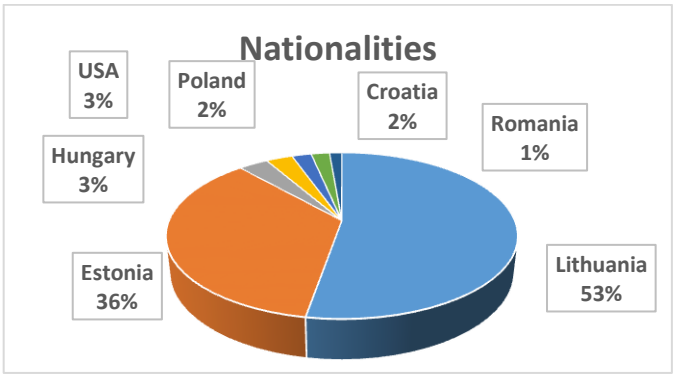


Age



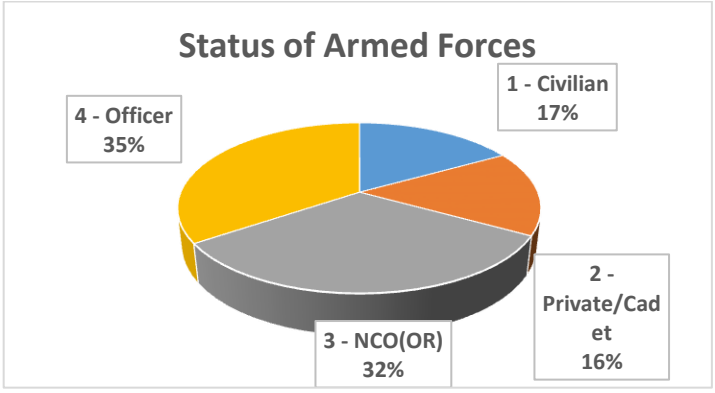
Nationality

Altogether 25 NATO member states are represented. Most numerous are respondents from Lithuania and Estonia.



Status in the Armed Forces

Officers and NCO-s comprise over 60 percent of the respondents, whereas there are relatively few privates and cadets (16 percent).



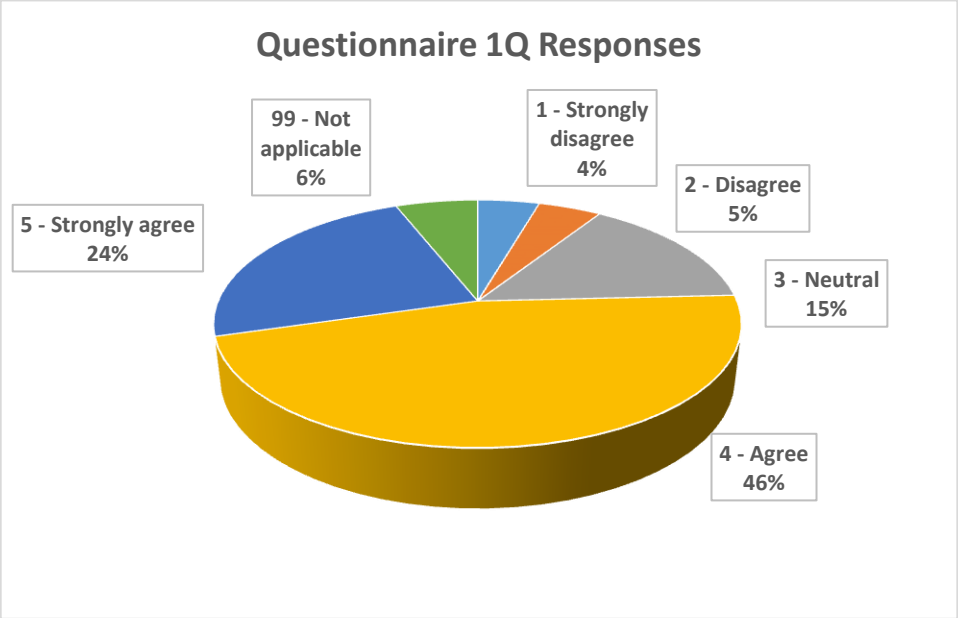
There are 16 subsamples, which differ in sample size and procedures of answering. An overview of subsamples is given in the following table:

Location	Event	Time	Sample
Hungary	*Capable Logistician 2015*	June 2015	129
Lithuania 1	*Baltic Ghost 2015 Cyber TTX*	Sept 2015	11
Norway	*TRJE 15 EXCON*	Sept/Oct 2015	29
Germany	*(ETOC Code: OPS-SA-5131)*	Sept/Oct 2015	30
Lithuania 2	*ARW 2015 ENSEC COE*	Nov 2015	11
Lithuania 3	International Vytautas the Great Army Command and Staff Course (26 responses in Lithuanian, 11 in English)	2016	37
Lithuania 4	The Lithuanian Navy (Naval Force)	2016	13
Lithuania 5	Air Defence Battalion of Lithuanian Air Force	2016	79
Lithuania 6	Center - Land Force Juozas Lukša Training a unit of the Land Force of the Lithuanian Armed Forces.	2016	23
Lithuania 7	Juozas Vitkus Engineer Battalion of the Lithuanian Armed Forces	2016	161
Lithuania 8	Training and Doctrine Command (TRADOC) and Logistics Command		4
Lithuania 9		December 2015	91
Lithuania 10	Lithuanian Army Logistics Department		65
Estonia 1	Baltic Defense College in Tartu	February-March 2016	27
Estonia 2	online survey in Estonian (distributed throughout Estonian Defense Forces and paramilitary organization Kaitseliit)	April-May 2016	217
international	online survey in English	May 2016	3
Estonia 3	Scouts battalion	May 2016	83

Descriptive Data – Questionnaire: Energy Efficiency in the Military

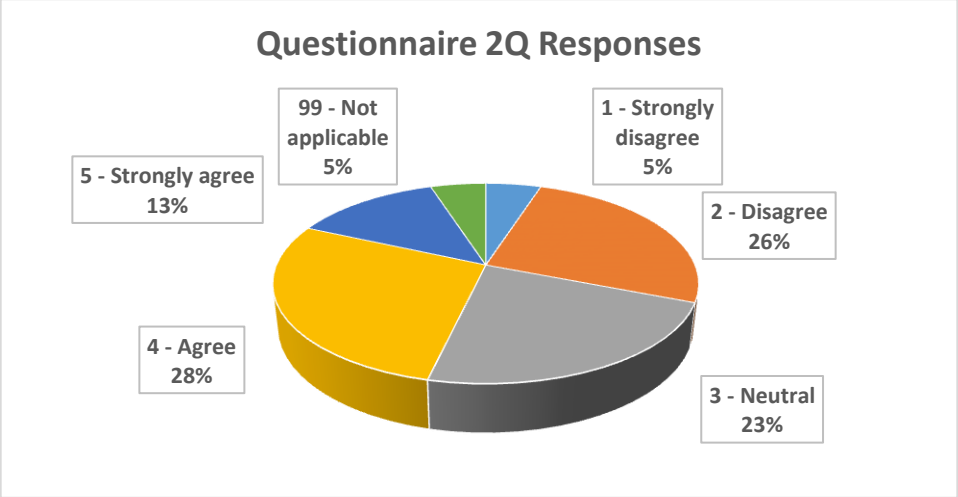
The following data provides the descriptive areas from the questionnaire completed by the 1013 participants as indicated in the preceding table. This data gives the indication of how military and civilian personnel in the military view energy efficiency from an operational perspective. The data can be used to provide insights for NATO's leaders to determine how best to support behavioural change toward energy efficiency.

1q. Do you agree that energy efficiency in the military means accomplishing the same task using less energy without limiting operational capability?



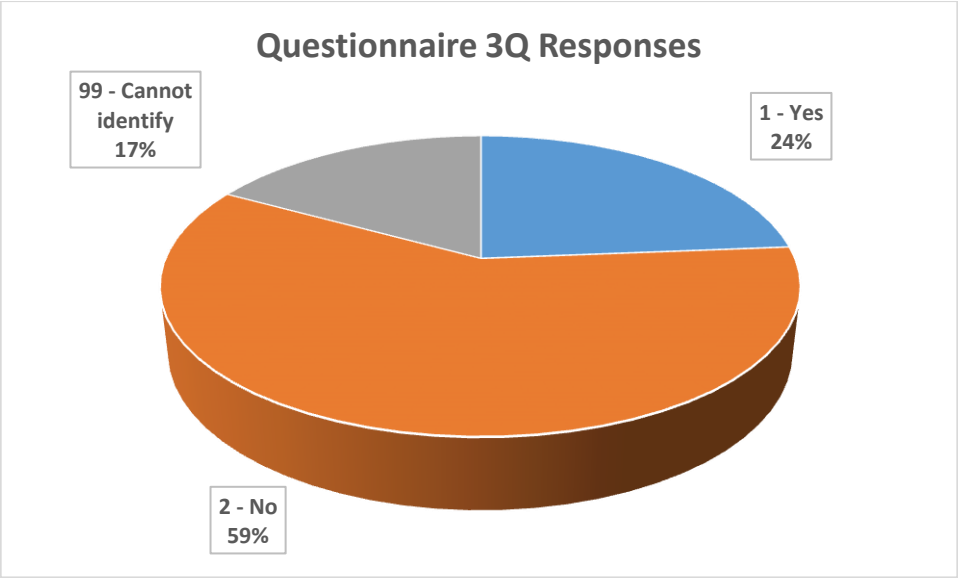
Analysis: The surveyed military personnel have a strong personal awareness of the meaning of energy efficiency as 70 percent of the respondents agreed that energy efficiency in the military means accomplishing the same task using less energy without limiting operational capability.

2q. Do you agree that saving energy is more important for you at home (private environment) than during missions?



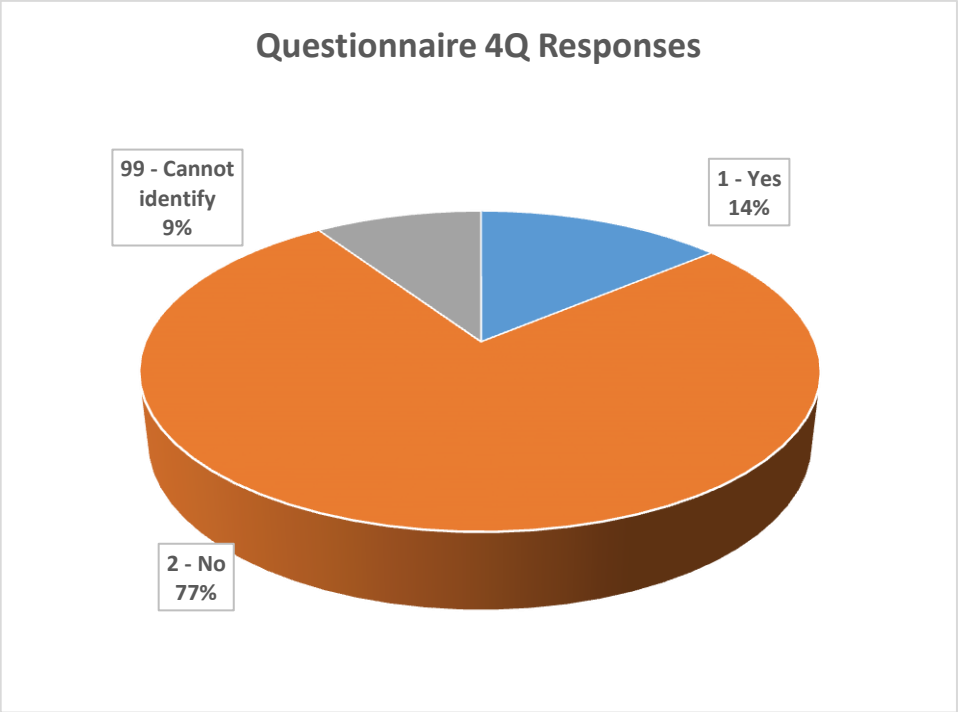
Analysis: Over 40 percent of respondents think that energy saving is more important at home than during the mission, while 31 percent of respondents disagree with this.

3q. Are you familiar with energy saving initiatives in the military?



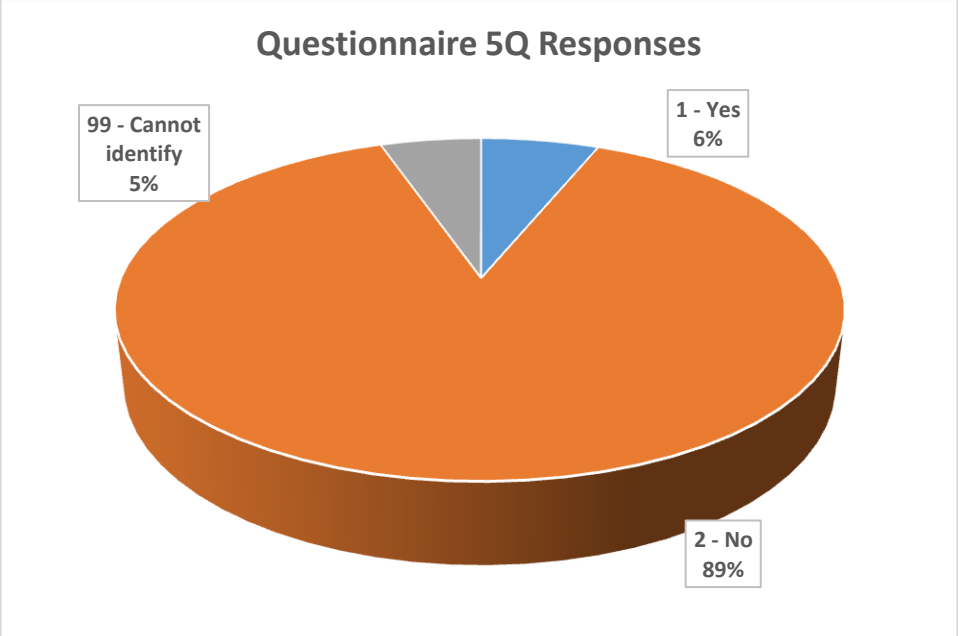
Analysis: Since the majority of respondents are not aware of EE initiatives, more advertising of existing initiatives and development of new initiatives needs to occur.

4q. Have you participated in energy efficiency initiatives in the military?



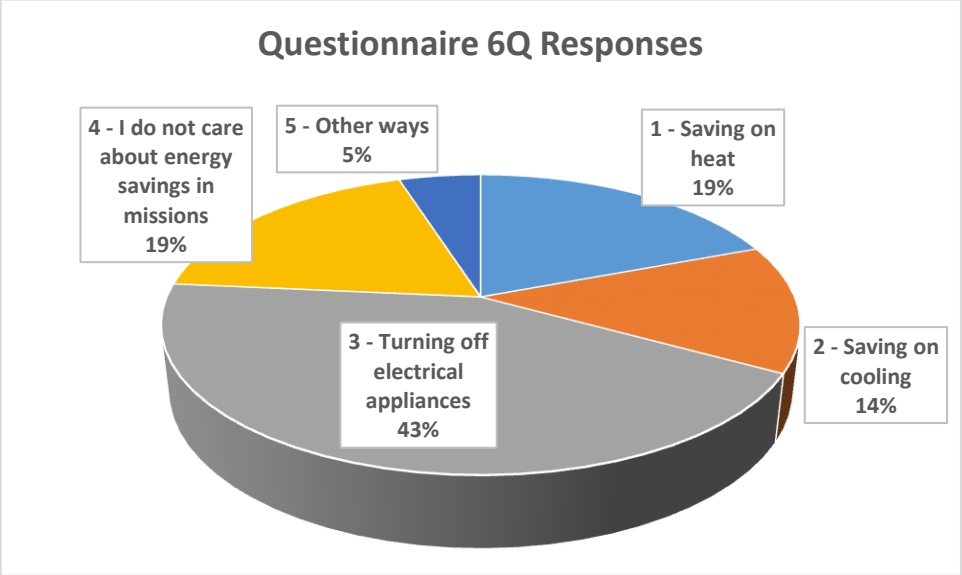
Analysis: Since the majority of respondents have not participated in military-based EE initiatives, more widespread access to existing and development of new initiatives needs to occur.

5q. Have you been trained on energy efficiency?



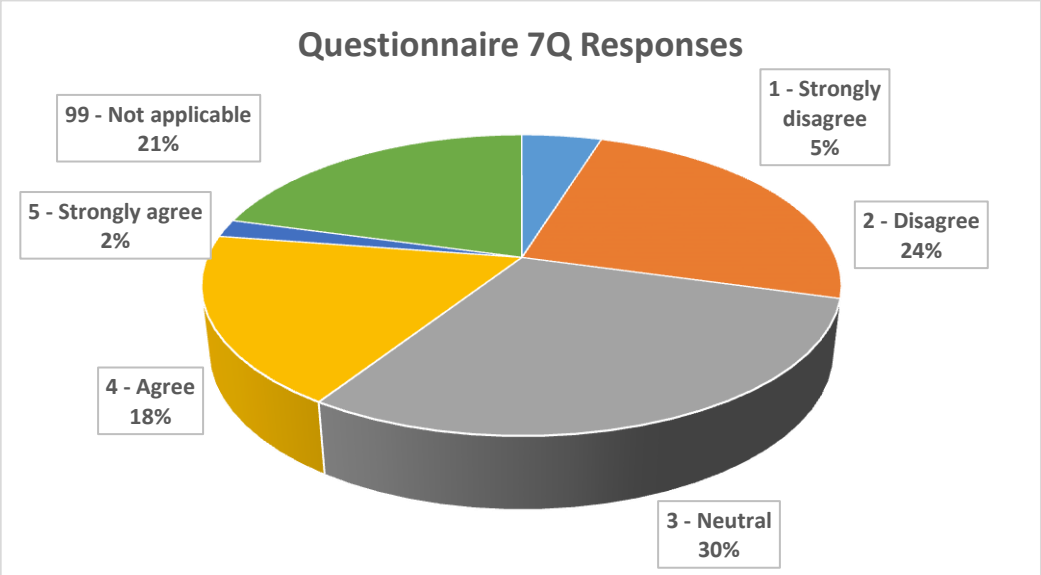
Analysis: Although 24 percent of respondents stated they have any familiarity with energy saving initiatives in the military, 10 percent have not participated in EE initiatives and 18 percent of them have not been trained on energy efficiency. This result shows great potential for increasing energy efficiency training in the military.

6q. How do you save energy during missions? (several options available)



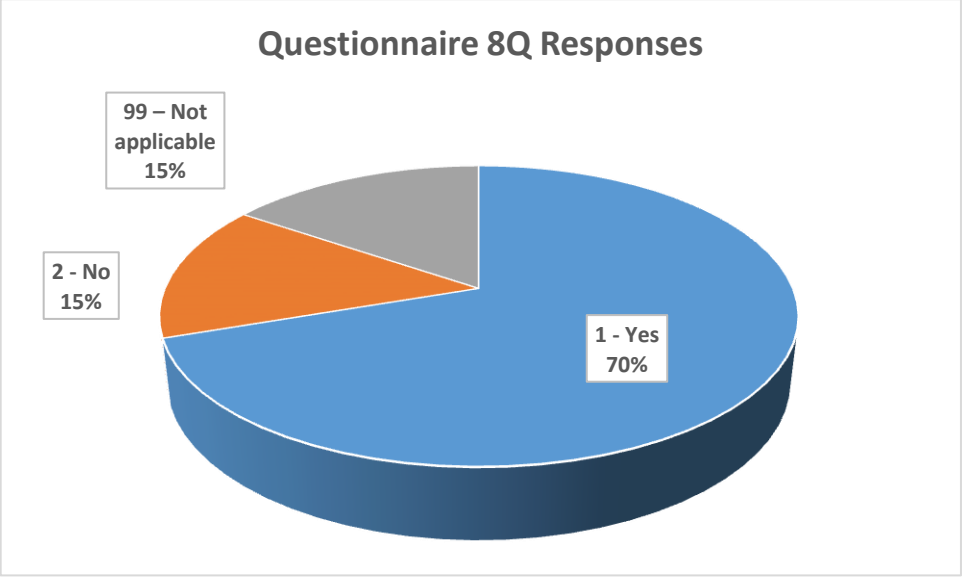
Analysis: The most widespread energy saving habit is turning off electrical appliances (reported by 43 percent of respondents) followed by 1/5 of respondents save energy on heating, and 1/5 save energy on cooling, 6 percent report other ways of energy saving during missions. 19 percent of respondents reported that they do not care about energy saving in missions. The reasons are partly given in open answers.

7q. Do you agree that most of the military you know are energy efficient during missions?



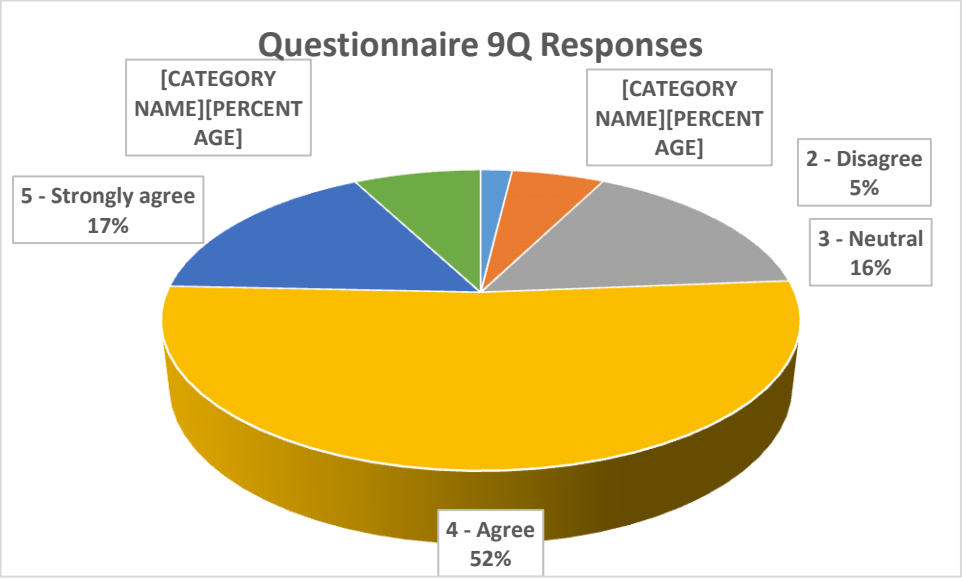
Analysis: With more than 50 percent of respondents not directly answering this question, more advertising of EE initiatives and policies needs to occur.

8q. Are you interested in gaining knowledge about energy efficiency in the military?



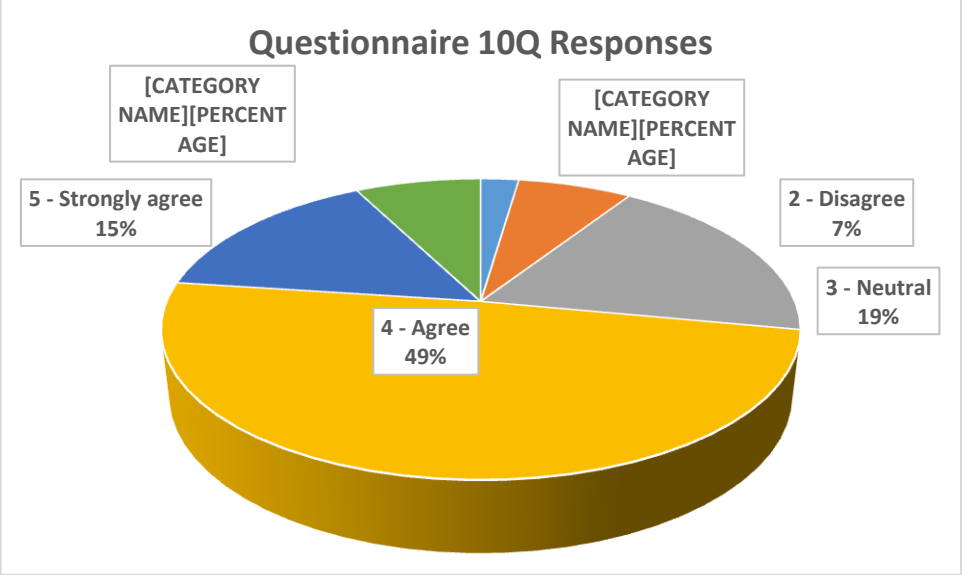
Analysis: The large majority of respondents (70 percent) are interested in knowing more about energy efficiency in the military. Response pattern to these questions indicates vast potential for increasing awareness of actual implementation of energy efficiency.

9q. Do you agree that your personal behaviour affects energy efficiency in the military?



Analysis: Majority of respondents (69 percent) believe in the impact of personal behaviour on energy efficiency in the military.

10q. Do you agree that training on energy efficiency could change soldier's behaviour and thus support energy efficiency in the military?



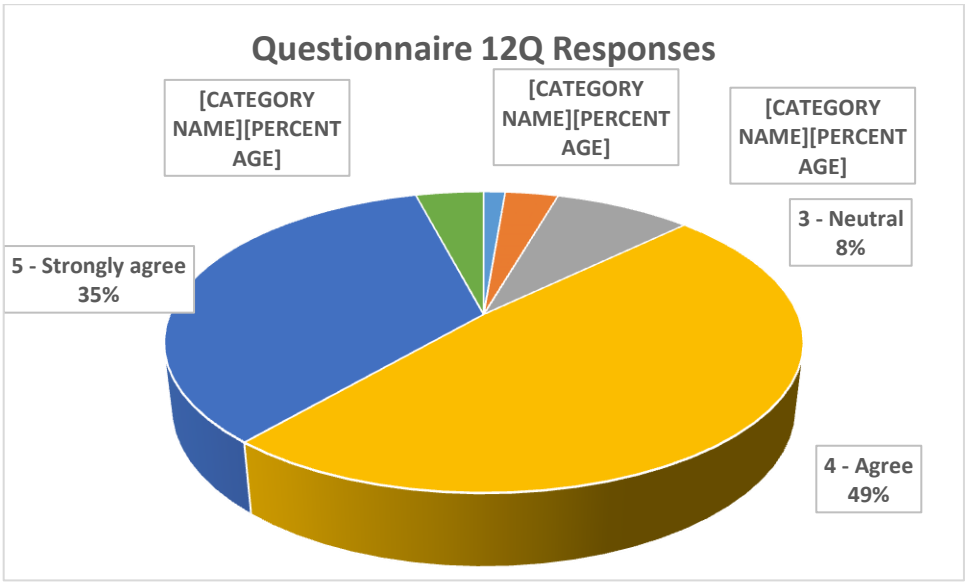
Analysis: There is divergence of opinions whether personal behaviour has an effect on energy efficiency in the military context: 69 percent believe in this relationship, while 23 percent of respondents either deny the relationship or have no opinion. Although 65 percent believe in the efficiency of training military personnel on energy efficiency, nearly 1/3 of respondents are not sure that training could change soldiers' behaviour and thus support energy efficiency in the military. Education and training of energy efficiency habits should especially be targeted at these categories of people.

11q. What could motivate you to be more energy efficient? Prioritize in order from 1 (weakest) to 4 (strongest)

	1	2	3	4
1 - Rewards	21.0	11.7	13.8	11.8
2 - Achieving better energy efficiency in military is part of my commanders' guidelines and intent	13.4	17.2	18.5	5.7
3 - Possibility to use resource savings for the benefit of your unit	36.7	7.7	18.0	18.1

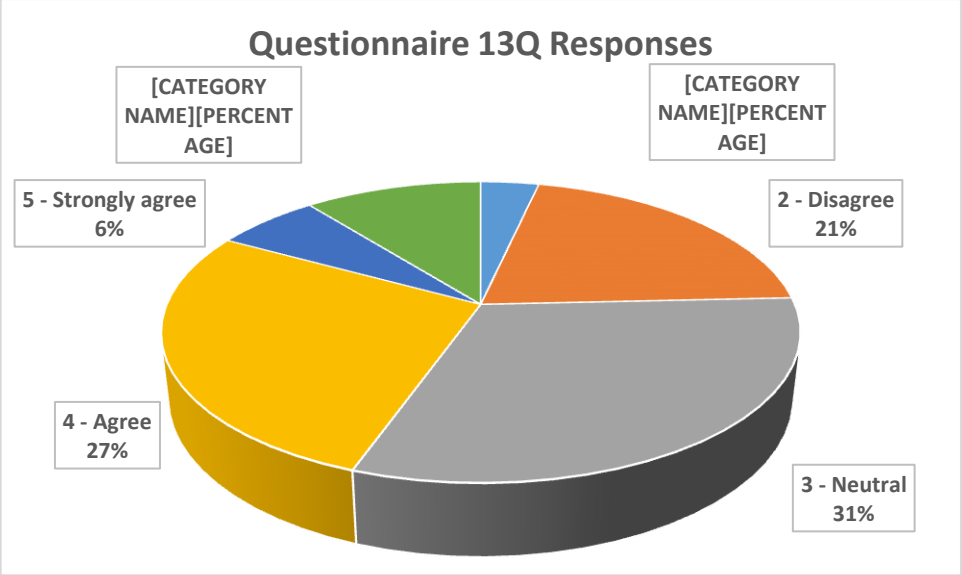
Among the incentives to be energy efficient, the use of resource savings for the benefit of the unit appears to be most important (36 percent marked it as a strong or very strong incentive). The commanders' guidance (for 24 percent it is a strong motivator) and possibility to earn rewards appeared to be slightly less important (for 25 percent it is a strong motivator).

12q. Do you agree that energy efficiency helps to protect environment?



Analysis: As for the impact of energy efficiency on the environment, majority of respondents (84 percent) consider it important for protecting the environment.

13q. Do you agree that energy efficiency technologies are always environmental friendly?



Analysis: 33 percent of respondents consider energy efficiency technologies as always environmentally friendly, which points to the fact that maintaining environmental sustainability may prove an important issue in designing energy efficiency strategies. Educational programs aimed at increasing both environmental awareness and energy efficiency competence among the military are needed.

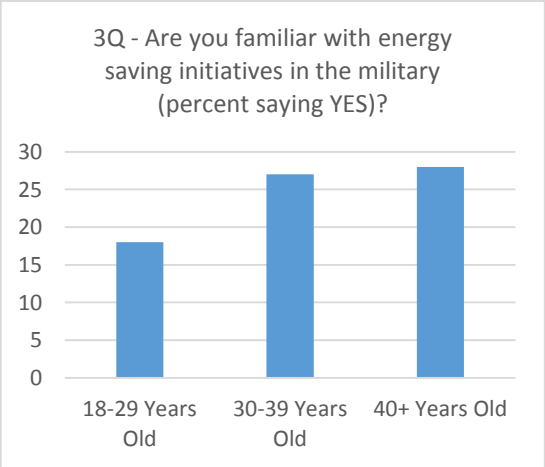
Behavioural Change Focused Analysis

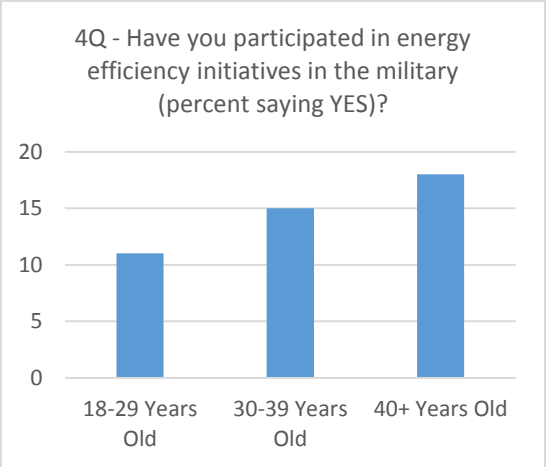
Our analysis is focused on revealing differences between the age, status and cultural subgroups concerning 1) familiarity and interest in energy efficiency topic, 2) practical energy saving behaviours 3) typology of respondents, and 4) cross-cultural comparisons.

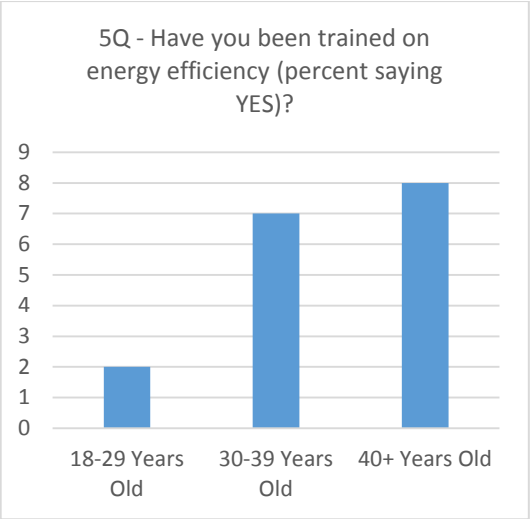
Familiarity and interest

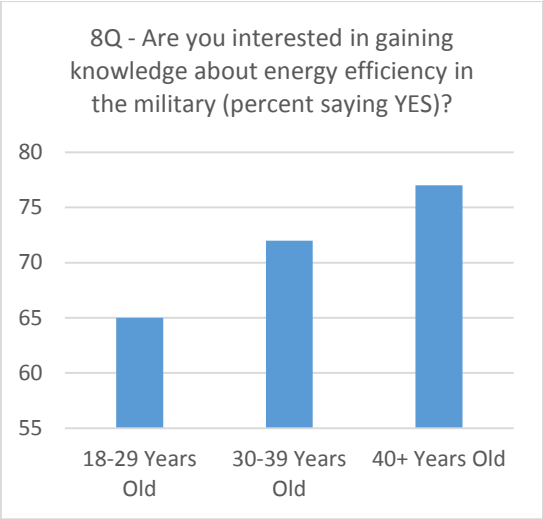
Familiarity with the topic of EE in the military and interest toward it was concerned in four questions. The following table presents results across different age and status groups (percent of positive responses in the particular subgroup):

Percentages of respondents in various age groups saying YES to the following questions:



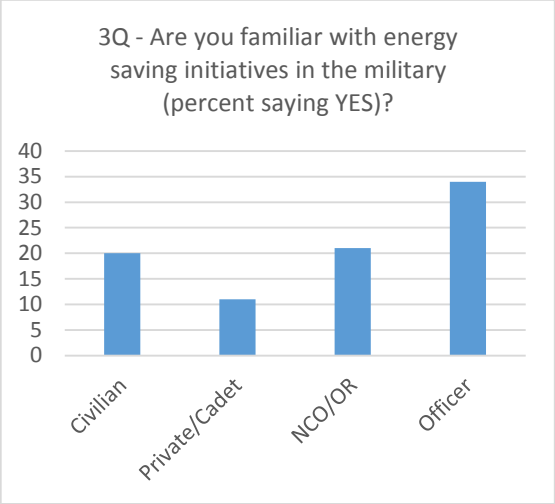


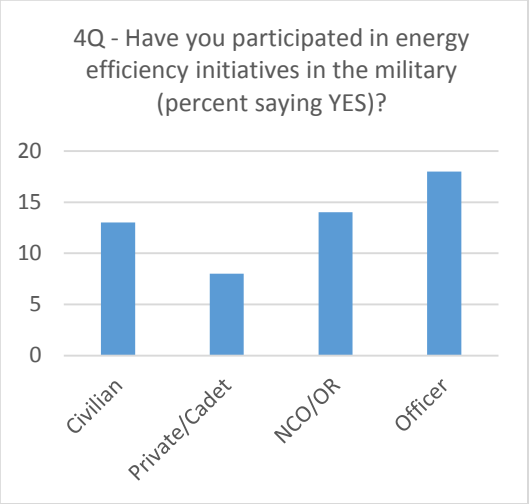


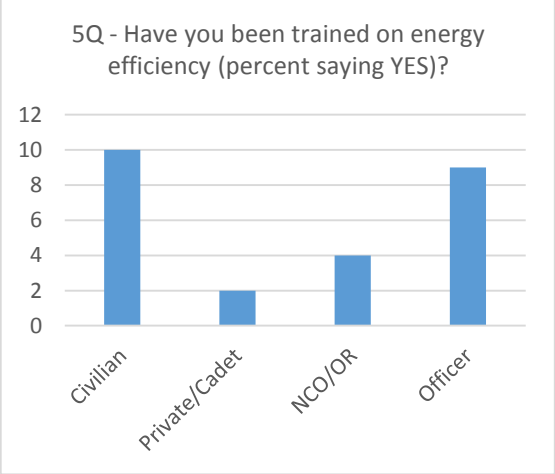


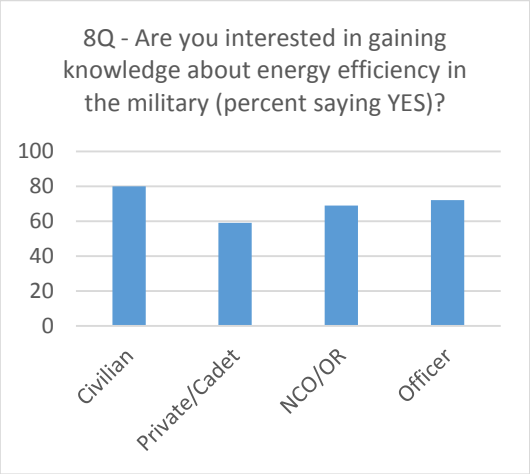
Analysis: In the youngest group (20-29) there is less persons who are familiar and interested in the EE topic, compared to the older respondents.

Percent of respondents in various status groups saying YES to the following questions:









Analysis: Among privates and cadets (compared to other status groups), relatively fewer persons are familiar and interested in EE. Interest in gaining knowledge about energy efficiency in the military is greatest among the group of civilians.

Composite indexes

Index of familiarity and interest was computed by summing up "yes" responses in variables 3,4,5 and 8. Mean = 1.14 (Standard Deviation = 0.97) (ranging from 0 to 4)

Comparison of mean values of FI_count index (independent samples t-test, ANOVA)

			statistical significance of difference
Status	**civilian**	1.22	*** (compared to private/cadet)
	private/cadet	0.78	*** (compared to officers) ** (compared to NCO)
	NCO	1.08	*
	officer	1.32	
Age	**18-29**	0.89	** (compared to 30-39) ***(compared to 40+)
	30-39	1.20	
	40-69	1.32	*** (compared to 18-29)

Analysis: Privates/cadets are least familiar and interested in EE among the status groups. Older respondents are more familiar and interested than the youngest group.

An *index of general orientation towards EE in the military and environmental protection* was computed as summation of mean values of variables 1, 9, 10 and 12. *(attitude_EE index)*

Cronbach alpha = 0.703

Mean = 3.9 (SD = 0.67) (range from 1 to 5)

Comparison of mean values of attitudes_EE index (independent samples t-test, ANOVA)

			statistical significance
Status	**Civilian**	4.07	*** (compared to privates)

			*** (compared to NCO) ** (compared to officers)
	Cadet	3.79	
	NCO	3.83	
	Officer	3.89	
Age	**18-29**	3.74	*** compared to 30-39 ***compared to 40+
	30-39	3.97	
	40-69	4.0	

Analysis: Civilians are more positive and optimistic than military persons. Older respondents are more positive and optimistic than younger respondents.

In sum, our analysis reveals that young persons with low military status (privates/cadets) are least aware about energy efficiency topic in the military, thus being target group for training and consciousness raising campaigns.

Practical experience of energy saving in the military

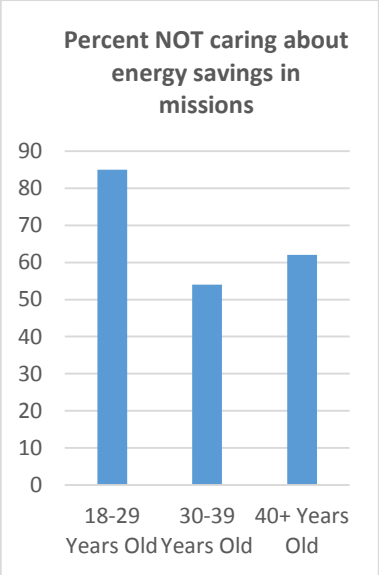
As was indicated above, the most widespread energy saving practice during missions is turning off electrical appliances (reported by 53 percent of respondents) followed by 1/4 of respondents who save energy on heating, and 1/5 save energy on cooling, 6 percent report other ways of energy saving during missions.

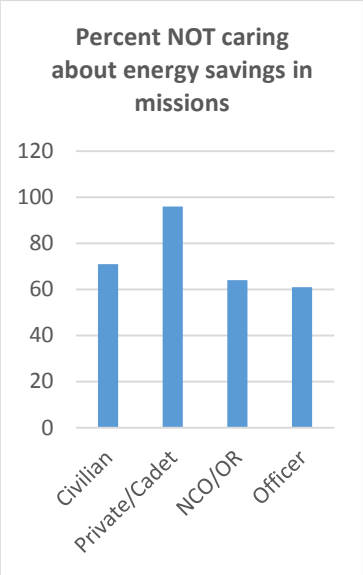
Examples of answers to open question are in Annex D-3:

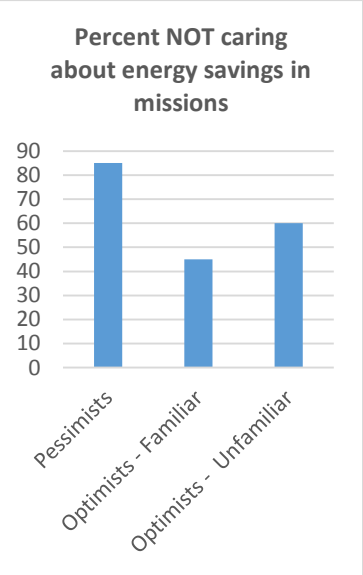
23 percent of respondents reported that they do not care about energy saving in missions.

I do not care about energy savings in missions

Age **Armed Forces Rank** **General Attitude**







Analysis: The reasons for neglecting energy saving during missions are partly given in open answers. Two main reasons are:

> 1) lack of control and feedback (*We are used to have energy. If we are in missions, then we do not pay the energy bill. We use as much as we must, can and want.*), and
>
> 2) priority of operational tasks (*I cannot say that energy saving is not important but on missions the priority is to accomplish the task. If it takes energy, we have to accept it; saves only to the extent permitted by the task execution; my task is to ensure safety of many people – it would be a sin to save anything in the name of this).*

Motivation to be more energy efficient

*What could **motivate** you to be more energy efficient? Prioritize in order from 1 (weakest) to 4 (strongest)*

As was mentioned above, among the incentives to be energy efficient, the possibility to use the resource savings for the benefit of the unit appears to be most important (36 percent marked it as a strong or very strong incentive). The commanders' guidance (for 24 percent it is a strong motivator) and possibility to earn rewards appeared to be slightly less important (for 25 percent it is a strong motivator). Comments to this question enable us to analyse the possible motives in more detail.

Open answers can be classified into two broad categories: **expressing strategic goals** of energy efficiency and **describing tactical measures** that may lead to increased energy efficiency.

Among strategic goals, the following clusters were determined:

(1) *Operational capability*
(2) *Patriotism and pride*
(3) *Moral responsibility, intrinsic motivation*
(4) *Environment protection*
(5) *Utilitarian argument*

Among tactical measures, the following groups of measures can be indicated:

(1) rules and regulations
(2) direct (material) incentives
(3) individual and group behaviour change
(4) awareness raising
(5) various technological solutions
(6) various organizational solutions
(7) implementing comprehensive energy efficiency policy

There were, though, also respondents who felt there are no solutions.

Strategic and tactical measures suggested by the respondents under each subheading group can be found in Annex D-3.

Respondents present a variety of motivators for being more energy efficient in the army, these include both intrinsic (personal responsibility, values, etc.), as well as extrinsic (rewards and punishments) motivators. Various tactical measures for changing energy consumption practices in the military were proposed: institutional (rules and regulations; organizational change), direct rewards, behaviour regulation measures, awareness raising, technological improvements.

A typology of military personnel based on familiarity with EE, interest in EE and attitude towards EE

It is important to distinguish between stakeholder groups by their attitudes. Better understanding of the types of attitudinal groups in the military would be useful in order to prepare targeted strategies for bringing about cultural change, especially in tackling resistance.

General classification of respondents into groups was performed by applying K-cluster analysis to variables 1, 9, 10, and 12 (general attitudes to EE in the military) and variables 3, 4, 5, and 8 (awareness and interest in EE in the military). In order to include maximum number of respondents, variables were recoded so that "cannot identify" response was equated with neutral response.

3-cluster solution produced a structure that can me meaningfully interpreted: all respondents can be divided into groups, which can be labelled as "pessimists," "informed optimists," and "uninformed optimists."

Mean values of the variables included in the analysis in respective groups are as follows:

	Pessimists – Unfamiliar & Uninterested	Optimists – Familiar & Interested	Optimists – Unfamiliar & Interested
q1 awareness of EE definition in the military	2.9	4.1	4.1
q9 belief in the effectiveness of personal behaviour	2.9	4.1	4.0
q10 belief in the effectiveness of training	2.8	4.1	4.0
q12 relation of EE to environment protection	3.4	4.4	4.4
q3 familiarity with EE	2.6	1.2	2.9
q4 participation in EE initiatives	2.8	1.9	2.9
q5 training in EE	2.9	2.5	3.0
q8 interest in EE	2.1	1.2	1.2
No	**270** (24.9%)	**264** (26.9%)	**495** (48.2%)

Pessimists – unfamiliar and uninterested (25%)

They tend to disagree that energy efficiency in the military means accomplishing the same task using less energy without limiting operational capability, that one's personal behaviour affects energy efficiency in the military, that training on energy efficiency could change soldier's behaviour and thus support energy efficiency in the military, that energy efficiency helps to protect environment, that energy efficiency technologies are always environmental friendly.

They are not familiar with energy saving initiatives in the military, they have not participated in energy efficiency initiatives in the military, they have not been trained on energy efficiency and they are not interested in gaining knowledge about energy efficiency in the military.

This group is least numerous (25 percent of the whole sample).

Training and educating this group requires special measures for overcoming negativity and resistance.

Informed optimists – familiar and interested (27%)

They agree or strongly agree that energy efficiency in the military means accomplishing the same task using less energy without limiting operational capability, that one's personal behaviour affects energy efficiency in the military, that training on energy efficiency could change soldier's behaviour and thus support energy efficiency in the military, that energy efficiency helps to protect environment, that energy efficiency technologies are always environmental friendly.

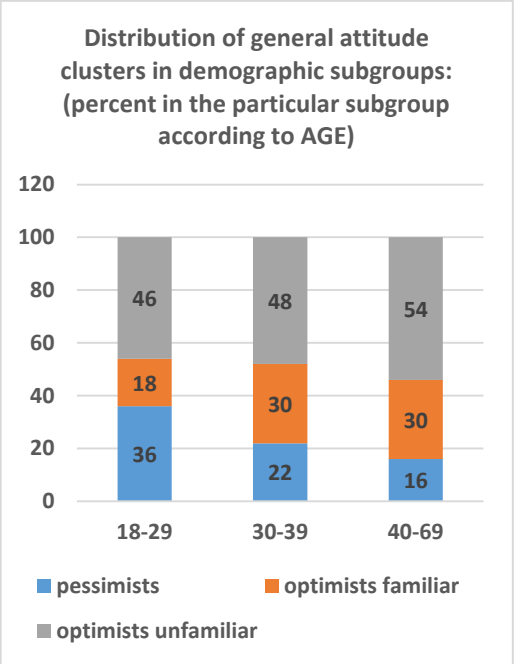
They are familiar with energy saving initiatives in the military, they have participated in energy efficiency initiatives in the military, they have been trained on energy efficiency and they are interested in gaining knowledge about energy efficiency in the military.

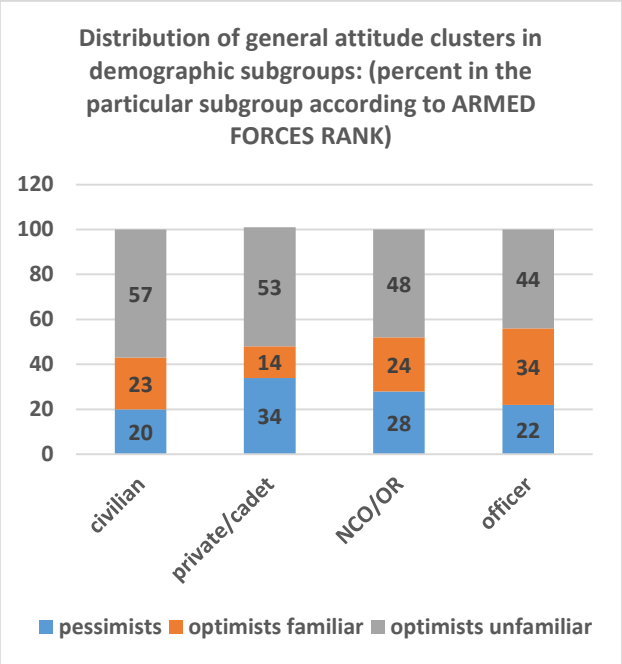
Uninformed optimists – interested but unfamiliar (48%)

They are similar to informed optimists in their general positive attitude towards energy efficiency measures in the military but they lack knowledge and experience in energy saving initiatives in the military. Nearly half of our respondents can be classified into the group of "uninformed optimists."

This group will be an excellent target for energy efficiency training and education.

Distribution of general attitude clusters in demographic subgroups: (percent in the particular subgroup)





Analysis: The youngest group (20-29) with low military status (privates/cadets) has the highest proportion of "pessimists" and the least proportion of "familiar optimists." This finding indicates again that this group would be the most urgent target group of training and educational activities in the army.

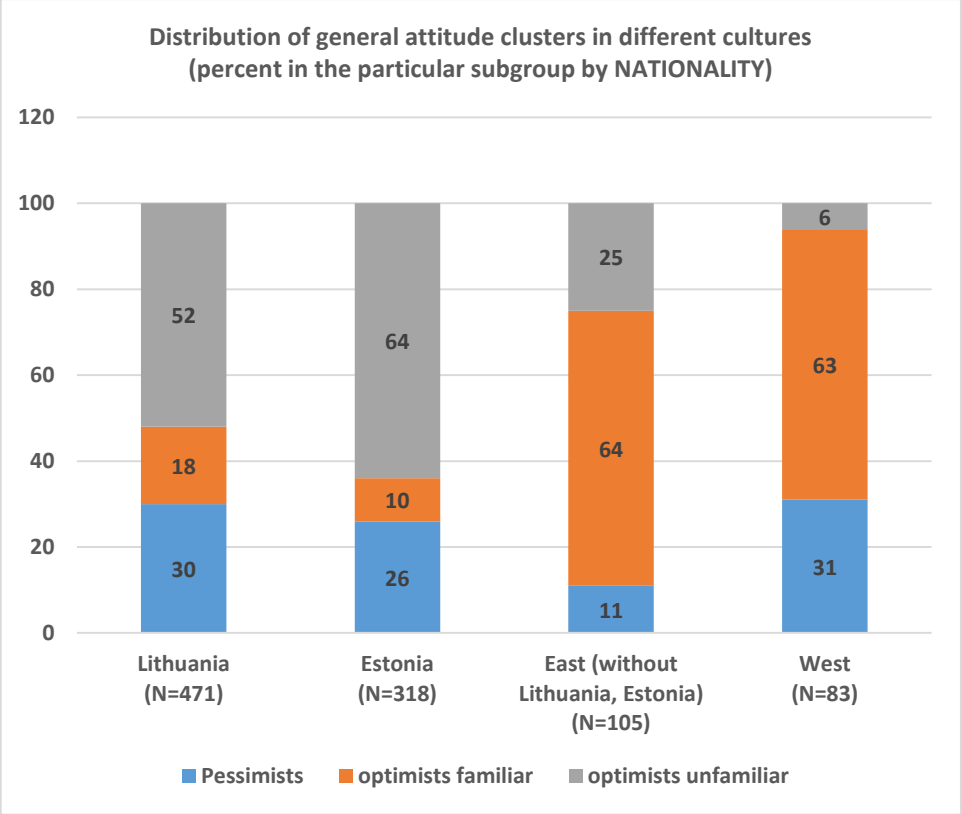
Cross-cultural comparisons

Comparative analysis is necessary for revealing the role of cultural context in shaping the energy efficiency related ideas and practices and for identifying culture-specific elements that resist, and those that promote EE within military. The structure of our sample enables to make comparisons between (relatively equal in size) Lithuanian and Estonian groups, and comparisons inside the rest of countries.

a. Comparing Lithuanian and Estonian respondents.
b. East-West comparison.

Comparisons between groups of respondents in different countries and nationalities reveal systemic differences between the so called "eastern" and "western" countries.

Distribution of general attitude clusters in different cultures (percent in the particular subgroup)



Analysis: While the proportion of "informed optimists" is equal in these groups of countries, the share of "pessimists" is higher in western countries, and unfamiliar optimists, in the east.

By comparing the mean values of indexes of familiarity and interest, and general attitudes to EE (see above), there were statistically significant differences between respondents from western and eastern countries. The western respondents are on the average more

familiar and interested in energy efficiency, compared to East European respondents (mean value of FI index east=1.02, mean west=1.96, $p<0.001$)

East European respondents are on the average slightly more positive and optimistic towards energy efficiency in the military than West Europeans (Mean value of attitude_EE index east=3.88, west=3.69, $p<0.001$).

Survey/Questionnaire Conclusions

In conclusion, the main findings of this survey indicate the following:

1. The importance of operational capability is an issue to be taken into account for creating models for energy efficient behaviour.
2. The importance of commander's guidelines and intent highlights the relevance of top-down approaches.
3. Another important factor could focus on the possibility to use resource savings for development of a benefit for the unit and a rewards system.
4. An integrative approach would be most appropriate to motivate military personnel to be more energy efficient, relying both on intrinsic and extrinsic motivation.
5. Majority of respondents revealed that they *have not been trained* on energy efficiency.
6. Majority of respondents have interest in *gaining knowledge* about energy efficiency in Military.
7. Majority of soldiers and officers have *different behavioural habits* in saving energy *at home* and *during the missions*.
8. There are distinct groups among military personnel with different levels of awareness and varying attitudes towards energy efficiency, with very different experiences, and all the different types can be found among all status groups.
9. In terms of gender or national culture, the results of this survey showed that military personnel do not perceive energy efficiency issues as sensitive ones.
10. This survey was a preliminary attempt to get an overview of attitudes and beliefs towards energy efficiency measures in the military context. It was aimed at arriving at stratified sample that would reflect sizeable enough amount of respondents from different groups: by rank; by seniority (both younger and older); by gender (both men and women); by nationality (not all from one ethnic/country background). On the other hand, this means that as the sample was not a probability sample it remains statistically unrepresentative: we cannot make generalizations about the military across NATO countries in general, but rather

suggest conclusions based on the groups. Yet the data can be used as an illustration pointing to certain tendencies

Survey/Questionnaire Recommendations

1. Survey findings are in line with the initial findings in phase 1 of the study, indicating that although factors related to *theory* **X** are dominating in Military and thus influencing behaviour of military personnel. Additionally, the factors described in *theory* **Y** appear to play a secondary role but should be also taken into account for creating models of behaviour change in the Military.

2. Survey results show that one of most effective methods to embed cultural long-term energy efficiency behaviours would be *training* and *education* programs. While top-down direction from military and political leaders should drive energy efficiency initially, *training* and *education* provides the long-term aspect of cultural change.

3. Based on this survey there is not enough data as yet to make conclusions about the relevance of inter-cultural factors in influencing behaviour in Military. A subsequent survey with more respondents from different cultural contexts could provide more insights to this regard, enabling statistical comparison by various (socio)cultural background settings.

4. It is also important that in future the number of participants better reflect the structure of the military. Currently the results are dominated by officers rather than other ranks. On the other hand, as this sample is presenting the views of officers, one could also say that the middle-range decision-makers are well represented and since they can have an immediate impact on the outcomes on the daily basis, this data reflects rather well their perceptions and views.

5. The long-lasting habits and behaviour models are usually being developed in everyday context and home environment. If those habits are not detected in missions, some factors for sustaining those habits are missing, and it should be studied how these could be provided.

6. To identify missing factors for energy efficient behaviour in missions, as well as reveal potential cross-cultural differences across units as well as within units, new rounds of surveys should be conducted.

7. It is evident that based on this pilot study, a more thorough and systematic study should be conducted among the military in different cultural contexts, which would address persons on different hierarchical levels who perform different functional roles. For next stage we propose to use a multi-method approach where systematic observation is accompanied by a quantitative survey and qualitative interview study. Observation should be focused on individual behaviour habits and collective practices in particular environments, characterized by different

levels of energy demand and infrastructure resiliency. The survey should encompass questions on both environmental protection and energy efficiency as these topics are conceptually and practically intertwined. The survey should be accompanied by individual and group interviews, in order to reveal more thoroughly knowledge, arguments, meanings, and motivations that support or hinder certain energy-related practices in the military context.

8. Military energy efficiency should not be perceived as a standalone initiative: it should be considered as part of a comprehensive approach developed in coordination with civilian authorities and industry partners.

MAIN FINDINGS

Relevant for Considering Strategies for Changing Attitudes, Behaviours and Developing Relevant Capabilities for Enhancing Energy Efficiency in the Military

In the first part of the study "Energy efficiency: cultural change", we have suggested that in designing cultural change in military, it is necessary to re-interpret the theoretical and conceptual models of implementing energy efficiency that are used in the civilian domain and in institutional contexts. In particular, we suggested to see the cultural change as consisting of the cumulative effect of several nudges, and to use the models of environment management systems, corporate social responsibility, social practice theory, multilevel systemic approach, and concordance theory. In designing this, we suggested to aim at bottom-up empowerment via targeted top-down interventions. This integrated approach was suggested, while it was argued that energy efficiency in the military domain could be achieved via changing the rules and regulations as well as improving training and education within military.

This draft report includes the research based on empirical evidence to test these suggestions. They were additionally supported by the evidence the experts provided during the two ARWs in Vilnius (held in November 2015 and April 2016) as well as by the pilot survey conducted among military personnel of various statuses and contexts (carried out between June 2015-May 2016).

In addition, insights derived from both Advanced Research Workshops (ARWs) confirm the usefulness for changing behaviours in military of re-interpretation and application of newest theoretical approaches (developed in civilian sector) which highlight role of interdisciplinary, mixed-methods, cross-conceptual and cross-organisational thinking, as well as integration of various kinds of intervention means; need in understanding and ascertaining of target groups awareness, perceptions, practices, behaviour and attitudes to energy; and engagement of stakeholders and energy users.

Understanding how to tailor sets of theoretical provisions and approaches as well as the process steps within the context of military operations and training, plays a key role in achieving successful behaviour change. For example, application of Concordance theory provisions does not directly apply to the military operational environment, though they have application during the military pre-deployment stage involving military instruction, education, and training of military personnel to be deployed, as well as to the militaries stationed at home (e.g. case study with Irish Defence Forces). On the other hand, the Plan-Do-Check-Act methodology has universal application and military forces use this methodology widely.

The material of both ARWs suggest that a number of opportunities (e.g. existence of political will, review of NATO policies) and enabling means can be used for making changes of organisational (e.g. staffing), educational (e.g. delivery of general and special courses), resource allocation, planning processes (e.g. including energy efficiency standards in contracts, best decision making practices in planning camps, etc.), as well as

conducting operations (using tailor-made monitoring and motivation tools) and others in order to enhance EE. They also suggest that relevant changes should take place at all levels of NATO and NATO Nations' activities.

Analysis suggests that mind-sets on three major levels are to be influenced by general and specific communications strategies to ensure that decision makers and policy implementers understand the need for such changes. Those levels include Strategic level of coordination in NATO; Coordination of programs by NATO Military Staff (MS) and Partner governments, and at the Operational level. While general communication strategy can influence decision makers and policy implementers on all levels (e.g. providing evidence how EE/EP considerations enhance force protection in military camps), special communication strategies should be tailor-made for each level separately.

In any of the communications campaigns, the existence of very different groups – by awareness, attitudes and experiences – at each of the levels should be acknowledged, and they should be targeted. Given the possibility of cross-cultural differences, the resources should be foreseen to specify the context-specificity of the factors that shape energy efficient behaviours.

Main elements of any such communications should include:

1. Framing of the issue /goal that is understandable and is within the field of interests of recipients (policy makers and implementers) and, preferably, is free from "cultural stigma" – e.g. the issue/goal could be communicated as "Energy Efficient and Sustainable Camp contributes significantly to operational performance and force protection", or "Efficient Chain of Energy Supply contributes significantly to operational performance and force protection";

2. Consider what connection should there be between energy efficiency and environmental sustainability, for example, by considering different temporal perspectives and different dimensions in measuring efficiency

3. Defining responsible entities (e.g., who will do what);

4. Preparing material for communications (to be released on regular basis) which consist of:

    a. Translating saved energy and financial resources (as a result of EE) into numbers reflecting input to combat power, proving statements through experimentation;
    b. Preparing site visits of decision makers to Energy Efficient and Sustainable Camps;
    c. Preparation of handbooks/toolboxes for management unit and soldiers of military camp, for transforming it to Energy Efficient and Sustainable Camp.

5. Suggesting system of motivating measures for integrating EE considerations in securing Efficient Chain of fuel supplies, and building Energy Efficient and Sustainable Camp.

Therefore, a very important element in the process of preparing communication strategies to ensure that politicians (as well as their electorates), policy decision makers, and policy implementers understand the need for changes leading to enhanced energy efficiency in the military, is preparation of the model, as a potential demonstration project, of an Energy Efficient and Sustainable Camp. Such Camp could be used for experimentation, training, and Energy Efficiency Management Policy development for NATO. We consider that regions indicated in NATO's *Readiness Action Plan* (agreed by NATO during the 2014 Wales Summit) as vulnerable regions, present a good choice for establishing such Camps serving as troop EE training sites (e.g. on a rotational basis prior to military deployments) since presence of troops helps minimize security threats in vulnerable regions of NATO Allies. Such combination of means for meeting different sets of challenges (energy security and reducing probablity of territorial attack) could be a good example of synergetic effects.

Survey analysis suggests to rely on respondents majority's optimism in respect of achieving EE in the military but also to prepare resistance management tools since around 25 percent of respondents are pesimistic on this issue.

Other survey results relevant for preparation of an Energy Efficient and Sustainable Camp - a potential demonstration project and training site, include:

1. The importance of operational capability, commander's guidelines and intent, and focus on the possibility to use resource savings for development of a benefit for the unit and a rewards system are the issues to be taken into account for creating models for energy efficient behaviour; Thereore an integrative approach would be most appropriate to motivate military personnel to be more energy efficient, relying both on intrinsic and extrinsic motivation.

2. Majority of respondents revealed that they have not been trained on energy efficiency, but they have interest in gaining knowledge about energy efficiency and have different behavioural habits in saving energy at home and during the missions. There are distinct groups among military personnel with different levels of awareness and varying attitudes towards energy efficiency, with very different experiences, and all the different types can be found among all status groups.

3. In terms of gender or national culture, the results of this survey showed that military personnel do not perceive energy efficiency issues as sensitive ones.

4. This project's surveys indicated a comparatively low level of current awareness in military personnel about energy efficiency throughout the military. On the other hand, a majority of respondents showed interest in gaining knowledge on energy efficiency, which presents a favourable condition for expanding education and

training in this domain. Though knowledge obtained during education and training by themselves is not sufficient for behaviour change to occur, it provides an important component that, when combined in a proper way with other components, can successfully transform military culture and result in significant energy savings with multiple positive consequences vital for increasing combat power.

Analysis suggests that successful national/multinational initiatives (functioning military compounds) could serve as prototypes of an Energy Efficient and Sustainable Camp. However, each of the reviewed examples revealed strengths as well as suffering from several weaknesses.

In addition, taking into account the need for Force protection, it might be useful to prepare two versions of the "Energy Efficient and Sustainable Camp;" one for exercises within NATO Nations territories and the second for camps in austere environments.

For developing of an "Energy Efficient and Sustainable Camp" model, it seems to be appropriate to use a spiral development methodology used in the project of the Oeiras Military Compound in the Reduto Gomes Freire Support Unit (RGF). This case would work very well for the starting phase since it required modest initial financing (amount of financial input necessary for purchase of software to ensure transparency and motivate soldiers to save energy is comparatively low and could be outsourced from the "maintenance" line), produced quick wins, and was comparatively simple to implement. Further, in the next stage, best practices from other energy efficiency enhancement initiatives based on behaviour changes could be supplemented in combination with modern technologies.

For developing of an "Energy Efficient and Sustainable Camp" model it is important to tailor made and integrate sets of measures used during successful interventions in operational environment analysed during ARWs and supported by survey respondents. Those included:

1. direct instruction/commanders intent (military orders)
2. positive and negative reinforcement (based on such tools as visualisation, metering, measuring, monitoring and control, and using relevant software)
3. indirect suggestions for achieving compliance and influencing the motives, incentives, and decision making of groups and individuals

In the case of Energy Efficiency Management (EEM), the concept of 'best practices' helps to identify and determine tools necessary to induce cultural changes that facilitate EEM and contain suitability for standardization, as opposed to those which are more bounded to a particular culture or environment. We suggest defining 'best practices' (in the framework of the study) as the tools that induce expected changes facilitating EE in military organizations amongst different cultural contexts. Such tools would incorporate

‘best practices’ that NATO could develop experimentation plans and standardisation policies. Examples include:

1. Using ISO 50001 Energy Management System standard where positive results occurred in case studies in:

    a. France (at La Valbonne’ barracks)
    b. Ireland (Irish Defence Forces (DF))

2. Combination of measuring, control and visualization where positive results occurred in case studies in:

    a. Portugal (in the Reduto Gomes Freire Support Unit)
    b. USA (Smart And Green Energy (SAGE), BeyOnD, Net Zero Operations, Energy Command and Control (Energy C2))

3. Active involvement of military commander in the process of performance of energy saving related activities with positive results in case studies in mentioned cases in Portugal, France, Ireland, and USA.

Considerations related to size of Camp Demonstration/Experimentation Project and Training site would rely on amount of accumulated knowledge and experience during national multinational initiatives focused on achieving EE through behavioural change. The size of national initiatives varies from several dozens of participants (e.g. Portuguese case) to several thousand (e.g. French case), and accumulation of political will and economic capacity necessary to organize experimentation on NATO level. Therefore, the most realistic option is an option of using method of ‘spiral development’ (used in Portuguese case), which can integrate also other modern methods, and begins with a small, more manageable goal and, in the case where positive results occur, expand to a larger size. Close cooperation links with European Defence Agency (EDA) who has accumulated experience in establishing this kind of experimentation sites can be regarded as a facilitating factor.

Considerations related to Camp/Demonstration Project/Experimentation and Training site in respect of the armed forces segment (Army/Navy/Air Force/Marines) rely on the amount of accumulated knowledge and experience during national initiatives of achieving EE through behavioural change. The majority of initiatives analysed as case studies during both ARWs have occurred within Land Forces or the land segment of the Navy (Marines).

The length of time necessary for experimentation, training, and EEM policy development directly correlates with the level of political will and amount of financing by NATO Members and Partners. Optimal choice would be combination of experimentation with the perspective of turning experimentation sites into EE training sites, on a rotational basis prior to military deployments.

The main tools for establishing EE within the NATO military culture using experimentation as the catalyst include:

1. A glossary of main concepts for help improve understanding of the activities necessary to develop an EE culture within the military.

2. A handbook for guidance to military personnel (including commanders and appointed energy officers) to establish relevant procedures for integrating energy efficient behaviour into military operations.

3. Educational and training materials and courses that provide basic knowledge on EE and its role on increasing operational effectiveness and other benefits as a contribution to raising awareness, changing attitudes and behaviours, developing additional useful competences and skills, necessary for achieving EE.

4. Establishment of troops EE training sites on a rotational basis prior to military deployments, which could play role as demonstration platform.

5. Common procedures and standards at the NATO level related to integrating EE behaviour in the military.

6. Identification of essential stakeholders' involvement in the EE cultural change process within the military.

Discussions of the case studies during each of the two ARWs highlighted the need to include the main drivers of behavioural change, for improving energy efficiency in the military, into the military chain of command organisational structure. In an operational environment, the military organisation's commander and energy officer play the role of the main driver. Each of them (though in different degrees) should possess basic knowledge and experience related to achieving energy efficiency during military operations. Therefore, tailor-made education and training tools on energy related issues represents a vital aspect for enhancing and embedding energy efficient behaviours on a larger scale in the operational environment

CONCLUSIONS

C1. Main findings generated during both stages of research and formulated in the section of Main Findings Relevant for Considering Strategies for Changing Attitudes, Behaviours and Developing Relevant Capabilities for Enhancing Energy Efficiency in the Military is an important step for acieving EE through behaviour change in military operations and, in longer term, embedding Energy Effcient culture in Armed Forces of NATO Allies.

C2. Insights derived from both Advanced Research Workshops (ARWs) confirm the usefulness (for changing behaviours and overall culture in military) of re-interpretation and application of highlighted in the First Part of the Study theoretical approaches when they are tailored in a proper way. Understanding how to tailor sets of theoretical provisions and approaches as well as the process steps within the context of military operations and training, plays a key role in achieving successful behaviour change.

C3. Mind-sets on three major levels are to be influenced by general and specific communications strategies to ensure that decision makers and policy implementers understand the need for such changes. Those levels include Strategic level of coordination in NATO; Coordination of programs by NATO Military Staff (MS) and Partner governments, and at the Operational level. While general communication strategy influence decision makers and policy implementers on all levels (e.g. providing evidence how EE/EP considerations enhance force protection in military camps), each level requires separately tailor-made special communication strategy.

C4. A very important element in the process of preparing communication strategies to ensure that politicians (as well as their electorates), policy decision makers, and policy implementers understand the need for changes leading to enhanced energy efficiency in the military, is preparation of the model, as a potential demonstration project, of an Energy Efficient and Sustainable Camp. Such Camp could be used for experimentation, training, and Energy Efficiency Management Policy development for NATO.

C5. Successful national/multinational initiatives (functioning military compounds) could serve as prototypes of an Energy Efficient and Sustainable Camp. However, each of the reviewed examples during current research revealed strengths as well as suffering from several weaknesses.

C6. A spiral development methodology used in the project of the Oeiras Military Compound in the Reduto Gomes Freire Support Unit (RGF) suits very well for the starting phase since it required modest initial financing (amount of financial input necessary for purchase of software to ensure transparency and motivate soldiers to save energy is comparatively low and could be outsourced from the “maintenance” line), produced quick wins, and was comparatively simple to implement. Further, in the next stage, best practices from other energy efficiency enhancement initiatives based on behaviour changes could be supplemented in combination with modern technologies.

C7. The majority of case studies during current research have occurred within Land Forces or the land segment of the Navy (Marines),

C8. Concept of 'best practices' helps to identify and determine tools necessary to induce cultural changes that facilitate Energy Efficiency Management and contain suitability for standardization, as opposed to those which are more bounded to a particular culture or environment. Examples include:

- Using ISO 50001 Energy Management System
- Combination of measuring, control and visualization
- Active involvement of military commander in the process of performance of energy saving related activities

C9. Sets of measures used during successful interventions in operational environment analysed during ARWs and supported by survey respondents included:

- direct instruction/commanders intent (military orders),
- positive and negative reinforcement (based on such tools as visualisation, metering, measuring, monitoring and control, and using relevant software), and
- indirect suggestions for achieving compliance and influencing the motives, incentives, and decision making of groups and individuals.

C10. Survey analysis suggests to rely on respondents' optimism in respect of achieving EE in the military but also to prepare resistance management tools since around 25 percent of respondents are pessimistic on this issue.

C11. Survey confirmed the importance of operational capability, commander's guidelines and intent, and focus on the possibility to use resource savings for development of a benefit for the unit and a rewards system are the issues to be taken into account for creating models for energy efficient behaviour. Therefore, an integrative approach would be most appropriate to motivate military personnel to be more energy efficient, relying both on intrinsic and extrinsic motivation.

C12. Survey revealed that majority of respondents have not been trained on energy efficiency, but they have interest in gaining knowledge about energy efficiency and have different behavioural habits in saving energy at home and during the missions. There are distinct groups among military personnel with different levels of awareness and varying attitudes towards energy efficiency, with very different experiences, and all the different types can be found among all status groups.

C13. In terms of gender or national culture, the results of this survey showed that military personnel do not perceive energy efficiency issues as sensitive ones

C14. The tools suggested for establishing EE within the NATO military culture using experimentation as the catalyst include:

- A glossary of main concepts for help improve understanding of the activities necessary to develop an EE culture within the military.
- A handbook for guidance to military personnel (including commanders and appointed energy officers) to establish relevant procedures for integrating energy efficient behaviour into military operations.
- Educational and training materials and courses that provide basic knowledge on EE and its role on increasing operational effectiveness and other benefits as a contribution to raising awareness, changing attitudes and behaviours, developing additional useful competences and skills, necessary for achieving EE.
- Establishment of troops EE training sites on a rotational basis prior to military deployments, which could play role as demonstration platform.
- Common procedures and standards at the NATO level related to integrating EE behaviour in the military.
- Identification of essential stakeholders' involvement in the EE cultural change process within the military.

C15. Analysis of cases in the Study indicated that instituting several sets of incentives usually bring positive results in achieving EE in military. Those include:

- rewards and status allocation, commander's intent, allocation of saved resources for the benefit of unit;
- education and communication,
- coercion,
- co-opting,
- facilitation and support,
- negotiation,
- gaining essential stakeholders support, and
- simulation games.

Each of these appeared in the best practices uncovered in this project and received support from a majority of survey respondents. Supporting factors include achieving satisfaction due to the existing evidence of how incentives:

1) positively affect the EE contribution to mission effectiveness,
2) support EE behaviour by commander,
3) improve education and training on EE, and
4) add to the efficacy of using an affine framework.

RECOMMENDATIONS

R1: Taking into account limited scope of survey and discussions during ARW's within the framework of current study, the research **(focused on defined research areas and including gap analysis) should continue** in a similar manner using analyses and accumulated experience from different military cultural contexts.

R2: The results of the current study, as well as the Draft-Handbook, and the Draft-Glossary should be **tested, verified, and approved** during further discussions of experts with wider and deeper experience.

R3: After approval, the Draft-Handbook and the Draft-Glossary should be used within NATO's **experimentation process** and, when demonstrating positive results (together with educational and training courses), should be **integrated into NATO standards** linked to NATO operational planning as well as setting energy personnel requirements. NATO ENSEC COE should play active role during each of those steps.

R4: Prepare a tailor-made set of tools (selection of best practices) for each target group as a means to influence their motives, incentives, and decision making. Each target group should be surveyed beforehand in order to understand and measure their levels of awareness, perceptions, practices, behaviour, and attitudes to energy efficiency.

R5: NATO and its Partners should create and adopt EEM basic knowledge and skills standards for NATO military commanders and designated energy officers to apply during operations.

R6: Focus on NATO Land-based Experimentation. Regarding the criteria and recommendations in respect of the armed forces (Army/Navy/Air Force/Marines), we recommend to take into account the amount of accumulated knowledge and experience during national initiatives of achieving EE through behavioural change. Since the majority of case studies have occurred within Land Forces or the land segment of the Navy (Marines), we recommend focusing NATO experimentation in these military segments.

R7: Consider Training Locations. In order to identify criteria and recommendations with respect to geography, we recommend taking into account the highest probability of achieving political support and financing from NATO members and partners. We consider that regions indicated in NATO's Readiness Action Plan (agreed by NATO during the 2014 Wales Summit), present a good choice for establishing troop EE training sites in vulnerable regions. We further recommend training on a rotational basis prior to military deployments to help minimize security threats in vulnerable regions.

R8: Consider Temporal Investment. With respect to the criteria and recommendations involving of length of time, we consider that the length of time necessary for experimentation, training, and EEM policy development, directly correlates with the level of political will and amount of financing by NATO Members and Partners. We recommend combining experimentation with the perspective of turning experimentation sites into EE training sites, on a rotational basis prior to military deployments. We

recommend using the ‘spiral development’ method to help ensure a successful beginning of comparatively small size experiments with demonstrated ‘small wins’ to help accumulate resources for additional investment, which could require an increase in the amount of experimentation.

R9: Consider EE Incentives. Several sets of incentives is recommended such as: rewards and status allocation, commander’s intent, allocation of saved resources for the benefit of unit; education and communication, coercion, co-opting, facilitation and support, negotiation, gaining essential stakeholders support, and simulation games.

R10: Consider close cooperation links with European Defence Agency (EDA) who has accumulated experience in establishing this kind of experimentation sites.

R11: Consider further deigning and approval main tools to establish EE in NATO Military Culture: Glossary and Handbook; educational and training materials and courses; establishment of troops EE training sites; common procedures and standards at the NATO level related to integrating EE behaviour in the military; identification of essential stakeholders’ involvement in the EE cultural change process within the military