NATO forces and energy efficiency

An interview with Dr Susanne Michaelis, officer at the Energy Security Section of the Emerging Security Challenges Division (ESCD) at NATO HQ in Brussels

Dr Susanne Michaelis, born in Germany, studied molecular biology and holds a doctorate in human genetics. After concluding her research, she joined the European Commission in 1995, working in life sciences. In 1996, Dr Michaelis assumed a position at NATO headquarters in Brussels, where she has served as a research assistant in the Scientific Affairs and Public Diplomacy Divisions. Since 2010, she has been working in the Energy Security Section of the Emerging Security Challenges Division. In the past five years, Dr Michaelis has built a vast network of stakeholders to promote the energy efficiency of NATO forces. This initiative combines research and development with awareness raising and policy making and has become known as NATO’s Smart Energy Initiative. One of Dr Michaelis’ most significant successes has been the implementation of a Smart Energy unit during the exercise Capable Logistician 2015, which took place in Hungary in June 2015. During the exercise, fourteen civilian companies from various countries, the Federal Office of Bundeswehr Equipment, Information Technology and In-Service Support (BAAINBw) and the US Pentagon showcased more than 50 items of Smart Energy equipment, some of which were combined in three smart micro grids. They also presented solutions showing how military forces can respond to different scenarios such as the breakdown of generators, power cuts and water contamination using current expertise. Dr Susanne Michaelis recently spoke to Jürgen K. G. Rosenthal, editor-in-chief of Hardthöhenkurier (HHK), in Brussels about new Smart Energy developments at NATO and her future projects.

HHK: Dr Michaelis, could you first say a few words about NATO’s Smart Energy Programme and the role NATO’s Energy Security Section plays in that programme?

Dr Michaelis: In 2011, our section started bringing together experts who were working in the various NATO countries’ defence ministries on the challenges of supplying energy to deployed military forces. We organised lectures to give the experts a chance to exchange views and share their pooled experience and ideas for solutions with decision-makers. This led to a whole series of activities which we have called NATO Smart Energy. For us, Smart Energy means everything that can reduce the energy consumption of the army, navy and air force, for example improving energy efficiency, energy generation and energy storage. Experts have been aware for quite some time now that fuel dependency is a security issue. We are seeing history repeat itself yet again: battles and even entire wars have been lost in the past due to insufficient energy supplies.

HHK: Yes, US supply shipments in Afghanistan and Iraq have also exemplified how much effort and how many soldiers’ lives it can cost to supply armed forces with fuel.

Dr Michaelis: Exactly. Some NATO nations – albeit not under NATO command – are now also establishing a longer-term operation in Mali. Experts have told me that things may get even worse. This is something we have to explain to decision-makers time and again. We try to do this here at NATO headquarters too. We brief the NATO command structure and the committees, as well as organising and holding conferences to give the experts a platform. We invite senior civil servants and include the private sector as well. We also show soldiers and decision-makers possible energy solutions during military exercises. We compiled all the progress we are making in a chapter of our Energy Security Progress Report, which was presented to the NATO heads of state and government at their summit meeting in Warsaw. As a result of this report, NATO nations agreed to call in the summit communiqué for NATO forces to be made more energy efficient. That was a big step, and for
the experts that communiqué was incredibly motivating. The problem, however, is that energy efficiency is a cross-cutting issue and as such is split up across various remits in most if not all NATO countries. The experts from the different nations need NATO’s help to pool the experience which they can then use to identify ideal solutions. Let’s take utilities at military camps as an example. In the last few years, motivated experts from various nations have established micro grids as demonstration projects. Unfortunately, all the data is measured in different ways, and the micro grids are not mutually compatible. The nations would not therefore be able to complement one another’s capabilities during a NATO mission.

HHK: What exactly are micro grids?

Dr Michaelis: It’s quite simple really. Almost everyone in Germany lives in a building that is connected to a power grid. The building gets its electricity via a cable which is connected to a power plant by an overhead transmission line. The power plant generates electricity by burning gas or coal, from nuclear fission or by making use of the wind or the sun. This network is called a power grid. A micro grid is just the same, but in miniature. Military camps mostly use diesel generators to produce electricity, which is transported by cable to the tents where it is needed for air conditioning units, computers and lamps. The kitchens, sanitary installations and water purification units also need power. Today, we still use electricity to heat up water for the showers, and in most cases this power comes from diesel generators. That is highly inefficient. You can save between 80% and 90% of the diesel straight of the bat if you use solar energy to heat up the water. The Bundeswehr has already demonstrated this. You can turn a micro grid into a “smart” one by connecting the diesel generators and the energy-consuming elements with computer software that collates data on electricity generation and consumption and decides when to turn a diesel generator on or off. Doing this can save some 10% to 20% of your diesel immediately. If you also include an energy-storage facility such as a battery container, you can turn off the diesel generators even more often. And when they do need to be turned on, they run at optimum speed to improve efficiency even more, reducing diesel consumption per kilowatt hour of electricity generated. This can save an additional 20% to 30% of your diesel. Hybrid micro grids are integrated systems which use not only diesel generators but also renewable energy sources such as solar and wind power. Energy generation from renewable sources costs zero litres of diesel. The “only” limiting factors here are the money that has to be invested to buy solar cells or wind turbines and the additional space that such equipment requires. Renewables also need some kind of energy-storage system, since they are not always available. This is something that decision-makers in procurement and logistics are understandably still uncomfortable with. On the other hand, today it is possible to save up to 50% of diesel consumption with a simple smart micro grid that can store energy. That is what we hope to put into practice.

HHK: Smart Energy is intended to efficiently reduce the energy consumption of military forces during deployments abroad and reduce the need for fossil fuels. What current projects are there in this area, and to what extent do they involve German solutions?

Dr Michaelis: We have made progress in two areas because the decision-makers are now backing us up. One new development is that any new camps procured for NATO have to include energy efficiency in their specifications. The new NATO camps at least have insulated tents and LED lights. This allows us to considerably reduce energy consumption, since 60% of the diesel is simply used to cool or heat tents. And LED lamps really were a no-brainer. LED lamps have several advantages. Not only do they need up to 80% less energy compared to conventional lamps, they also give light up to 20 times longer. In addition, LED lamps are much more robust – a very pertinent consideration for camps, which need to be set up and dismantled often. But we hope to bring more modern energy efficiency to these new NATO camps, such as modern diesel generators that reuse their own heat, or
air conditioning units that use heat pumps to make them much more efficient and use less energy. I have to admit, however, that it is quite a difficult goal to achieve, since it does mean a higher initial outlay. At the moment, investing in these technologies still costs more than conventional generators and air conditioning units. To encourage investment, we would need robust data on diesel consumption and a clear idea of how often military camps are actually used. We don’t have either yet. We don’t even have standardised scenarios for NATO missions in different climate zones. We are working on that right now. But the biggest problem is that the 28 nations have to decide unanimously when it comes to procuring military camps for NATO.

HHK: What do you think the chances of Smart Energy are in the alliance?

Dr Michaelis: I actually see pretty good chances at NATO. Twenty-one experts from twelve nations came to NATO headquarters in Brussels on 5 December 2016 when I arranged the first meeting of the NATO Smart Defence project SETAC (Smart Energy Training and Assessment Camp). My colleagues from the NATO command structures and the agencies also joined us. This is already a critical mass of people who can now work at all levels of multinational cooperation to help establish energy efficiency as a NATO focus. We will develop uniform standards for micro grids so that open, fully compatible plug-and-play systems with integrated technologies become available. In pursuit of Smart Defence, we will bring together various items of equipment likely to optimise energy efficiency in military camps and measure their performance using standardised protocols. Then we will try to combine the components in micro grids, which means making them interoperable. One milestone will be SETAC, which we plan to test as a flexible, modular and comprehensive system during the upcoming Capable Logistician 2019 exercise in Poland. In SETAC, we Smart Energy specialists will engage in training as well as testing and finalising our new standard for integrating components. In the end, the private sector will also benefit from this, since companies will need such standards to promote further development in the area of Smart Energy. When I talk about standards, I don’t mean standards for technologies or for reduced diesel consumption; I simply mean standards to allow for better integration of components. Standardising technologies themselves would destroy the private sector’s potential for innovation. NATO and the military should not cling to the technologies of yesteryear. Instead, all military camps procured by NATO or its nations should be designed in a way that the components for energy generation, energy storage and energy management, as well as the energy-consuming elements such as air conditioning units, lights and water purifications units, can be swapped out depending on the theatre of operations and on technological developments.

HHK: Dr Michaelis, thank you very much for taking the time to talk to the Hardthöhenkurier today.