



Energy Security: Operational Highlights

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2014: A Watershed Year for Energy Security



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Historians will look back upon 2014 as the year in which Europe's post-Cold War architecture suffered its most severe test. In the course of just a few short weeks, Russia emerged as a revisionist power with irredentist ambitions, willing to change borders by force and deny a neighboring country its sovereign choice in determining its own foreign and economic alignments.

Russia's move sent shockwaves throughout Europe and NATO was called to respond. At the Wales Summit, Allies agree upon the Readiness Action Plan, which foresees more exercises, higher readiness levels, and the pre-disposition of equipment in Central and Eastern Europe. As a result, the plan sent the message that mattered most, reinforcing the conception of Europe and North America as a single security space.

But 2014 will be looked back upon as a watershed year not only for NATO, but also for European energy security. There are three reasons why this is so.

First, the Ukraine crisis has brought old lessons back into new focus. When it comes to energy, geography is still destiny, since pipelines can translate into both economic and political power. In this regard, the struggle between Moscow and Kiev over the price of gas is more instructive than a thousand economy textbooks. However, the Ukraine crisis was also a reminder that energy can be a question of national security; that dependence on Russia can be a strategic liability; and that interdependence between the producer and the consumer can create a strategic asymmetry. When a producer can go longer without revenue than a consumer can go without gas, the power will swing in his favor.

But there are more lessons to be learned from this example. To de-stabilize Ukraine, Russia applied a combination of military, semi-military and strategic communication tools. In what is sometimes referred to as "Hybrid Warfare", energy also played an important part (via the nationalization of Ukrainian energy assets and an increased gas price).

Hence, if NATO wants to seriously examine "Hybrid Threats" and develop mechanisms to counter them, energy must be included as part of the equation. This will require NATO to overcome its long-standing reluctance to discuss energy security issues, while stepping up Allied political dialogue and strategic analysis in line with the emerging security environment.

This leads us to the second reason why 2014 will be a critical year for energy security. Given the wider implications, the Ukraine crisis has highlighted the need to achieve a new type of European solidarity, moving beyond military responses and even beyond NATO. In the face of Russian pressure, support for Ukraine becomes both support for a rule-based European security order and a deterrent against future Russian adventurism. With its predominantly military toolbox, NATO alone cannot counter a Russian strategy that leverages non-military instruments such as energy.

* The views expressed here are the author's alone and do not reflect any institution's official view

But, as members of not only NATO but the European Union, individual Allies can respond to these new threats. This affords those Allies means to counter Russia's approach on several levels. One instrument is sanctions agreed upon by the EU. While sanctions are a double-edged sword – also hurting our own economies – they are the only non-military means of responding to a crisis like the one in Eastern Ukraine. Although sanctions alone cannot prevent Russian adventurism, they can drive up the cost of these actions – and there are growing signs they already have.

The EU has also mediated between Russia and Ukraine on gas prices, while it will also foot part of the Ukrainian gas bill to ensure the country makes it through winter. Another major aspect of energy solidarity is the willingness of some countries to allow for the "reverse flow" of gas to Ukraine. By doing so, these countries are exposing themselves to considerable political and legal risks, but they are playing a vital role in stabilizing Ukraine. Finally, another expression of solidarity is maintaining Ukraine's role as a transit country, by withholding support for schemes designed to deliberately circumvent the country. Again, this is not without risks, but European solidarity can mitigate these.

The final reason why 2014 will likely prove a seminal year for energy security is that it marked the beginning of the end of Russia's dominant position in the European energy space. The Ukraine crisis both vindicated the policies of those countries that sought alternatives to Russian gas and accelerated other's search for alternatives. The arrival of Lithuania's floating LNG terminal "Independence" is a vivid demonstration of this ongoing change, since it will transform the energy relationships between countries in the region.

Moored in Klaipeda, the Independence terminal opens up the prospect of LNG imports from the United States, potentially constitut-



The LNG terminal in Klaipeda is the first completed regional gas infrastructure project with a potential to increase level of energy security to Baltic states and Finland.

Source: <http://www.sgd.lt/index.php?id=spec&L=1>

ing an entirely new dimension of transatlantic solidarity. But this is not the only sign of Russia's weakening energy dominance. Despite major international crises, surging U.S. oil production has pushed global prices to five-year lows. With Russia's economy and government budget heavily dependent on high-oil prices, the slump is already beginning to have painful knock-on effects. And while Russia has attempted to diversify exports to China, even the major gas deal with Beijing will not save it: Russia will remain the junior partner in this relationship, unable to charge the prices it would need to offset declines experienced elsewhere. As a result, Russia will remain one of Europe's major suppliers, yet the existence of alternatives will force it to compromise on prices.

Overall, 2014 proved a setback for European security and a tragedy for Ukraine. But tragedy can also breed opportunity. Europe's energy situation is changing for the better. Nations are exploring new forms of non-military solidarity, notably in the area of energy, and are getting serious about the search for alternative supplies. As a result, Russia will soon regret it allowed nationalist fervor to trump political and economic rationality.

NATO e-Learning: challenges and opportunities for energy security discipline



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Having completed development of the Advanced Distributed Learning (ADL) e-course on energy security awareness, NATO ENSEC COE is preparing to upload the product onto NATO's e-learning portal. This will complement the residential courses of the energy security discipline program, creating a significant leap in the development of an energy security discipline. Nevertheless, as e-Learning is a comparatively new and demanding domain, both technologically and conceptually, questions arise over the perspectives and challenges it may bring into the NATO Education & Training (E&T) landscape.

BACKGROUND

While NATO Education and Training (E&T) has been developing since the early creation of the Alliance, the task was largely a national responsibility focused primarily on the drill and practice of collective defense concept. After 2001, due to the change in the strategic environment, technological development and a greater need for the interoperability of NATO Forces, E&T returned as a subject of NATO interest.

The Alliance's E&T landscape shifted in 2004 with the establishment of the Allied Command Transformation (ACT), responsible for the planning and delivery of NATO E&T programs. Furthermore, the importance of E&T from the NATO perspective was outlined during the Chicago Summit in 2012,

introducing the Connected Forces Initiative (CFI). **Better use of technology, one of the subdomains of CFI, reflects the expansion of e-Learning.** As technology has advanced, e-Learning initiatives are taking an increasingly prominent place in NATO E&T agenda. E-Learning is being promoted by holding

The main elements of CFI are expanded E&T, increased exercise and better use of technology (e-learning).

annual fora, bringing together speakers from academic, industry and military fields with the purpose of discussing capabilities, ideas, situations and perspectives. These e-Learning initiatives would enable NATO countries to expand E&T, and push it closer to realizing its goals: increasing the interoperability and effectiveness of NATO-led multinational forces, assisting partner countries in their reform efforts, and helping to bring peace and stability.

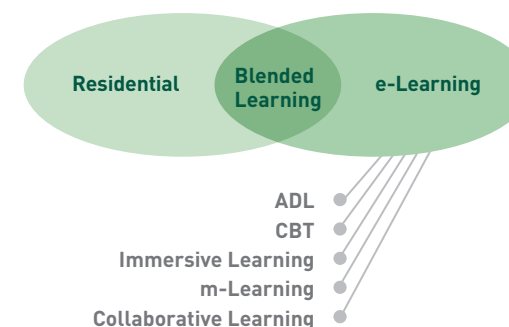


Brigadier General Dzintars Roga, HQ SACT Assistant Chief of Staff Joint Education, Training and Exercises of the Latvian Armed Forces

OPENING THE DOORS OF THE NATO E-LEARNING WORLD

According to NATO's definition, E-Learning is E&T delivered electronically through a computer or other device. This includes five different branches, depending on how E&T is being delivered: Advanced distributed learning (ADL), Computer-Based Training (CBT), immersive learning, mobile learning (m-Learning) and collaborative learning. The fundamental pillar of all these branches is the better use of technology to provide cost-efficient necessary training without diminishing performance. E-learning, as an innovative developing perspective of E&T, responds to today's needs, such as the use of new technologies, collaboration over distance, faster reaction, training to purpose, spending smarter, open to opportunities and

EDUCATION AND TRAINING TECHNOLOGIES



Source: NATO ACT <http://www.act.nato.int/elearning2>

simplifying. In the area of energy security, schemes of Advanced Distributed Learning (ADL), Computer-Based Training (CBT) and Mobile learning (m-Learning) are the most promising ones, complementing each other, responding to the needs.

In the future perspective ADL on energy security issues might be integrated in each course and become mandatory before conducting residential courses. This would improve residential E&T by providing students with the same background knowledge on energy security. Moreover, blended learning, using both strategies, is considered to be beneficial to deepen the knowledge.

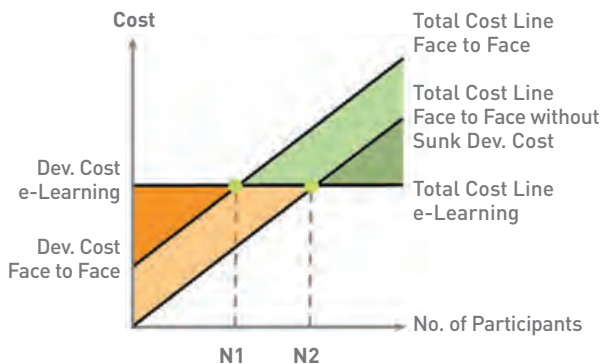
Interesting Fact:

Britain's Open University's study found that producing and providing distance learning courses consumes an average of 90% less energy and produces 85% fewer CO2 emissions per student than conventional face-to-face courses.

ADL also provides an opportunity to track student progress and course completion – something that cannot be provided using Computer-Based Training (CBT). Nevertheless, since energy security E&T target audiences are wide in scope, CBT might still prove beneficial, especially when students are without Internet access. More convenience and flexibility could be brought by Mobile learning (m-Learning), enabling students to reach the e-course using portable devices; however, Internet access is still an essential element. In the future, Collaborative Learning on energy security would be of great benefit, enabling students to raise questions, discuss issues and clarify uncertainties in a social environment. This branch of e-Learning requires a wide range of technological and human resources as interactive methods of instruc-

tion are used. Considering these aspects of the branches of e-Learning, ADL is the most suitable choice to respond to the current needs in the energy security domain, raising general awareness of energy security issues.

Firstly, the most influential factor for using e-Learning is economic, since the ability to involve unlimited number of students reduces costs. Taking the example from the private sector, which is driven by competition to reduce costs, the introduction of e-Learning leads to significant results concerning cost-efficiency. For instance, Ernst & Young, a global leader in insurance, tax, transactions and advisory services, cut training costs by 35 percent while improving consistency and scalability. E-courses, as well as residential courses have a fixed development cost, which remains the same irrespective of the number of students enrolled.



Source: <http://www.learningsolutionsmag.com/articles/435/evaluating-e-learning-investments-with-cost-effectiveness-analysis>

CONSIDERING LIMITED NATO BUDGETS FOR SECURITY AND DEFENCE, THE REDUCTION OF ENERGY SECURITY E&T COSTS, WHILE STILL REACHING REQUIRED OUTCOMES, IS AN EXTREMELY IMPORTANT BENEFIT OF E-LEARNING.

Secondly, e-Learning is not geographically bounded and can provide greater access to E&T than traditional education models. Bearing in mind the wide scope of the energy security E&T target audience, a reduction of

geographical constraints might broaden the horizons of energy security awareness. In addition, PfP countries – where interest is high because of recent geopolitical developments – could also be involved in energy security e-Learning.

E – Learning:

- ✓ Cost – efficiency;
- ✓ Accessibility;
- ✓ Flexibility;
- ✓ On – demand availability.

Thirdly, e-Learning is beneficial for its flexible approach, which enables learners to choose the most suitable methods to accommodate their needs. In addition, it offers on-demand availability of courses, enabling students to enroll at any time and set a schedule convenient for their needs. Students can personally manage the whole education process, focusing on the topics that are most difficult, pausing if necessary, while replaying some segments. In such a way, while being cost-efficient, e-Learning might still reach the same effectiveness as residential courses, fulfilling the intended training objectives.

Despite all the mentioned benefits, there are some risks that e-Learning might face. The most important challenge might be discipline and motivation, as students work independently and they must be motivated to complete the course working on their own without the instructor's assistance. Since E-Learning reduces social and cultural interactions, some students might find it challenging to work in physical isolation from their instructor and classmates. Thus, students should have good study habits to gain the benefits that e-Learning brings. The NATO e-Learning concept proposes some ways to overcome these possible limitations and reach the peak of e-Learning success. Firstly, with the purpose of solving the motivation and discipline issue, providing online learning orientation

so that students understand the expectations and demands of the course is advisable. Meanwhile, social interaction can be introduced by live chats, blogs, other communication technologies and collaborative learning tools. Additionally, the design of e-courses should be obliging to provide information in a condensed way, emphasizing the key material and ensuring efficient instructional format. E-courses should be divided into manageable units, and embedded prompts and study tips should be provided.

Course quality, ensured by complying with the requirements, is an important concern. It is worth mentioning that e-Learning courses, as well as all other NATO E&T programs, are defined, designed, developed, delivered, evaluated, validated and managed in accordance with the System Approach to Training (SAT) model to ensure that E&T adhere to fundamental principles-performance orientation, system approach, optimum efficiency and tailored to audience.

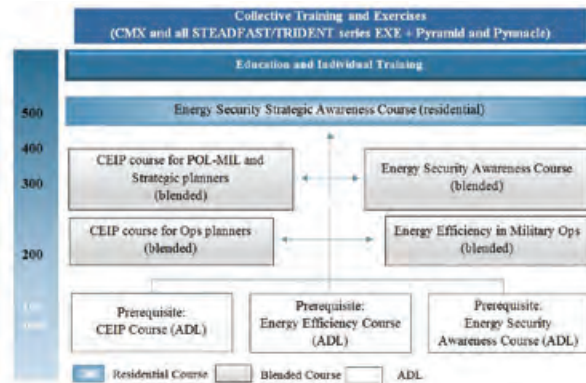
According to an empirical investigation of the critical factors influencing learner satisfaction, e-Learning course quality, flexibility, perceived usefulness, perceived ease of use, and diversity in assessments are the critical factors affecting learners' perceived satisfaction.

All the requirements are closely related with the satisfaction of students. From this perspective, technological design plays an especially important role in students' perceived usefulness and ease of use, and will therefore have an important impact on students' satisfaction. The interface and screen design are important, while interactive and stimulating multimedia components effectively engage students thereby facilitating the learning process.

However, meeting all the requirements can be difficult, as a range of capabilities are essential to design, deliver and support the full potential of e-Learning. It is a great challenge for the Centres of Excellence, as expert knowledge looking from the "e-perspective" could be transmitted effectively only with the support of the third parties, concerning the use of technologies to design a comprehensive e-course. An e-Learning entity ("e-cademy") might be a solution to the problem, opening an opportunity to share best practice of design and development capabilities, ensuring that the common standards, responding the requirements, are followed

THE DEVELOPMENT OF E-LEARNING DOMAIN IN NATO ENERGY SECURITY DISCIPLINE

Education and training (E&T) in the area of energy security is a result of the joint efforts of NATO's Allied Command Transformation Joint Force Trainer (ACT JFT), Requirement Authority (RA) and the Department Head (DH) for training and exercises in the energy security domain (NATO Energy Security Centre of Excellence is assuming this role). The two main events of NATO's Global Programming process were the Training Landscape Development Conference in the area of energy security (TLDC, held on 10-12 September, 2013) and the Training Requirements Analysis Workshop (TRA WS, held on 10-12 December, 2013). Together these provided the basis for NATO's Energy Security Discipline program. In the final report prepared by NATO ACT JFT, the importance of developing a certain amount of residential courses in three main areas including the e-course domain (100-200 DoK) was emphasized*. **Striving to reach concrete, effective and comprehensive results, e-Learning has been considered a suitable way to begin educating people on energy security.** E-courses have been set up for each area in order to provide access to high-quality learning and performance improvement that can be tailored to individual needs and deliver cost-effective education and training (see the chart No. 1).



Following the requirements in the Energy Security Discipline program, NATO ENSEC COE has developed the first ever NATO e-course on Energy security which will soon be available in NATO Education and Training Opportunities Catalogue (ETOC).

Working together, subject matter experts (SMEs) at NATO's ENSEC CEO designed a comprehensive e-course on energy security which covers three main subject areas: The global energy and security nexus impacts to NATO; Critical energy infrastructure protection (CEIP) and energy supply security; and energy efficiency in the military.

In the future, ADL on energy security might become a prerequisite before conducting residential courses. This would lead towards a more efficient residential E&T course, as the students will share background information on energy security. Moreover, blended learning, using both strategies, is considered to be beneficial to deepen the knowledge.

In conclusion, e-Learning is a promising strategy to raise general awareness and provide basic knowledge of the issues concerning energy security. It is cost-efficient, scalable, flexible and available on-demand. Despite these benefits, reaping the full benefits of e-Learning can require considerable efforts.

WAY FORWARD

As technological capabilities advance, e-Learning will likely become more rooted in NATO's E&T, bringing both benefits and new challenges. In the area of energy security, the ADL awareness course soon to be available will be one step towards the development of the e-Learning domain. An e-course on the protection of critical energy security infrastructure will follow in the same year. By these means, basic knowledge regarding energy security will be spread to the target audience. Since there is no commonly confirmed NATO energy security policy, the development of e-Learning and shared knowledge on the subject should prove beneficial. Additionally, e-Learning could become a cost efficient means of delivering education to NATO members and partners of the Alliance on the increasingly important topic of energy security.

ADL ESAC general outlook

Design: ADL level 2;

Duration: 2, 5 hours (about 70 visual and recorded slides);

Course offering: 24/7

Multimedia solutions: effective navigation system, audio, video, interactive assessment of the learning process;

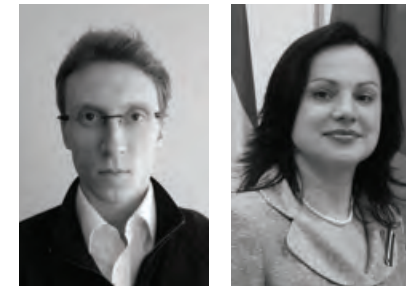
Evaluation: multiple choice test after finishing the course;

Certificate level: 100 Dok (if less than 70%) and 200 Dok (if more)
Target audience: NATO, IO, PfP nations officials (only if, approved by Institutional Manager ENSEC COE staff officer);

Quality assessment: feedback questioner

Update: NLT after 1 year

Europe and the imported refined products: a new form of dependence



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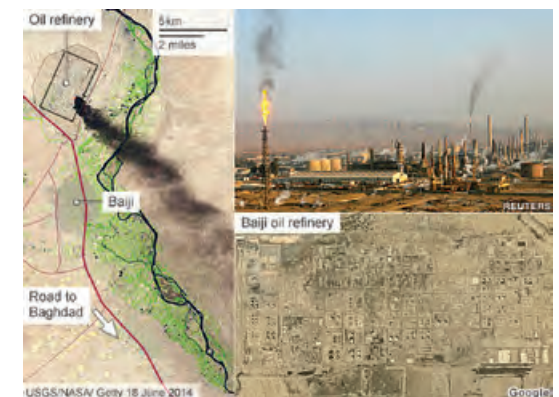
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The long term decline of the European refining industry is leading to an increasing dependence on imports of refined products such as diesel and jet fuel from the USA, Russia and the Middle East. However, steady flows of oil products through some of these regions could face disruptions – in April 2014 Russia temporarily stopped delivering diesel fuel to Hungary due to the activities of armed insurgents in Ukraine. Meanwhile, in June 2014, Sunni rebels of ISIL¹ took control of 75 percent of Baiji, Iraq's biggest refinery, proving that even the most critical of energy infrastructure can face significant threats. What has caused the decline of the refining industry in Europe and how does the rising dependence on imports of diesel and jet fuel affect its energy security?

SHRINKING EUROPEAN REFINING SECTOR

The European refining sector has been undergoing a period of dynamic change. 14 large refineries in all corners of the continent have been closed since 2007², and the trend is set to continue in the future³. Meanwhile, both South Asia and the Middle East have experienced a rapid development of modern refining facilities equipped with top notch technology, which cannot be matched by their mostly outdated counterparts in Europe. Further problems are caused by cheap US refined products which pressure European plants thanks to their access to WTI⁴ crude oil, which is trading at a significant discount to BrentCrude because of the US ban on crude exports.

As a result, the future of the refining industry in Europe looks bleak. In order to responsibly prepare for any possible threats related to this phenomenon, we have to understand its causes and possible implications.



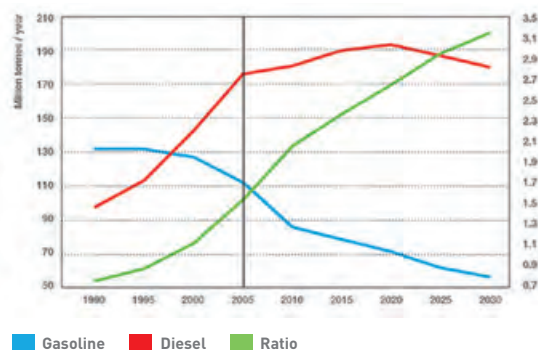
From the companies' point of view, oil refining is about making money. Unfortunately, when it comes to profit margins, Europe is not as attractive as it used to be - revenues have been shrinking for a long time, and nothing indicates a possible reversal of this trend.

A majority of European refineries were built in the period between the 1960s and 1970s.

* The views expressed here are the author's alone and do not reflect any institution's official view
1 Islamic State in Iraq and the Levant

THE TAX INCENTIVIZED DIESELISATION TREND IS SET TO CONTINUE WITHOUT A REVISION OF THE ENERGY TAXATION DIRECTIVE

Sources: Wood Mackenzie - Historical demand 1990-2005, JEC Fleet & Fuels model - Projection 2010-2030



The demand in the transportation sector looked very differently from today as most of the car engines operated on gasoline. The situation slowly changed when engines powered by diesel started to become increasingly popular. The need for diesel kept rising all over Europe and gasoline demand stagnated. Since adjusting a refinery's output is an extremely costly operation, the overproduction of gasoline kept on going and demand for diesel was met by increasing imports from outside the European continent.

DEMAND FOR DIESEL AND GASOLINE IN EU

Originally, it used to be easy and profitable to sell the surplus of gasoline on the world market, especially in India and China. Times have changed however, and so have the refining industries of these two countries. China has currently one of the most dynamic refining sectors on the planet⁵ and India's Jamnagar refinery is ranked among the best in the world when it comes to its technological complexity⁶. The boom is currently ongoing also in the Middle East. Saudi Arabia has invested billions of dollars to build new refin-

eries. While some of this capacity is used to feed growing domestic demand, it predominantly serves as an export oriented facility. Some of the leftover gasoline from Europe can still be exported to the US, which still presents significant revenues. But even here the future does not look bright due to increasing American self-sufficiency, although many of the American refineries also face significant hardships and could be closed⁷. The situation in general is very different than in Europe⁸, and in 2011 the USA met 81 % of its needs, which is the highest ratio since 1992⁹.

Another negative factor multiplying the stress on European refineries is the environmental regulation promoted by the European Union and the member states. Among the most important directives on the EU level in this regard is the industrial emissions directive (2010/75/EU), fuels quality directive (2009/30/EC), and the directive on sulfur content of marine fuels (2012/33/EU) which will enter into force in 2015. We also have to mention the complex policies aiming to reduce demand for energy, raise fuel efficiency and expand the use of bio-fuels. Effects of these incentives are twofold. Firstly, they reduce the overall consumption of traditional fuels, which translates into decreasing demand and forces refineries to run under their maximum utilization rate. Secondly, they push the refining and petrochemical industries towards costly upgrades which are needed in order to meet the environmental criteria.

Next circumstance which has to be taken into consideration is the slow but growing use of alternative fueled cars operating on LPG, natural gas or electricity.¹⁰ Users of these vehicles also contribute to decreasing demand for oil based fuels, although – at least for now – in a rather limited way. On the other hand, they also lower the needs for imports of die-

sel fuel and thus improve the overall energy security of Europe.

The cost of production must also be considered. The price of energy is very high, and employees of European refining facilities enjoy wages which are unparalleled in the rest of the world (with the exception of North America). To make matters worse, domestic production of crude oil is negligible, which results in additional burden in the form of transportation costs.

European refiners have also been hit by the abundance of North American ethylene, which is being produced in growing quantities in the US as a result of the shale gas and tight oil revolution. Since European production depends largely on naphtha as a feedstock, producers on the continent have found themselves at a disadvantage compared to their North American counterparts which use cheaper supplies of ethane. The resulting surpluses on the American market are also depressing global prices and deepening losses for European refiners.

Most of the refineries in Europe will soon approach the end of their life cycle. This will probably add up to the aforementioned economic factors and become yet another reason for their closures.

DEPENDENCE ON IMPORTS OF REFINED PRODUCTS

The overall development causes concern among most of the players in the European distillation industry. There is very little they can do to fight the negative margins except for lowering the utilization rate¹¹ – unless they are ready to spend tremendous sums of money for modifying the output of a refinery. Some successful (and costly) attempts¹² have been made in the previous years, but it is still a rather unusual approach. Moreover, from a business perspective it can hardly be con-

sidered as a tempting operation. Even though a production tailored exactly to the needs of the market immediately increases the profitability, the overall price of a reconstruction process cannot be compensated in a reasonable amount of time. For these reasons we should not expect a significant amount of investments flowing to the European refining industry in the nearest future, unless there is going to be some kind of a government subsidy or pressure such as in France, where in 2010 Total agreed to continue operating all of its refineries at least until 2016 despite their long term financial losses.¹³

Further closures of European refineries are therefore inevitable. Countries will not be able to turn increasing volumes of imported crude oil into products they need, which means they will have to look for them elsewhere. The situation is worst for diesel. It already needs to be imported in significant amounts and the logistic operations are going to be increasingly difficult with every further refinery closure. Jet fuel will also have to be imported in greater quantities. Demand for this commodity is projected to rise in the future both in Europe as well as in the rest of the world as the global airline fleet continues to grow.

There have been three main geographical destinations from which the majority of imported diesel (approx. 11 % of total consumption¹⁴) and jet fuel (approx. 30 % of total consumption¹⁵) flow into Europe – USA, Russia and the Middle East.

While Russian exports of diesel have been growing following the upgrade of refineries, US deliveries have grown sharply since 2008. The rest of the demand is satisfied predominantly by the Middle Eastern suppliers. The primary source of imported jet fuel is the Middle East, from where European customers obtained 49% of the imports in 2000 and 69% in 2012. Easy access to this commod-

² Europe is now left with 87 refineries (excluding the smallest ones). Biggest decrease of refining capacity took place in France: 30 % since 2008.

³ <http://www.platts.com/latest-news/oil/paris/feature-european-refining-faces-new-wave-of-refinery-26820986>

⁴ <http://www.bloomberg.com/news/2013-04-04/europe-to-shut-10-refineries-as-profits-tumble.html>

⁵ West Texas Intermediate

⁶ http://usa.chinadaily.com.cn/business/2013-11/19/content_17114277.htm

⁷ Based on the so called "Nelson complexity index" <http://www.crudeoil.com/2011/05/worlds-top-21-largest-oil-refineries.html>

⁸ <http://www.api.org/-/media/Files/Oil-and-Natural-Gas/Refining/EnSys-API-East-Coast-Refs-White-Paper.pdf>

⁹ <http://blogs.platts.com/2013/05/17/us-east-coast-oil-refineries-enjoy-a-stirring-comeback/>

¹⁰ <http://www.bloomberg.com/news/2012-10-03/gasoline-poised-to-fall-as-refineries-returning-energy-markets.html>

¹¹ <http://www.eea.europa.eu/data-and-maps/figures/proportion-of-vehicle-stock-by-percentage-of-car-stock-by>

¹¹ <http://www.platts.com/latest-news/oil/barcelona/european-refiners-opt-for-lower-runs-rather-than-26764236>

¹² Examples include Petrobrazi refinery in Romania (600 million €) <http://www.ojg.com/articles/2014/07/romanian-refinery-wraps-modernization-project.html> or the Antwerp refinery in Belgium (1,5 billion €) <http://news.exxonmobil.com/press-release/exxonmobil-announces-antwerp-refinery-investment-more-1-billion>

¹³ <http://uk.reuters.com/article/2013/06/02/uk-total-margerie-idUKBRE9510BM20130602>

ity cannot be taken for granted forever, as Asian needs for aviation fuel shall continue growing in the future.¹⁶ Further development will be highly dependent on China's ability to upgrade its refining sector, as its consumption of jet fuel is predicted to rise by 9 % until 2020.¹⁷ Europe must be ready to compete for the available resources even with other hungry players such as India, which in 2012 allowed its airline companies to import jet fuel directly from the producers instead of buying it through state agencies for higher price due to additional taxes.¹⁸

Continuing reduction of the refining sector in Europe could instigate problems in various other branches of the industry as well. A lot of refineries are closely connected to specialized industrial facilities which further process the chemicals. A need to import them from further destinations will lead to increased transportation costs and, consequently, lower revenues.

THE SECURITY OF SUPPLY

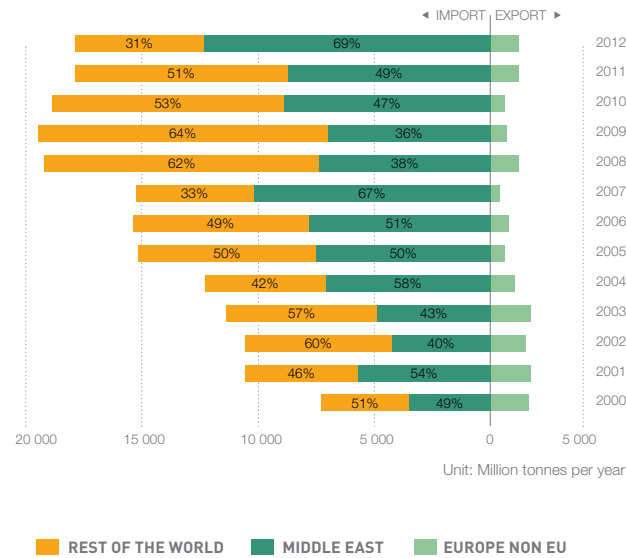
All of the aforementioned hardships resulting from the closures of European refineries were primarily connected to the economy, but the trend could also have more far reaching effects which could negatively influence the overall energy security of European NATO member countries. First and foremost, the dependence could trigger problems with the availability of supplies. This rather general statement could be further specified according to the particular geographical region, from which the exported commodities flow.

THE MIDDLE EAST

When speaking about jet and diesel fuel imported from the Middle East, European consumers have to be prepared for a disruption of supplies resulting from sabotage or attacks on critical energy infrastructure.¹⁹

EU JET FUEL TRADING BALANCE: EU CONTINUOUSLY INCREASES ITS IMPORT OF JET FUEL FROM MIDDLE EAST

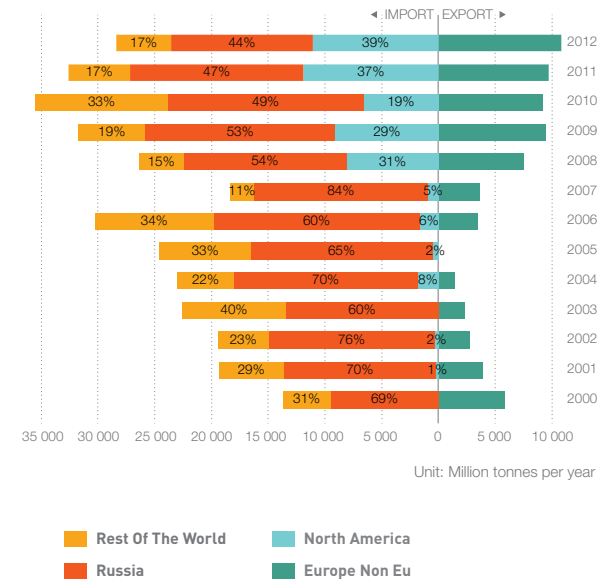
Source: Eurostat



The main reason for this is the virtually permanent political instability in some parts of the region (especially Iraq, Syria, Yemen and Libya) combined with significant presence of extremist militants, which often target oil pipelines and other industrial facilities in order to inflict financial losses on their opponents. This is especially relevant in the case of Iraq, where the armed forces of ISIL captured the country's biggest refinery in Baiji and have operated it in order to finance its military activities.²⁰ Paradoxically, it were the allied forces who successfully attempted to damage this facility and thus limited the rebels' revenue. Such event did not have any significant impact on European energy security, as the refinery doesn't export any oil products abroad.²¹ Its inoperability on the other hand created a gap on Iraqi domestic market and absorbed oil products from local export oriented facilities.

EU GASOIL TRADING BALANCE: RUSSIA IS A LEADING EXPORTER OF GASOIL TO THE EU

Source: Eurostat



RUSSIA

Russia presents a different story. Its government is heavily dependent on revenue generated by exports of crude oil, petroleum products and natural gas, but that doesn't prevent it from considering natural resources as a tool which could be used against other countries for achieving particular policy goals. The risk of this happening rises exponentially with the level of a particular country's dependency on Russian supplies. Apart from this issue yet another aspect plays its role: the transit countries through which the products flow towards the West- and Central European customers. Supplies through Belarus and Ukraine were halted by the Kremlin on more than one occasion during negotiations about transit prices or ownership of the transit infrastructure. Moreover, current separatist activities in eastern Ukraine also pose a threat to the supply chain. Some complications already materialized as Transneft had to temporarily stop transporting diesel

through one of the pipelines, which directly affected not only Ukraine, but also Hungary.²²

The next potential cause of a crisis situation could be the obsolete pipeline network in Russia, where the average age of a pipeline approaches 35 years. To make matters worse, the construction process was often quick and reckless, which left the country with one of the world's leakiest pipeline networks.²³ The situation in Belarus and Ukraine is nearly identical.

Another important trend is the continual influx of Russian capital in the European petrochemical sector. Moscow-based companies now co-own important facilities in many countries including Germany, Italy or the Netherlands.²⁴ This results in a very delicate phenomenon where Europe demands significant amounts of refined products from Russia, which at the same time increases its investments in European refining industry. The fact that the ownership structure of refineries matters has been proven by the events surrounding the acquisition of shares of the Mažeikių Nafta facility in Lithuania in 2006. When Lukoil's offer was not accepted and the deal was made with Polish PKN Orlen, Transneft stopped pumping oil in the refinery through the Druzhba line. The official explanation was that the engineers discovered a significant leak which had to be repaired, but even after the fix was performed the flow of crude oil was not resumed in its previous levels, forcing Mažeikių Nafta to obtain additional crude oil from the Būtingė sea terminal at higher prices.²⁵

EUROPE

European producers cannot be omitted while performing a thorough evaluation of risks connected to the supply chain. A troublesome situation could occur in case of specific circumstances, e.g. during an unexpected technical failure in one refinery combined with scheduled maintenance process on the other. A scenario like this is not completely unrealis-

¹⁴ http://www.energy.eu/publications/KOAE09001_002.pdf

¹⁵ <http://www.reuters.com/article/2013/11/13/europe-jet-usa-idUSL5N0IY2Q820131113>

¹⁶ Middle Eastern growth of demand for air travel exceeded 14 % in 2014 <http://www.argusmedia.com/Outlook/Jet-fuel-demand-to-stay-capped>

¹⁷ <http://www.platts.com/latest-news/oil/dubai/china-could-become-net-oil-product-exporter-to-26788061>

¹⁸ <http://www.bloomberg.com/news/2012-02-22/india-allows-airlines-to-import-jet-fuel-to-save-on-local-taxes.html>

¹⁹ http://gulfbusiness.com/2012/08/yemen-to-export-jet-fuel-as-refinery-output-resumes/#.U9TR-vl_t0o

²⁰ <http://www.ibtimes.co.in/iraq-formally-asks-us-air-attacks-isil-75-baiji-refinery-captured-by-militants-602560>

²¹ <http://www.washingtonpost.com/blogs/wonkblog/wp/2014/06/18/iraqs-biggest-oil-refinery-is-on-fire-how-important-is-that/>

²² <http://www.pennenergy.com/articles/pennenergy/2014/05/pipeline-news-russia-s-transneft-halts-diesel-shipments-to-ukraine-hungary.html>

²³ <http://en.ria.ru/russia/20121211/178065224.html>

²⁴ <http://www.euractiv.com/sections/energy/russian-strategy-buy-europes-refineries-exposed-302329>

²⁵ http://www.rand.org/content/dam/rand/pubs/monographs/2009/RAND_MG838.pdf



tic, as the average age of European refineries exceeds 40 years²⁶ and most of the pipelines were built during 1960s and 1970s.²⁷ This kind of event would have only limited regional impact however, and under standard conditions there should be no problems with delivering desired jet or diesel fuel from elsewhere despite some modest logistical hardships.

More serious problems could occur after further closures of European refineries, especially those located further from the coastline or major rivers. Inland countries rely on transporting petroleum products from harbors by railway, and if they wanted to significantly increase their imports they would have to deal with a whole set of problems such as the ones recently burdening the US government. The American oil shale boom sparked a rise of crude-by-train shipments and resulted in spiraling amount of derailments and explosions. The Department of transportation decided to counter this issue by intro-

ducing stricter safety rules, but their full implementation will take up to two years during which the accidents may continue.²⁸

RECOMMENDATIONS

Responsible policy makers need to adjust to the new reality. European refining facilities are no longer capable of turning oil into desired chemical compounds in sufficient amounts which leads to a completely new form of dependence on imports of jet and diesel fuel. These products have to be shipped from the US, Russia and the Middle East. Whereas the United States is a reliable partner, other regions bring some uncertainty to the table, and all potential risks resulting from their specific characteristics should be adequately managed.

The secondary result of shrinking European refining sector is the increasing pressure on pipeline and railway networks within the regions hit by the closures. This should be ad-

dressed by reviewing the maintenance policy of the pipelines, building new interconnections and tightening the security standards for train tanks containing flammable materials.

Aforementioned trends in European refining industry are not important solely for the civilian sector, but for NATO as well. Current developments could serve as an incentive to rethink the Central Europe Pipeline system (CEPS),²⁹ an essential tool used to manage NATO's strategic fuel reserves in Europe.³⁰ All of the CEPS pipeline and storage sites are located within accessible distance from one of the 18 refining facilities. The well-being of these petrochemical complexes should be the utmost priority for NATO, because any potential closure could endanger the effectivity of the whole system. If some of the important refineries connected to CEPS will have to be closed, there should be a detailed cost-benefit analysis resulting in recommendations for politicians clarifying whether to remain passive, or somehow to support the facility and find a way how to invest to its reconstruction and adjust its output to the needs of the market and the military. Responsible bodies could also promote vertical integration, which was successfully performed e.g. in USA, where the Delta airline company acquired a small refinery in Philadelphia.³¹ The advantages were twofold. The organization secured supplies of cheap aviation fuel for its planes, and became able to sell remaining chemical compounds on the market.

Another possible measure could be to alter the storage policy of CEPS. So far the only type of fuel which is stored for the military purposes is the F-35, also known as JET A-1 (civilian term) or JP-8 (US military term). F-35

is the most important product due to NATO's Single fuel policy;³² however, the armed forces also need other types of fuel, such as the F-44 and F-76. The overall consumption of these is much lower, but only a very limited number of refineries can effectively produce them. Introducing new storage sites for this purpose could therefore prove useful in the future, especially if some of the key facilities making the F-44 and F-76 fuels decided to halt their production.

Further steps could be taken towards expanding the NATO Central European Pipeline System. Its current form where an absolute majority of installations are concentrated along

Responsible policy makers need to find adequate responses to the challenges emanating from growing European dependence on imports of jet and diesel fuel.

the former Iron curtain still reflects the realities of the Cold War. The enlargement process could connect CEPS with other strategic European refineries; especially those located further away from the shore and hence are isolated from the access of sea tankers. As far as the new connection is

concerned it seems that a cost-effective solution would be to focus on greater cooperation with the civilian sector and joint management of the distribution network encompassing railway tankers, tanker trucks and private pipeline infrastructure rather than building new pipelines. A NATO public-private partnership like this could potentially serve as a pattern for further cooperation in other spheres where the objectives of private and military sectors are shared. Another partner for NATO could be the European Union, which decided to invest 30 billion € in critical infrastructure through a program called Connecting Europe facility. One of its priorities is to increase the interconnectivity of oil pipelines in Central Europe before 2020,³³ which offers an excellent opportunity for joint cooperation between the two organizations.

²⁶ <http://equity.co.kr/upfile/issue/2012/01/04/1325640402645.pdf>

²⁷ Despite the age of European pipelines the overall amount of leakages and ruptures steadily decreases: <http://www.hazardexonthenet.net/article/69699/European-cross-country-oil-pipelines.aspx>

²⁸ <http://www.usatoday.com/story/money/business/2014/07/23/obama-dot-proposes-tougher-oil-train-safety-rules/13036837/>

²⁹ http://www.nato.int/cps/en/natolive/topics_49151.htm

³⁰ CEPS consists of pipelines and storage tanks dispersed across five countries (Belgium, France, Germany, Luxemburg and the Netherlands) which accommodate around 13 million cubic meters of refined products, primarily the aviation fuel.

³¹ <http://www.cnbc.com/id/101253932>

³² Single fuel policy says that engines of vehicles, aircraft and generators should be able to operate on jet fuel (F-34): https://www.rusi.org/analysis/commentary/ref:C4CAED99A3AD8/#.U9UeyPl_t0o

³³ <http://ec.europa.eu/energy/miff/facility/doc/2012/connecting-europe.pdf>



M3-131 Energy Security Strategic Awareness Course

Given the increasing role of energy security in NATO's political agenda, underlined in the Strategic Concept (2010) and at the Wales Summit (2014), NSO announces a new course, M3-131 Energy Security Strategic Awareness Course, to be held 28 Sep - 2 Oct 2015. The aim of this pilot course is to raise awareness on current energy developments and vulnerabilities as part of new challenges to security, by developing a common understanding of NATO's energy security agenda and a better connected NATO with national and international partners in the field of energy security.

Duration: 1 Week, 28 Sep 15 - 02 Oct 15

Section: SA - Situational Awareness/Current Plans

Course Structure: Resident (1)

Depth of Knowledge: 5 - Leadership and Command

Language: English 3333 IAW STANAG 6001

ePrime No.: ACT.535

Classification: NATO Unclassified

ETOC Code: OPS-SA-5131

Area: OPS - Joint Operations

COURSE PARTICIPANTS:

Military officers (OF-3 through OF-9) or their civilian equivalent who are working in energy security, humanitarian assistance, disaster response or any other related field. For the Rank Waiver, students will be asked to provide their rank, position, and the reasons why they need to attend the course.

Language Proficiency: English 3333 IAW STANAG 6001

Rank Requirements: NCO: Not eligible; Officer: OF-3 thru OF-9

METHODOLOGY

This one-week course is a mix of lectures, Q&As, small group sessions, panels, and facilitated discussions. Using these different formats will facilitate the exchange of ideas on NATO's challenges, opportunities and the way ahead on energy security, on the role of technology, and on NATO partners' strategic importance for Alliance's energy security.

LEARNING OBJECTIVES

1. Energy Developments and Vulnerabilities:

students will examine energy developments and vulnerabilities as part of new challenges to security, and the cross-cutting nature of emerging threats, to include cyber, terrorist, and piracy threats to energy infrastructure in accordance with the body of knowledge as represented in the course readings.

2. The Influence of Energy:

students will identify the links between energy and conflict, energy and democracy, and energy and geopolitics, in accordance with the guidelines provided by the course reading materials.

3. Energy's Strategic Position:

students will summarize energy as a strategic security issue for NATO in accordance with the guidelines provided by the course reading materials and NATO strategic documents regarding energy security.

4. National and International Competencies:

students will describe the national and international competencies in the field of energy security, and the role of international cooperation and organizations, including the private sector, in accordance with the body of knowledge as represented in the course readings.

5. Geopolitics:

students will discuss the strategic importance of the Caucasus, the Black Sea regions and the Middle East for NATO's energy security, in accordance with the guidelines provided by the course reading materials.

6. Logistical Considerations:

students will evaluate the energy supply as a logistical challenge in the military, in accordance with the guidelines provided by the course reading materials.

7. New Technologies:

students will evaluate the new technologies and their role in enhancing energy efficiency in the military, in accordance with the guidelines provided by the course reading materials.

8. International Cooperation:

Given their professional experiences, students will explain the importance of international cooperation in the energy domain, and NATO's role in energy security, in accordance with the guidelines provided by the course reading materials.

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