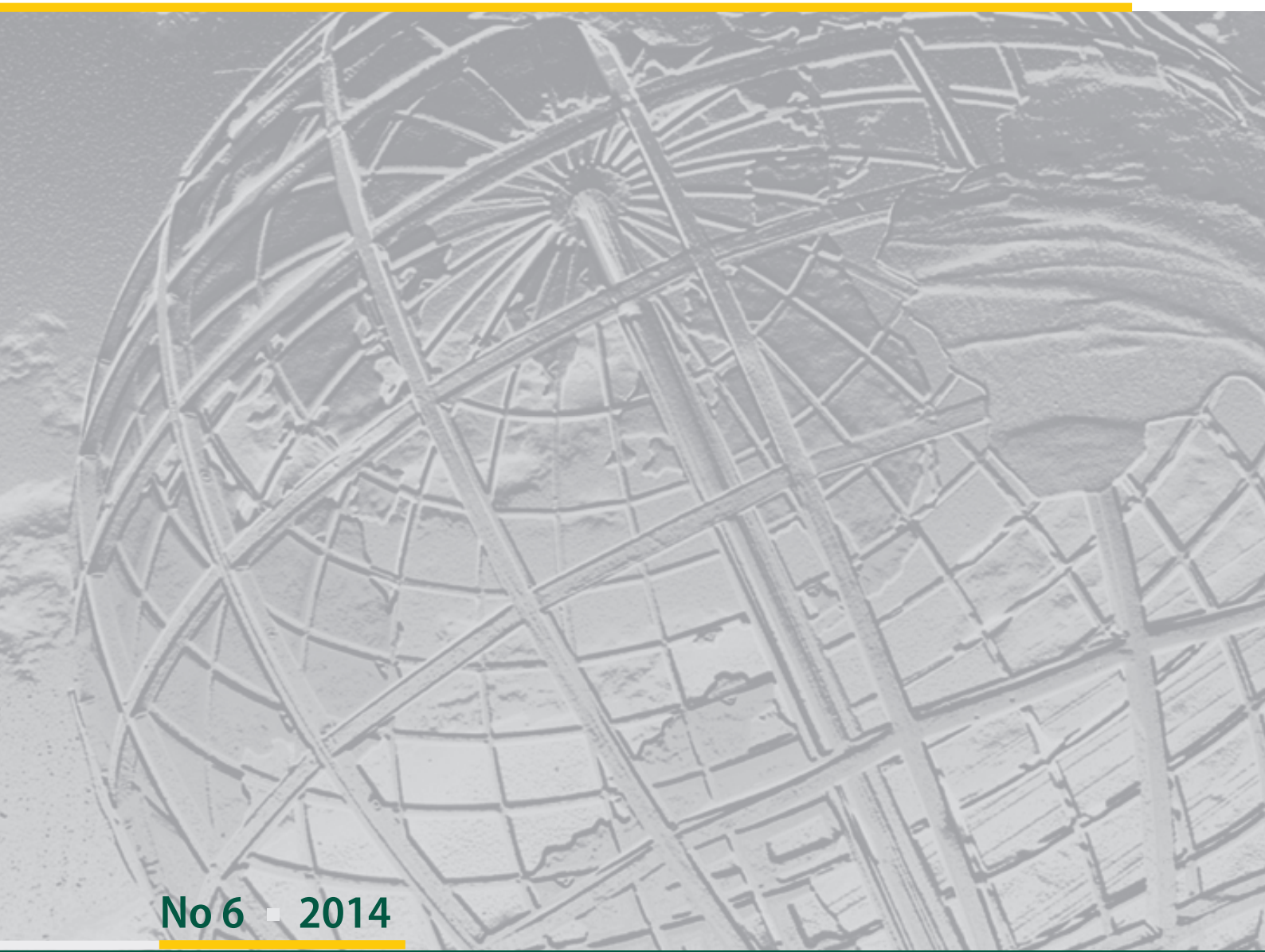
Energy Security: Operational Highlights



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Energy Security Discipline Development in NATO: First Steps for Moving Forward

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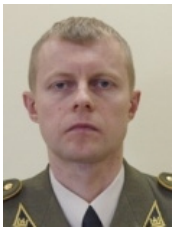

The Training Requirements Analysis Workshop of 10-12 December 2013, which followed the Training Landscape Development Conference in the area of energy security (held on 10-12 September, 2013) are two major steps facilitating the process of "operationalization" of the Training Requirements on Energy Security in line with NATO Strategic Approach to Training and Global Programming Framework. Why is this process important and how was it initiated? What challenges are to be responded and what aspects are to be highlighted for turning this "operationalization" into a powerful tool ensuring appropriate embedment of NATO education and training standards in the area of energy security?

Background developments

At the Chicago Summit in 2012, NATO stressed the importance of expanding education and training, especially within the context of the Connected Forces Initiative (CFI). CFI aims to ensure the ability of forces to communicate and work with each other, the use of common doctrines, concepts and procedures, as well as interoperable equipment. The military needs to practice working together through joint and combined training and exercising in order to standardize skills and make better use of technology. Bearing in mind the end of ISAF mission in Afghanistan, one could argue that the new era of "exercising" NATO has commenced. In addition to previous tasks, NATO's Allied Command Transformation (ACT) has also been given the responsibility of managing collective training and exercises based on Allied Command Operations' requirements.

The importance of NATO's role in energy security has been identified already in 2006 with the major footprint made during Chicago Summit (2012). Based on the aforementioned political and military direction and guidances, NATO Energy Security Training and Education plan was produced in 2013 by ACT in Bi-SC format. Its purpose was to define education and training in a structured and holistic way for the identified training audiences from politico-military to tactical levels.

However, in the absence of a doctrine and concepts at the time, the energy security discipline development started from the scratch pushing forward natural questions: What needs to be done to have the Allies' forces well prepared to deal with emerging challenges related to energy security? What Education and Training (E&T) is needed and how is it going to blend with existing education in NATO environment? To find these answers, NATO Energy Security Centre of Excellence (ENSEC COE) with support of ACT Joint Force Trainer (JFT) and NATO International Staff Emerging Security Challenge Division (NATO IS ESCD) took initial action towards "operationalization" of the Training Requirements on Energy Security in line with Strategic Approach to Training and Global Programming Framework.

A central plank of the aforementioned CFI initiative is the use of E&T to build and sustain interoperability and readiness and prepare NATO forces for all types of contingencies. In order to do that E&T spectrum should cover all Individual and Collective training activities.

Scratching NATO E&T landscape

With considerable cuts to defence spending and the end of major operations overseas,

education, training and exercises are supposed to be the engine of transformation for the long term future of the Alliance posture.

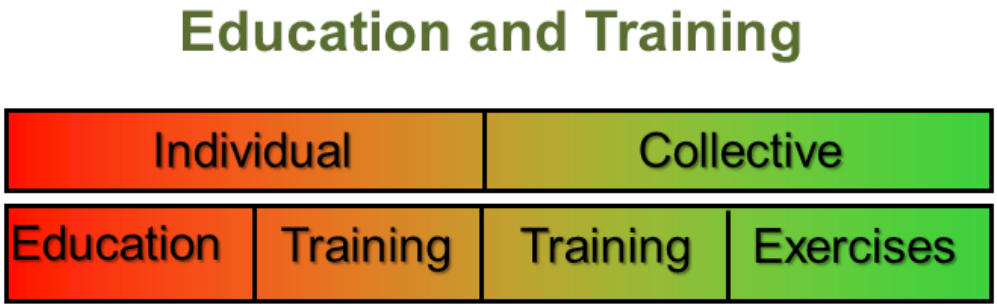

Figure 1. NATO Education and Training Spectrum

Following the implementation of a new NATO E&T policy, a specific holistic training structure has been developed and subsequently named a "global programming". It is foreseen that ACT will implement the Global Programming structure to deliver E&T based on the available political and operational requirements, at the strategic, operational and tactical levels. To meet Alied Command Operations' (ACOs') capability priorities and operational requirements, HQ SACT will deliver E&T based on International Educational Standards to safeguard Quality Assurance. The future Training Management System will make education and training opportunities known, indicate requirements and signal participation.

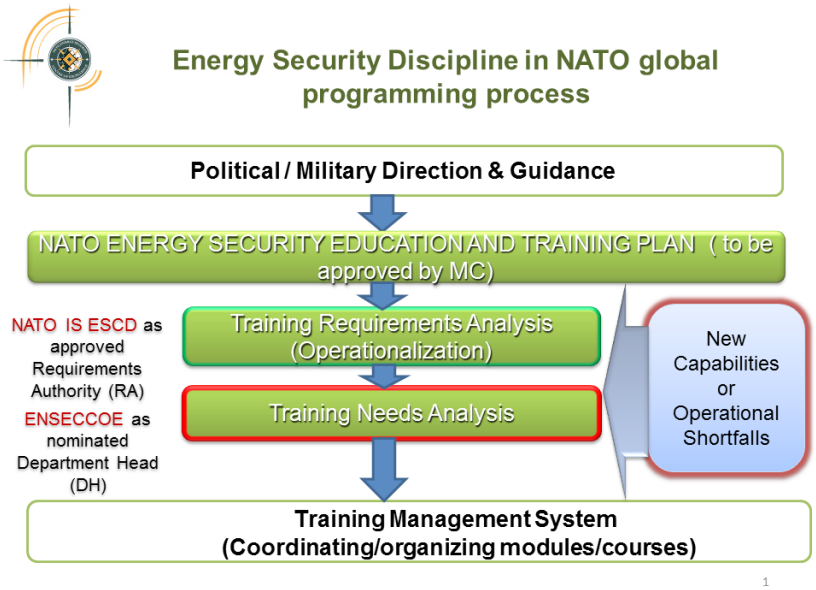

Figure 2. Energy Security Discipline in Global Programming

Global Programming process will be managed by relevant Requirements Authority (RA) and Department Head (DH) institutions, both of which are controlled by JFT.

In the area of energy security, NATO IS ESCD was appointed as RA to be responsible for development and crystallization of the E&T requirements for the respective discipline within the range of the available political-military guidance. Respectively, NATO ENSEC COE has been nominated DH to be responsible for translation of operational requirements and application of the educational standards into any NATO programme, course or module. DH will also coordinate stakeholders providing E&T solutions for energy security.

NATO Energy Security Education and Training plan (STP) was the main driver or facilitator of the Energy Security discipline development in Global Programing framework. The STP was designed to focus on NATO military education and training tasks within energy security to avoid duplication of effort, synchronise needs and identify requirements. The plan sets up the conditions for Training Requirements Analysis (TRA) in the area of Energy Security, in line with NATO's E&T Global Programming.

Startup: Building Community of Interest and Raising Awareness

In NATO E&T directives, the TRA is described as an academic plan which includes recommended solutions for identified gaps and redundancies in one or another discipline, identified by NATO. It is used to systematically identify relationships between the target audience, Depth of Knowledge (DoK) and competencies required for NATO personnel (military and civilians).

To be in line with the new developments on NATO E&T policy, NATO ENSEC COE with support of ACT JFT and RA, organized Training Landscape Development Conference (TLCD) in the area of energy security on 10-12 September, 2013, which took place in Trakai, Lithuania. The event proved to be a major step in defining the Community of Interest (COI) as it brought together participants from NATO and its Partner nations, both the military and academia to exchange their thoughts and ideas regarding the current status and future prospects of education and training in the area of energy security. The aim of the conference was not only to provide a discussion forum for the COI but also to investigate the status quo in the field in order to build an effective conceptual platform that addresses specific core competencies for consistent quality E&T outcomes in the future. It was commonly agreed that there is a vast demand for raising awareness on energy security issues. Thus, in order to curb the full range of energy - related challenges and to be able to seize the opportunities effectively, education and training are required in all levels possible. The discussions basically concentrated on strategic and operational levels as it was agreed to employ a 'top-down' model, yet not excluding the considerations on tactical level as well. E&T environment in the energy security domain is a challenge itself, as there is no officially accepted NATO policy or strategy yet. Energy security is a sensitive topic, thus it does not have an easy or quick interim solution. It is obvious that there is a need to have a long-term vision of future changes and evolution of technologies when developing and implementing E&T requirements. The existing programs should be broadened so that the trainees have at least general knowledge of the matter.

Figure 3. TLD Conference.
Source: NATO ENSEC COE

NATO forces should be trained on reducing the demand and increasing the efficiency, recycling as well as re-using available resources and implementing renewable energy sources in the operational field. As a result, it would not only ensure forces' military self – sustainability but also have a smaller environmental footprint.

More specifically, the main questions raised were as followed: what energy security awareness courses are needed, how and who should implement scenario-building workshops and how energy security issues should be integrated in staff-level exercises. The discussion followed on what are the best practices on military energy efficiency that needs to be exchanged and what energy efficiency standards for the equipment and procedures in the education and training have to be set. Furthermore, the question regarding how military needs to be trained on saving energy and protecting the environment was also addressed.

Finally, syndicate work provided initial insights on the requirements for E&T in military energy security area. Further need of cooperation is clear as energy security offers a suitable framework for enabling multi-organizational cooperation. Currently, NATO ENSEC COE,

The development of strategic level education must be considered carefully as it is one of the means to raise energy security awareness and start coming up with innovative ideas.

NATO Cooperative Cyber Defense Centre of Excellence (CCD COE), NATO Center Against Weapons of Mass Destruction (WMD) and NATO Center of Excellence Defense Against Terrorism (COE-DAT) are all somewhat related to energy. Thus, enhanced cooperation via developed network for sharing the expertise in the area of energy security would provide a great opportunity for ensuring high level E&T programs.

Identification of Training Requirements on Energy Security

TLDC was a perfect conceptual platform to continue with an official TRA process 3 months later. Organized by ACT JFT and supported by RA and DH, Training Requirements Analysis Workshop (TRA WS) was held on the 10-12 December 2013 in Vilnius, Lithuania. The event hosted a great variety of entities, including representatives from NATO bodies, such as ACT JFT, JFC Brunssum, other COE's, as CCD and MARSEC, military educational institutions, as NATO School Oberammergau, Baltic Defence College and US Naval Postgraduate School, also governmental institutions and academia. The purpose of the Workshop was to collect and share information on requirements for E&T and present an overview of the existing energy security training landscape and the current E&T gaps.

Figure 4. Energy Security TRA WS.
Source: NATO ENSEC COE

RA and DH presented a generalized perception on training requirements and proposed that NATO E&T in energy security domain programs should focus on raising strategic awareness, the protection of critical infrastructure (CEIP) and military energy efficiency.

Eventually stakeholders agreed that the requirements for education and training should differ and it would be not wise to apply the 'one size fits all' concept. The chosen method was plenary group discussions to ensure a result with maximum influence by all stakeholders and subject matter experts (SMEs). Each identified level, prioritized training audience and functional area were analysed. Matching the results of the analysis with the existing training opportunities identified gaps and redundancies in energy security E&T. The results of the Education and Individual Training (E&IT) and collective E&T audience analysis were presented by level and sub-level, in functional areas, performance objectives and required DoK. This analysis was matched with the gathered data of E&IT opportunities. The diagram (Figure 5) depicts Energy Security Discipline map for a more comprehensive view to structure energy security training in the long term, which includes closing the identified gaps through the modification of existing courses, or developing, or assisting in the development of new courses.

Education and Individual Training:

- Develop pilot Strategic Awareness Course for Pol/Mil, Strategic and Operational Senior Military and Civil Leadership;

- Develop CEIP-related courses (DoK 200-400) for Pol/Mil, Strategic and Operational level

planners, including from partner nations;

• Develop Energy Security Awareness courses (DoK 100-300). ENSEC CoE is to investigate and seek solutions from training institutions which were identified during the Energy Security TRA preparation phase and beyond;

• Develop an Energy Efficiency in Military operations course (DoK 200). ENSEC CoE is to investigate and seek solutions from training institutions which were identified during the

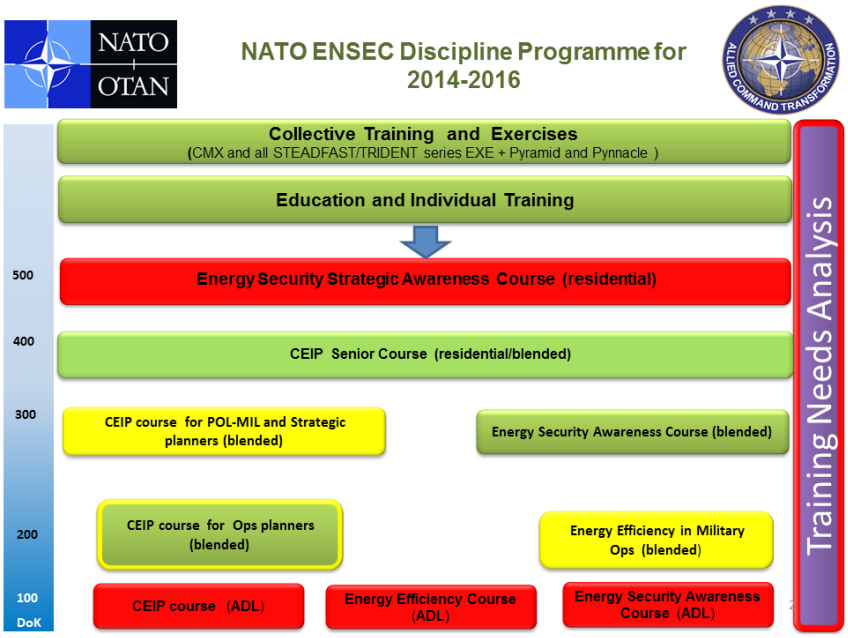

Figure 5. NATO Energy Security Discipline Programme

Energy Security TRA preparation phase and beyond.

Further, it was assumed that the Collective Training and Exercises pillar concerning CMX and all STEADFAST/TRIDENT series exercises could contain energy security aspects. In order to close collective training gaps for Energy Efficiency in Military operations, ENSEC COE was asked to investigate whether ENERGEX, Capable Logistician Exercise or other similar events could offer proper training. It was agreed that there is a need to identify if BST, MRE, BRILLIANT, NOBLE, and LIVEX exercises contain any energy security-related exercise objectives, injects, or scenario content. Besides mentioned aspects there was a significant discussion on a number of issues that need a resolution in the future. Direct linkages between military engineering, energy efficiency, cyber security and critical energy infrastructure protection were identified. The importance of cultural change was particularly highlighted within energy efficiency issues. The ENSEC COE is currently conducting a study „Energy Efficiency: Cultural Change" which, when finalised, should be shared with the E&T community and analysed for injection into applicable courses. Energy security should be examined within the context of the other domains (land, sea, air, cyber and space). A definition and identification of Critical Energy Infrastructure is required, since it is rather difficult to instruct in the field of protection issues or to plan when the assets to be protected are not identified. It implies also a need for doctrinal development to commence. The doctrine is needed in E&T institutions to ensure that course syllabi and exercise design are matching doctrinal requirements. Guidance as to mandatory requirements should be issued from the highest level of NATO leadership to ensure that energy security remains at the forefront of senior NATO authority consideration.

Although TRA is conducted only once, Energy Security discipline development is not a linear process. Hence, identified requirement will be re-evaluated/revised annually during the

Discipline Conference which is scheduled for spring 2015.

Way forward

As NATO is moving from a "deployed" to a "prepared" posture, an enhanced training effort is the key to maintain interoperability among Allies and with partners. Moreover, education and training, including exercises, can help ensure that the security implications of non traditional challenges, such as energy developments, are being recognised in full.

Emerging challenges in the military environment need to be coped with; therefore, there is a vast demand for developing E&T activities in the area of energy security which is considered as a perfect platform for cooperation among various stakeholders. For this reason, ESCD and the ENSEC COE, supported by Allied Command Transformation, are now in the process of identifying energy security training requirements, surveying the existing training landscape and, if required, developing more specific training courses in those areas that are not yet adequately covered. It will be of particular importance to ensure that the training effort is balanced, i.e. that it covers three main pillars of awareness, infrastructure protection and energy efficiency, and tailors them to the right target audience.

The TRA revealed that current energy security E&T landscape is not in line with Requirement Authority training requirements and, therefore, urgent steps should be taken to close the gaps in the discipline. The current situation is quite advantageous due to the change in Cluster-Framework of the NATO E&T system. The role of JFT as a driving force for the establishment of ESCD as RA and ENSEC COE as DH on Education and Training cannot be overestimated: with such establishment, according to Ambassador Sorin Ducaru *„ the stage is now set for a new chapter not only in the cooperation between these two entities, but also for NATO as a whole"*[1]. It is worth mentioning that the aforementioned events helped to build the standing community on energy security from in and out of NATO. Although there is no official NATO policy or strategy on energy security, it should not hamper the initial NATO's energy security E&T effort. The latter might be very beneficial for raising awareness in energy security as one of major steps towards a comprehensive NATO's energy security agenda.

1. S. Ducaru. „NATO and Energy Security: Current Achievements and Future Challenges", Energy Security: Operational Highlights, No 5, p. 6.

Canadian Case Studies on Energy Efficiency During Operations

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Recently, the Canadian military conducted studies on the actual energy and environmental consumption during a number of operations in Northern Canada, including Canadian Armed Forces annual operation in North. The use of traditional energy sources on operations continues to be a topic of discussion in many militaries. The data collection study, combined with collaboration with defence science and industry, are the first steps towards understanding what energy is consumed and where it is consumed in operational environment. The information collected is designed to provide technical and procedural solutions to improving energy efficiency and reducing the logistical and operational burden caused by traditional fossil based fuels on operations. The next steps will see the integration of technology to demonstrate reductions in future activities and to influence future procurement strategies.

From analysis towards recommendations

Case studies performed by the Canadian Armed Forces (CAF) aimed at a reduction in the energy consumption during deployed military operations. The Canadian Joint Operations Command (CJOC) conducts domestic and international operations within the CAF. Through the work conducted during an exercise in Northern Canada and further studies during cold-weather and hot-weather conditions, it has been demonstrated that significant savings can be achieved. Cooperative efforts are required when a defence organization works with both industry and academia in achieving collective goals. Some of these challenges and limitations will be discussed with recommendations on how defence agencies and industry can work together towards a common goal.

Strengthening cooperation between military community and industry

In a modern era where technology and efficiency are primary concerns for industry, it is only logical that the military community joins with industry in achieving these objectives. In the past few years, this cooperation has developed and matured, specifically in the field of energy efficiencies for deployed military camps.
National initiatives such as the UK POWERFOB and the US Experimental Forward Operating Base (ExFOB) have proven that significant savings can be achieved with relatively simple solutions and close cooperation with industry and academia. Canada is no exception and recent deployments to Afghanistan have demonstrated and solidified the argument that militaries need to look at alternative solutions to energy production and energy conservation during deployments. The financial strain, combined with the risk to soldiers on resupply convoys, has forced the CAF to look at ways to reduce diesel fuel consumption on deployed operations. These initiatives have taken the form of cooperation with the Department of National Defence (DND) science and technology specialists and Natural Resources Canada (NRCan). The CJOC has led this initiative through technology demonstration projects and cooperative efforts with other federal departments and private industry. One such example occurred during the summer of 2012 during the conduct of Operation NANOOK 2012.

The increased cost for traditional fossil fuels and the logistical and security challenges associated with transporting large quantities of fuel to forward locations has forced militaries to re-evaluate and look for alternate solutions, all focused on reducing the consumption of such fuels in deployed locations.

Case Study 1 - Op NANOOK 2012

The CAF conducts an annual sovereignty exercise in the Canadian north named Operation NANOOK. The 2012 edition of this exercise took place in the Northwest Territories from 07

Op NANOOK 12 was designed to prove a concept that military camps are capable of being sustainable and as a result in a position to reduce their impact on the local environment.

to 26 August 2012. The aim of this joint, integrated and combined Operation was to exercise Canada's Arctic sovereignty and to visibly demonstrate the CAF's capability to support our partners in executing a whole of government response to security and safety situations in the North. Early in the planning for Operation NANOOK 12, military engineers focused their efforts on ensuring the employment of the Relocatable Temporary Camp (RTC) suite of equipment for the Main Operating Base (MOB) near Inuvik, NWT. The military camp would house up to 320 people from across Canada, using primarily integral military equipment. The secondary objective with the deployment of these assets and associated equipment was to conduct a proof of concept with respect to sustainable military camps. Within this concept, the CAF would be less reliant on contractor support during operations and focused more on integral equipment to mitigate the myriad of environmental and energy issues associated with deployed operations.

The concept of sustainability was demonstrated through the use of equipment and energy monitoring, including:

- Vehicle Wash System
- Mobile Incinerator
- Reverse Osmosis Water Purification Unit (ROWPU)
- Mobile Wastewater Treatment Plant (WWTP)
- Variable Speed Generator
- Real-time energy data collection and analysis

A. Vehicle Wash Station

The vehicle wash station was recently procured by the Canadian Armed Forces and Op NANOOK 12 was the first opportunity to demonstrate the newly acquired system. Designed to wash all types of military vehicles, the vehicle wash station is designed to recycle 100% of the water used during the vehicle wash operations. Given the scarcity of water at many deployed locations, this acquisition will prove to enhance the Canadian Forces commitment to Environmental Protection and sustainable camps. The ability to recycle the majority of water in one system will have a follow-on effect of reducing the fuel consumption of water production units.

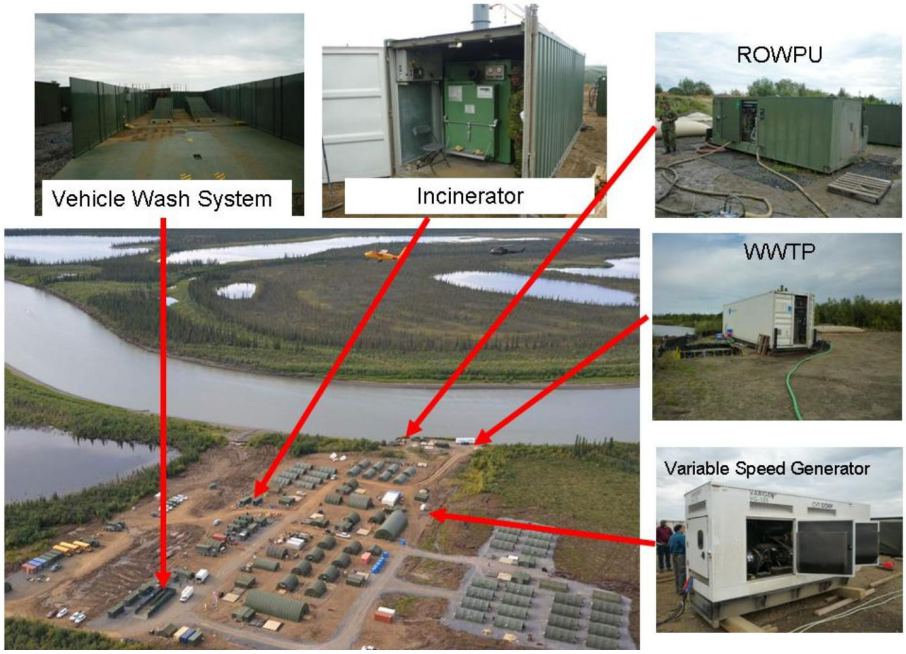


Figure 1. Op NANOOK employs sustainable technology at its main camp in Inuvik, NT

B. Mobile Incinerator

Two mobile incinerators were deployed to Op NANOOK 12. They were primarily designed for disposal of medical waste but during Op NANOOK 12, they have been used to dispose of domestic waste. The use of mobile incinerators will drastically reduce the quantity of solid waste going to local landfills, reducing the burden on local communities.

C. Reverse Osmosis Water Purification Unit

The Reverse Osmosis Water Purification Unit (ROWPU) is the primary method of water treatment in the Canadian Armed Forces and has been in the inventory for many years. It has proven itself on numerous deployments and disaster relief operations, such as Turkey, Honduras, Pakistan, Sierra Leone Haiti and Afghanistan. One ROWPU can produce up to 5,000 litres of potable water per hour, depending on the quality of the water source. During Op NANOOK 12, the ROWPU produced more than 700,000 litres of water from mid-July to mid-August, providing both drinking water and shower/wash water for all occupants of the camp. The use of the ROWPU has resulted in a drastic reduction on the quantity of plastic water bottles purchased by Op NANOOK 12 and subsequently a reduction in solid waste sent to the local landfill.

D. Mobile Wastewater Treatment Plant

The mobile wastewater treatment plant (WWTP), for Op NANOOK 12, was a rental solution as the Canadian Armed Forces presently does not have an operational and deployable mobile WWTP. The mobile WWTP was intended to treat all wastewater produced by the 320 people of the camp and ensure that the effluent quality met local environmental effluent guidelines. Op NANOOK 12 was also a case-study for innovations in water treatment and water usage. Given the treatment technology of the ROWPU and the effluent water quality, this approach enabled the camp to reuse the wastewater to become a potable water source for the camp. Prior to releasing any of the water for human consumption, medical personnel tested the water at an approved environmental laboratory. It was only after the water had been tested was it approved for consumption by the Medical officer on the camp. A new approach which proves the concept that water reuse only adds to the sustainability of deployed camps.

E. Variable Speed Generator

The Canadian Armed Forces recently procured, through a try and buy program with a Canadian company, a variable speed generator. This generator will ensure the fuel savings if compared to a standard constant speed generator. The variable speed generator's ability to manage the power output depending on power loads will ensure a more efficient fuel management and fuel savings. The demonstration proved successful and initial results showed a reduction of 29-33% in diesel consumption for this single generator. The next phase of the trial will be to work with industry to ensure the generator meets the specific and stringent military specifications before being introduced into the Canadian inventory.

The user trial demonstrated that fuel savings and energy efficiencies were achieved, validating the military community's need to invest in such systems.

F. Data Collection and Analysis

The preliminary data gathered during Op NANOOK 12 supports the sustainable military camp concept by reducing energy consumption and the camp's overall environmental footprint.
As Figure 2 highlights, the largest energy consumer in a deployed camp are the accommo-

The data collection also illustrated the need for further education to soldiers and commanders in the area of energy efficiency.

dation tents (33%). The next step will be to analyze the information related to solid waste, water, wastewater, energy and fuel consumption and use this as baseline data as the Canadian Armed Forces moves forward in establishing itself as a leader in advancing sustainable military camps. The data collection was completed with the closeout of activities at the Inuvik camp and will be analyzed over the upcoming months, with a goal to understand where savings can be made and to further reduce the environmental and energy footprint from CAF deployed operations.

G. Summary

The momentum and interest of the trial during Op NANOOK 12 has meant greater interest in pursuing such initiatives. As a result, the CJOC is working even closer with NRCan and Industry Canada to define the requirements and source potential solutions to improve on the energy efficiencies of military operations. One such example was a technology demonstration project led by NRCan's CanmetENERGY laboratory in Varennes, Quebec. The Integrated Camp Energy Technologies (ICE-T) demonstration focused on power and energy solutions for cold-weather environments. The initial collaboration consisted of an energy monitoring of the main camp during Op NANOOK 12. CanmetENERGY (Varennes and Ottawa) installed energy monitoring equipment on the power distribution system as well as in typical shelters. The data collected will be part of the solution to determine the energy usage for Canadian deployed infrastructure, with a goal of developing technologies to improve performance while reducing the energy requirements for deployed military camps.

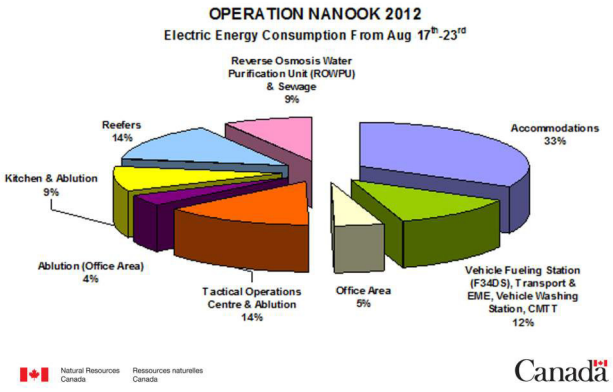


Figure 2. Energy data collected during Op NANOOK 12[1]

Case Study 2 - Cold Weather Energy Study

The next phase of the demonstration was the collaboration between the Canadian military, CanmetENERGY as they demonstrated solutions to improve on energy consumption in cold weather conditions. The project consisted of the setup of a mini-camp consisting of four military tents, each proposing a different solution to the problem. The project ran during the winter of 2013 with temperatures reaching -30 degrees celsius. The data collected during Case Study 1 will be compared with the information collected in Case Study 2.

The Technology Demonstration Project tested three technologies during the demonstration period, all of which were evaluated against a reference shelter:

1. Air Plenum and Fan Coil, using heat recovery from a variable speed generator;
2. Cold-climate air source Heat Pump (split unit); and
3. Radiant floor heating, using recovered heat from a generator and hydronic baseboard heating.

1. Cassolato, Suzanne and Giguere, Daniel: Operation NANOOK Energy Profiles, CanmetENERGY, 23 November 2012

Figure 3. ICE-T Demonstration

Future Initiatives

So, what is next for the CAF in the application of alternative energy and sustainable military camps? Projects are already approved and/or underway to replace mobile incinerators with higher capacity incinerators capable of treating solid waste for a 500 person camp. The following equipment will be the focus of project proposals and/or research in the near future:

- Waste to energy systems;
- Alternative energy technology;
- Energy capture systems; and
- Water reuse systems.

Several other initiatives are underway, to include the following:

A.Northern/Arctic Power and Energy Workshop

The challenges associated with military activities and operations in the extreme Northern/ Arctic regions of Canada bring with it challenges associated with power and energy.
Such a relationship has been developed with Sustainable Development Technology Canada (SDTC) with a goal to cooperate on potential power and energy solutions for such operations. SDTC is a not-for-profit foundation that finances and supports the development and demonstration of clean technologies which provide solutions to issues of climate change, clean air, water quality and soil, and which deliver economic, environmental and health benefits to Canadians [2]. The cooperative efforts come with challenges as defence agencies have varying methods to fund projects and the use of S&Tfunds to assist with projects will be an important facilitator. This collaboration may prove effective in overcoming the obstacle faced by the operational customer due to their limited capabilities to fund Research and Development (R&D) projects. However, the ability to combine efforts, with S&T agencies funding the R&D efforts and the operational customer funding the Technology Demonstration Project is an effective method to counter such obstacles. The challenge exists but solutions also exist to bring effective solutions to the forefront.

A recent workshop looked into such challenges, with a specific goal to develop intergovernmental relationships in order to work on potential solutions. The workshop highlighted the necessity for the military customer to develop working relationships with industry Canada.

2. http://www.sdtc.ca/index.php?page=sdtc-profile&hl=en_CA

B. *Solar Shade Testing*

A follow-on from the work conducted during Case Study 2 has been the relationship established between CJOC and CanmetENERGY research facility in Varennes, Qc. As a result, further studies into the use of solar shades on military shelters will be conducted. The study will look at the energy profiles when solar shades are installed on a standard military shelters, as well as evaluating the efficiency of the Environmental Control Unit (ECU) used to heat/cool tents. An energy comparison with the ECU and heat-pump provides further knowledge to military planners and engineers in the design and integration of these technologies for future deployments.

The long-term goal of these efforts is to better understand the actual energy consumption in a deployed context and to put forward solutions to reduce the consumption and to improve on how militaries plan and conduct such operations.

C. *Energy data collection*

The CAF have been conducting modern expeditionary operations for decades; however, the collection of data on energy usage is a new concept to the Canadian military. It was through a collaborative effort between the Canadian military and defence scientists that the first steps towards data collection occurred, as outlined above during Op NANOOK 12. These efforts have proven their success and have continued through further energy data collection efforts during military deployment at Canadian Forces Base.
Through joint funding and research, as well as cooperation with industry, both departments are seeing the value in such activities, both financial and operational.

Conclusions

Through work with industry and cooperation with other NATO nations, Canada will be working toward improving both the environmental and energy footprint related to military deployments. This cooperative effort will strive for a reduction on fossil fuel technology in deployed camps, with secondary effects being a reduced burden on logistics and force protection. The success of such activities will be largely dependant on the cooperation between defence agencies, science and technology and private industry. Defence agencies will be reliant on this cooperation with industry as they develop technology solutions to meet defence needs. The challenges exist; both from a procurement and fiscal perspective, but solutions are available and must be pursued in order to develop more efficient responses to the energy and environmental demands during military operations.

Considering Public-Private Partnership Solutions in the Framework of Energy Security: a Spanish Case

DR. RAFAEL JOSÉ DE ESPONA

The new Spanish National Security Strategy launched in mid-2013 highlights energy security related public-private partnership (PPP) solutions as potential to increase efficiency, synergies and improving coordination among enterprises and governmental bodies. This document empowered a key player in hydrocarbon logistic operations - Compañía Logística de Hidrocarburos S.A (CLH) – not only to elevate its security and safety levels but also to continue operating in a comparatively very efficient way. This case can be considered as one of best practices providing interesting solutions for those who are searching adequate means to meet current security challenges and requirements voiced during the NATO Chicago Summit (2012) and act in line with the Smart Defence Concept which promotes pooling and sharing capabilities, setting priorities and coordinating efforts better.

Description of the system: Government's and CLH's partnership

The Spanish business model is based on the ownership and operation of the Spanish military bulk fuel system as a Government concession. Assets are the refined products pipeline Rota-Torrejón-Zaragoza (ROTAZA) and strategic storage tanks (La Muela and Loeches). The Chief of Defence (CHoD), on behalf of MoD, retains the ownership of the assets integrated in the system, while CLH operates, maintains, updates, upgrades, and permanently improves the system.

This military refined products logistic subsystem is fully interoperable with the rest of the Spanish non-military bulk fuel system. The oil refined products logistic system is performed in open access for any customer, facilitating competitive prices (fee is less than 1% of retail product value) and flexible conditions, immediate product availability in any facility, fully automated operations, periodic quality control and product rotation. This logistic system has a high degree of automated processes and advanced level of integration (in terms of storage and transport facilities, as well as management and control systems) providing a guarantee of the integrity and consistency of the information.

The Spanish Government's concession business model

The concession business model implemented in Spain for the refined products logistic system with military assets has several advantages aimed to operational and cost-limited efficiency. Military authorities have the property over the assets and this ensures a military preferential use, under peacetime, crisis situation or war conditions. Consequently, the civil network can be used for military purposes either under peacetime, crisis situation or war conditions.

Military assets under normal operation (integrated with civil infrastructures) ensures assets maintenance and readiness in crisis situation, therefore it mitigates the risk of technologic or material obsolescence.

Emergency stocks always ensure product availability under crisis situation, furthermore, some of the NATO's European partners (i.e. Ireland) locate their emergency stocks in Spain as well. Military authorities obtain an economic benefit, especially from long term governmental concessions: fee regarding the right of use of the assets for civil purposes; preferential service price based on operation direct costs, and also competitive prices whenever network is efficiently operated.

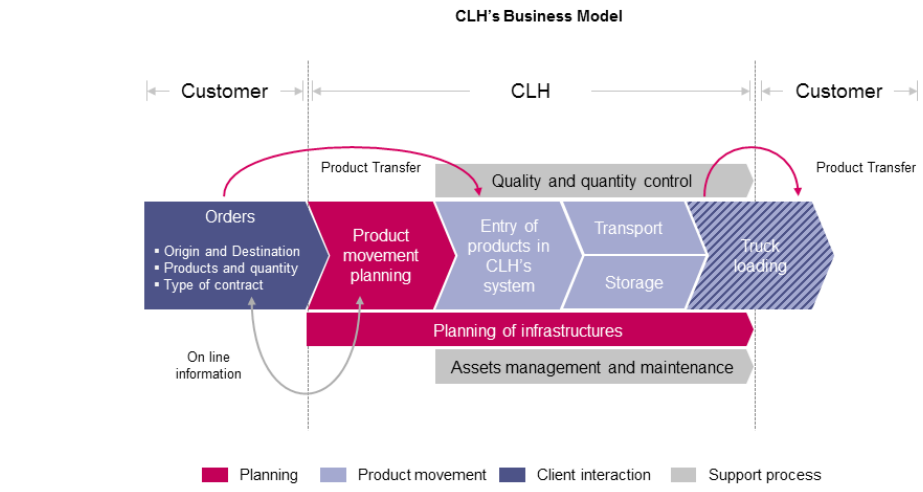
Military standards (i.e. O&M, product quality, specific certifications) are included in the Government concession agreement terms and conditions.

CLH company profile

CLH is a private entity, independent, with corporate governance stable under its own bylaw. It has long business experience of more than 80 years. Main activities are oil refined products logistics, including storage, pipeline transport and tanker truck loading; management of airport storage facilities and into-plane refuelling services; strategic storage and emergency stocks management for the Spanish central agency CORES (state-owned corporation of strategic reserves of oil-based products, which is responsible for managing strategic reserves and controlling the compulsory minimum security stocks in Spain), other foreign agencies and the operators; injection of quality and fiscal additives; biofuels blending. CLH also provides bunkering services.

CLH

CLH's Business Model



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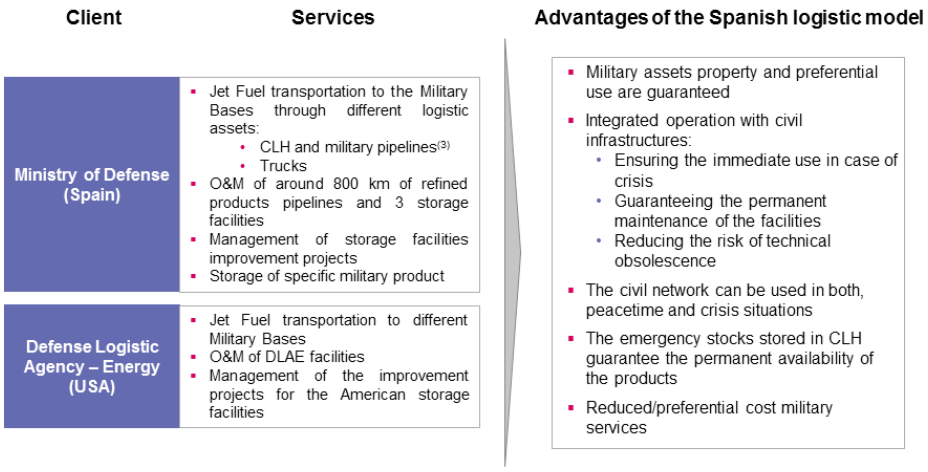
Main assets include 4,027 km of pipelines (connecting import harbour facilities, refineries, inland depots and other logistic companies), 7.9 mm3 of storage capacity in 39 facilities, 28 airport storage facilities, 5 hydrant systems in principal airports, 1,461 skilled workers. It has a national Spanish coverage, providing service in more than 500,000 square km. and more than 46 million inhabitants, as well as international links to Mediterranean and North European markets.

At the same time, CLH's security division pays attention to critical infrastructure protection measures, according to requirements of CNPIC (National Center for Critical Infrastructure Protection) and it will establish Operator Security Plan (PSO) and also Specific Security Plans (for each facility).

Key aspects of CLH´s logistic services are open access for any customer in Spain, competitive prices and flexible conditions, immediate product availability in any of CLH facilities upon receipt in CLH system, modern business model and efficient operations and information systems (i.e. state-of-the art practices, fully automated, online nominations, inventories and billing), guaranteed product quality with dynamic product rotation. High degree of automation allows to significantly increasing its productivity.

CLH is the main operator of Spanish oil refined products logistic system. Since the 1960´s the company is cooperating with military authorities – customers are Ministry of Defence (MINISDEF) and Defence Energy Support Center (DESC).

CLH provides different services to the MoD(1) of Spain and to the DLAE(2) of the United States of America



(1) Ministry of Defense
(2)Defense Logistic Agency – Energy of the United States of America
(3): Military pipelines are operated and maintained by CLH

CLH security framework

Security operational framework is performed taking into account the new Spanish National Security Strategy 2013, which considers Energy Security and critical infrastructure protection risks and menaces. CLH's business concept is closely related to Spanish emergency and strategic stocks of refined products, corporate governance, and the management pays special attention to these issues. After the publication of the new Spanish National Security document, CLH has strengthened security and safety measures, including implementation of modern technologies and increased capacity at its facilities.

CLH is permanently linked to Spanish General Staff headquarters, and it includes the operational military energy security common framework. At the same time, CLH cooperates with the national agency CORES supporting obligation of 92 days emergency refined products storage (requirement of EU Directive 2009/119/CE, September 14, 2009).

Additionally, the company has designed business continuity protocols considering potential impacts (i.e. natural disaster, cyber failure).

Collaboration framework between CLH and the military institutions

CLH provides services to the Ministry of Defence and Defence Energy Support Center. Services include product transport and storage, quality control and additivation (anti freezing, anti-corrosion and anti-static additives), proposal and management of improvement projects.

The economic relationship is based on a fee paid by CLH for using the pipeline (ROTAZA) under a governmental concession scheme. Preferential prices are based only on direct costs derived from the operation of the pipeline (i.e. labour, energy, maintenance, etc.), depreciation, general costs and industrial margin.

- **Operation in the crisis situation scheme means that pipeline network and storage facilities are put at military authorities disposal with preferential use, under activation of military operations (i.e. Operation Dessert Storm, Operation Irak Freedom, Operation Enduring Freedom, Operation Allied Force Joint Guardian) or crisis management situation (i.e. Puertollano oil refinery activity interruption in 2003).**
- **The Spanish oil refined products logistic concession business model managed by CLH is a PPP concrete case that creates a very efficient framework for military-civil cooperation since it brings private investments and management, as well as efficient energy supply to public military sector, without weakening security environment.**

Regulatory committees are established: Peer Mixed Committee (CLH – MINISEDF) and Mixed Technical Commission (DESC – MINISDEF), as regulated in the Defence Agreement between the Kingdom of Spain and the United States of America (April 2002).

Advantages for military

Under this PPP model, military fuel supply is the priority and always guaranteed over civil services. Logistic services (storage and transport) ensure the supply of the Rota and Morón military bases (South of Spain area). The military assets are used also for civil services integrated in the CLH network, maximizing its operational utilization, minimizing risk of obsolescence and ensuring the financial resources for its maintenance.

Spanish model as an example to be followed

The oil refined products logistics military system operated by CLH in Spain on the basis of PPP and empowered by the new Spanish National Security Strategy could provide a very efficient solution for optimising and securing energy supplies for military, budget costs, planning process and operations in other states as well. It seems to be a tested solution to improve military operational schemes and energy security related capabilities.

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