POLICY ON POWER GENERATION

FOR DEPLOYED FORCE INFRASTRUCTURE (DFI)
INTRODUCTION

Background

1. In November 2010, NATO nations stated that “key environmental and resource constraints, including health risks, climate change, water scarcity and increasing energy needs will further shape the future security environment in areas of concern to NATO and have the potential to significantly affect NATO planning and operations”. This statement was reiterated during the Chicago Summit in May 2012. In Chicago, the nations also declared that “… we will work towards significantly improving the energy efficiency of our military forces”.

2. Energy, most often fuel and electricity, is indispensable to the sustainment of military operations. Military forces use large quantities of fossil fuels during operations and a substantial proportion of this consumption is dedicated to electrical power generation for deployed force infrastructure.

3. The demand for energy during military operations has been increasing in part because camps and soldiers have been equipped with additional energy demanding equipment that provides both increased safety and quality of life. The inefficient use of generators in camps, poor insulation of shelters, and a lack of desire or awareness of the requirement to control energy consumption have contributed further to the expanding demand. This has significantly increased the financial and logistical burdens and put soldiers and contractors at risk in convoys, for which the protection effort distracts time and resources from other missions (Logistics Committee (LC) Alternative Operational Energy, 6 February 2012).

4. Beyond the consideration of the personnel and logistics costs plus the economic benefit of reducing energy consumption, there is a need to consider operational, environmental and strategic issues in enhancing the capability to improve energy efficiency of military forces.

Framework

5. In accordance with MC Policy for Allied Forces and their Use for Operations, military engineering (MILENG) support includes the development and management of infrastructure. The MILENG community is working on a broad scale “Sustainable Military Compounds” project, a series of Advanced Research Workshops sponsored through the NATO Science for Peace and Security (SPS) Programme. The project aims, inter alia, to develop a conceptual model including more efficient power generation.

6. Other NATO projects have been established to develop new studies on energy efficiency. In particular the Smart Energy Team (SENT) aims to generate
cross-cutting knowledge and steer the process of integrating military energy efficiency into Smart Defence.

7. The NATO Energy Security Centre of Excellence (ENSEC COE) also contributes to improving the energy efficiency of NATO military forces. Its mission is to assist nations, Partners and other bodies by supporting the Alliance’s capability development process, mission effectiveness, and interoperability by providing comprehensive and timely expertise on aspects of energy security.

AIM

8. To state the policy on power generation for deployed force infrastructure (DFI). It also gives guidance aimed at a reduction in the logistical burden of energy through a demand validation and increased generation efficiency on the scale of DFI.

SCOPE

9. This document describes the principles and guidance to improve energy generation efficiency. It sets a framework for the development of standards. It also addresses the related areas of energy consumption, storage and distribution in order to enhance the overall cost effectiveness.

APPLICABILITY

10. This Policy applies to peace, crisis and conflict and includes NATO exercises and all NATO-led operations and activities. It applies to all NATO and non-NATO nations participating in NATO-led activities. It provides sufficient flexibility for close cooperation with relevant organisations as required.

PRINCIPLES

11. Every camp is different, and the optimum power production solution differs according to the location, climatic conditions, local resources, size, function, Force structure, concept of operations, and the phase of the operation. To achieve energy efficiency, three key principles should be taken into account: modularity, interoperability and sustainability.

   a. Modularity.

      (1) Designed and developed as a fully integrated system that may be improved as operations mature and infrastructure requirements change, DFI comprises buildings, facilities and installations required to support military forces when deployed.
(2) Within the infrastructure concept, a camp should be treated as a complex system in which all infrastructure construction and operations are interconnected and interrelated.

(3) Developed from a series of “blocks”, DFI is the product of adding basic modules to satisfy the capacity requirement. A module can provide complete real life support for a defined size of camp or a specific service for the camp (e.g. ablutions, laundry, kitchen facilities).

(4) Modular design of the power generation system will enable capacity to be tailored to the energy requirements of the camp. All energy related equipment and material should be preinstalled as a functional system and prepared for easy set-up.

b. Interoperability.

(1) To be interoperable, the differences between European and North American electrical standards should always be considered in order to connect both systems, or in case of handover of all or part of DFI. Electrical devices should be capable of being used with either system and with a host nation’s power grid.

(2) A set of aligned power standards should be agreed across the nations to encourage interoperability, and provide the catalyst for “plug and play” capability, development of power generation from renewable energy sources, and improvement of energy storage.

(3) Beyond “plug and play” capability, power generation should have an efficient power management system with measurement of the load from the platform services (even if belonging to different owners), and intelligent monitoring and control of power sources to best match energy demands.

(4) During the planning phase of an operation or exercise, troop contributing nations should provide an inventory of their equipment for power generation, storage and management, with a view to optimizing energy production efficiency and minimizing energy consumption.

c. Sustainability.

(1) Sustainability should be included in all facets of DFI designs. It should be taken into account as early as possible in the planning process and throughout the complete life cycle of DFI.

(2) When properly designed and built, a sustainable camp will minimize overall costs during its operation and maintenance. In addition, reducing the logistic footprint will reduce adverse
environmental impacts and could lead to better acceptance of the Force, as well as energy savings.

(3) Sustainability implies the ability to use innovative systems and equipment with low footprint, and local resources if available, leading the way to the stabilization phase and thus the handover of the camp to the host nation (HN).

(4) The use of renewable and alternative energy (e.g. solar, wind, fuel cells, waste-to-energy technology) is a potential way of reducing liquid fuel consumption. These sources of energy have to take into account a low human and logistic load for their operation and maintenance.

GUIDANCE

12. To successfully implement these principles, it is necessary to adopt a holistic approach, including power generation and management, infrastructure design and management, and command and control, training and awareness.

   a. Power Generation and Management.

(1) Planning and coordination of power requirements, comprising all levels from individual and tactical combat systems up to power generation for a large NATO camp, should be considered as key elements to contribute to increasing the effectiveness of existing energy systems and reducing liquid fuel demand.

(2) The use of multi-energy as well as multi-size systems, from the early stages of an operation, is recommended to ensure efficient and secure power. However, autonomous power generation and supply must be continuously available for operational functions and critical services in case of failure of a traditional centralized grid.

(3) In order to ensure scalability, reliability and flexibility of electric power it is preferable to use microgrids, with a mixture of fossil fuel based generators, renewable energy sources, energy storage and HN power, if existing and usable.

(4) The location and the size of a camp are factors for choosing alternative and renewable energy as main or secondary energy sources. In small, remote or insular camps it is preferable to use renewable energy as the main energy source because the technology and the existing equipment allow a significant reduction of fossil fuel consumption. In larger camps, it is better to use it as complement to the main source to meet peak energy demand.
b. Infrastructure Design and Management.

(1) Real property management responsibilities and “ownership” of portions or all of the camps should be determined as early as possible to enable efficient use of the facilities. The unused or excess infrastructure should be reallocated or demolished.

(2) The passive measures such as sealing and insulating of accommodations and using additional protection if needed, should be installed.

(3) Appropriate active measures such as low energy consumption equipment (e.g. light-emitting diodes (LEDs) and low energy heating and cooling systems) and occupant sensing switches (e.g. motion sensor lighting) should also be installed. Design and control heating, ventilation and air conditioning (HVAC) systems stringently in order to ensure that each is properly sized and only used when required.

c. Command and Control, Training and Awareness.

(1) Operational commanders are responsible for the use of resources under their command, including energy. The senior military engineer advises the commander on operational energy concerns such as energy conservation programs, awareness plans and training objectives.

(2) 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. There are two elements to awareness; the first is to provide training to inform all personnel on the best practices in order to minimize energy consumption, and the second is to reinforce that training with feedback that highlights 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 instill a true "energy conservation ethos" down to the lowest level.
SYNERGY

13. In accordance with the Connected Forces Initiative\(^1\) (CFI), NATO and Partner nations, under the auspices of NATO Senior Joint Engineer Conference (NSJEC) and within the framework of the MILENG Working Group as the focal point, are encouraged to continue to engage academia and industry to identify additional potential energy saving solutions suitable for military use, taking into account interoperability and standardization. They should exchange information, lessons learned and outcomes, using enablers and stakeholders such as the ENSEC COE and MILENG COE, in order to improve standardized doctrine and equipment on power generation.

IMPLEMENTATION

14. NATO Commands at all levels are to implement this Policy into their concepts, doctrine and procedures in agreement with nations. NATO and Partner nations are strongly encouraged to adapt their own national policy, concepts, doctrine and procedures in order to implement this Policy as fully as possible.

\(^1\) The fundamental elements of CFI are expanded education and training, increased exercises and better use of technology.