TACKLING ENERGY DEPENDENCY. SHALE GAS POTENTIAL IN THE BALTIC SEA REGION AND IN EUROPE

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Abstract

This article examines the European Union (EU) energy dependency on Russian resources and focuses on the possible scenarios of shale gas potential in the Baltic Sea Basin. After depicting the extent of energy dependency and setting the scene of the controversial energy dialogue within the umbrella of EU-Russian relations, this article analyses the emblematic energy situation and concerns of the Baltic States. Thereafter, the article exemplifies the increasing sphere of unconventional gas in Europe, once exclusive American prerogative. Hence, the case study of shale gas potentials and prospects in the Baltic Sea Basin directs attention to the peculiarities of the Polish shale. The article is concluded by remarks on the situation at stake and its future perspectives.

Introduction

Tackling dependency on Russian energy resources is one of the greatest future challenges the European Union (EU) has to face. Indeed, the emerging European energy policy is seeking to establish a stable trade and co-operation market, exploiting mutual interests and territorial proximity in the North Sea, Middle East, and in North Africa. Due to this, Northern Europe often resorts to diversification as a key to securing its energy needs, while Liquefied Natural Gas (LNG), and, more recently, shale gas, are increasingly referred to as the panacea of European energy problems.

Furthermore, since the beginning of the Nord Stream project in 2005, Russia's engagement in the Baltic Sea Region has become one of the core

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elements of EU-Russia relations. On the other hand, the Russian-Ukrainian gas crises in 2006 and 2009 have increased the concern over the dimension of energy security from an EU perspective as well as at the member state level. Within this framework, the Baltic States "face the complicated challenge of balancing national, regional and European interests in their energy policy choices, while exploring measures against dependence on Russia."[1]

This article aims to explore the set of concerns over energy security of the Baltic States and the dynamics of the different types of alternative resources the Baltic States and the EU could implement to secure their energy needs. Furthermore, in order to assess its potential in the Baltic Basin, special attention is given to the controversial issue of shale gas, and analysis focuses on the Polish case as the most advanced in the field. Although there is no extensive literature on European shale gas developments, the geopolitical and economic impacts as well as the scenarios for the development of this resource have been widely considered, especially in the framework of the Estonian ICDS (International Centre for Defence Study), the American CSIS (Centre for strategic and international studies), the US Energy Information Administration and the Finnish Baltic Rim Economies (BRE). To conclude, this article intends to contribute to the existing literature and aims at depicting the potential of shale gas, as an eventual source of energy that would soften the dependency on Russian resources, and its future perspectives in the Baltic Sea.

1. Tackling dependency on Russia energy resources

1.1. To what extent is the EU dependent?

"A region's security can be influenced by the energy sectors of other countries especially in the areas of the environment and economy."[2] This assumption best introduces the situation of EU energy dependency and, in particular, that of the Baltic States. Indeed, the European Commission forecasts an "en-

[1] Maigre M., "Energy security concerns of the Baltic States", ICDS analysis, issue: march 2010, p. 2.

[2] Maurig L., Schaer D., "The effect of the Russian energy sector on the security of the Baltic States, Russian energy sector and Baltic Security", vol.8, 2006, p. 66.

ergy dependence level of 70% in 2030 for the European Union compared with 50% of today"[3], thereby underlying the idea that the world's energy demand is believed to increase in the coming decades. For instance, as regards gas supplies, this dependency is witnessed by the fact that "40% of EU gas imports originate from Russia and by 2030 over 60% of EU gas imports are expected to come from Russia with overall EU dependence on gas imports expected to reach 80%".[4] Therefore, European dependency on the Russian energy sector does not only affect the Baltic States economically, but also has a significant impact on their security, and on the EU itself.[5]

For the sake of clarity, it needs to be said that the eventual conceptualisation of energy security, one of the features that extends the traditional framework of security analysis, was developed by the Copenhagen School of international relations at the beginning of the 1990s.[6] This article employs the term energy security defined by the European Commission as "*the ability to ensure that future essential energy needs can be met, both by means of adequate domestic resources worked under economically acceptable conditions or maintained as strategic reserves, and by calling upon accessible and stable external sources supplemented where appropriate by strategic stocks*."[7]

The developments concerning energy supply of Russian gas to Europe, which have occurred systematically since the collapse of the Soviet Union, "have heightened EU concerns about the security, diversity, reliability and affordability of natural gas supply".[8] To reduce the growing gas dependency on Russia, the Baltic States have been developing several strategies. These scenarios can be summarised as follows:

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[3] Ibid., p. 66.

[4] Ibid., p. 66.

[5] Ibid., p. 66.

[6] Buzan Bary, Wæver O., De Wilde J., "Security: New Framework for Analysis", Lynne Rienner Publisher, London, 1998.

[7] Kovačovská L.,"European Union's Energy (In)security - Dependence on Russia", Journal of Defence & Strategy, 2/2007, pp.6-7 <http://www.defenceandstrategy.eu/en/current-issue-2-2007/articles/european-union-s-energy-in-security-dependence-on-russia.html>

[8] Kavalov B., Petric H., "The future role of LNG in EU's gas supply – issues for consideration, Expert article 452 Baltic Rim Economies, 01/2010, p.14 <http://www.tse.fi/FI/yksikot/erillislaitokset/pei/Documents/BRE2010/BRE%201-2010%20artikkelit/BRE_2_2010__14.pdf>, 07/04/2011

- building new gas grid interconnections between the Baltic States and the rest of the EU, including the medium- to long- term possibility to build an LNG import terminal, and the seemingly remote possibility to interconnect the Baltic with other EU member States in the framework of transport of shale gas;[9]
- increasing the use of renewable resources (in line with the EU strategy for increasing the overall share of renewables in the EU to 20% by the year 2020);[10]
- investigating the potential and possible dynamics of unconventional gas (especially shale gas) in the Baltic Sea Basin, as well as the possible "chain of consequences for Russia's role as a gas exporter".[11]

As far as LNG is concerned, it is often referred to as a way to relieve dependency and an alternative to mainstream shipments through pipelines. It is seen as one of the most expensive and technically complicated alternative energy sources to the effect that, "if the EU chooses to go for a large contribution of LNG to meet its overall gas demand, EU customers will most likely face higher prices for gas", and, therefore "price affordability may become a key issue when taking the political and investment decisions on LNG."[12] LNG already contributes to the security and diversity of natural gas supply of the EU (15% of gas import), and, although significant growth in LNG trade by sea is expected by 2020-2030, its impact on the overall traffic by sea is believed to be negligible.[13]

Realistic enough, these possibilities are medium- and long-term prospects of how the dependency scenario could be changed in the Baltic States. Nevertheless, the current situation in the Baltic States may be interpreted as a total reliance on Russian natural gas resources.

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[9] Kariņš K., "The Baltic energy sector", Expert article 445 Baltic Rim Economies, 01/2010, p. 6, <http://www.tse.fi/FI/yksikot/erillislaitokset/pei/Documents/BRE2010/BRE_1_2010_Web.pdf>, 07/04/2011

[10] Ibid., p. 6.

[11] Øverland I., "The surge in unconventional gas – implications for Russian export strategies, Expert article 456 Baltic Rim Economies", 19.2.2010, p.18 <http://www.tse.fi/FI/yksikot/erillislaitokset/pei/Documents/BRE2010/BRE_1_2010_Web.pdf>, 07/04/2011

[12] Kavalov B., Petric H. (footnote 8), p. 14.

[13] Ibid., p. 14.

1.2. Energy dialogue: the core element of EU-Russia relations

The EU is Russia's major trade partner, accounting for 52.3% of its overall trade turnover in 2008, and is by far the most important investor in Russia, as up to 75% of its Foreign Direct Investment (FDI) stocks come from the EU member states (amounting to €17 billion of EU outward investment to Russia in 2007).[14] Russia, on the other hand, is the third EU's major trade partner, accounting for 9.7% of its turnover, representing 11.2% of its imports and 8% of its exports.[15] These figures underline the fact that, institutionalised by the Partnership and Co-operation Agreement (PCA)[16], EU-Russia relations are not only vitally important for their reciprocal economy, politics and security, but also any further unilateral statements from one or the other side will mean, consequently, stalemate in the overall relations.

The EU energy dependency has allowed Russia to establish a new approach to energy by "using economic levers as a diplomatic tool".[17] Indeed, "the EU and Russia share common interests that are largely related to the energy sector as the EU is the largest importer of Russian energy and therefore the largest market for Russia in that sector".[18] Therefore, to secure its energy supplies, the EU has started to elaborate alternative projects. If, on the one hand, these mid- and long-term projects partly include green energy policies, on the other hand, they are interrelated with Russia indirectly, i.e. every manoeuvre from one of the two entities has cross-border effects on their neighbours, thus threatening the fragile equilibrium of energy security. At the same time, the EU seeks to secure energy supply for European citizens and industries via "building reliable partnerships with

[14] European Commission, "EU bilateral trade relations with Russia", <http://ec.europa.eu/trade/creating-opportunities/bilateral-relations/countries/russia/>, 07/04/2011

[15] European Commission, "EU bilateral trade and trade with the world. Russia", <http://trade.ec.europa.eu/doclib/docs/2006/september/tradoc_113440.pdf>, 07/04/2011

[16] The Partnership and Cooperation Agreement (PCA) was signed at the Corfu Summit (24/06/1994) by the EU and Russian Federation; due to internal causes and to the controversial nature of the EU-Russian Relations, the PCA was ratififed only in 1997. By now negotiations for a new PCA are still ongoing. A.N.

[17] Maurig L., Schaer D. (footnote 4), p. 67.

[18] Ibid., p. 68.

supplier, transit and consumer countries", which might reduce "the risks of Europe's energy dependency".[19]

Furthermore, within the EU, the issue of tackling the nature and the dynamics of its embryonic energy policy is still at stake. Due to the fact that the EU has started to give priority to energy issues only recently, it has encountered many obstacles in developing a common energy policy, as "there have always been huge differences between member states in terms of availability of natural energy resources on their territory", and to the tradition of member state to assert "national sovereignty over their energy mix".[20] Indeed, this may become an obstacle to the development of a "common energy policy" and, at the same time, it appears to be undeniable that "in the field of energy the internal market cannot function fully" for Europe still lacks grid interconnections between member states.[21] Hence, "there can be no functioning internal market for energy" within the EU "without a fully integrated" energy "grid system".[22]

1.3 The Baltic States: shortcomings of dependency

The Baltic States do not only consume Russian energy, but they also are still an important transit location and distributor of Russian energy and Russian export system. Meanwhile the EU plays a significant role in meeting "financial motivators to facilitate agreements and energy projects between the Baltic States [...] and provides a multilateral forum for the [...] discussions on various energy issues". Coordinating these elements, the EU seeks to be "effective in preventing energy unilateralism".[23] To date, the relevant efforts have resulted in the "Baltic Energy Market Interconnection Plan (BEIMP) designed to connect the Baltic States to wider EU Energy networks".[24] Nevertheless, the Baltic States have rather high dependency index on energy supplies. More-

[19] European Commission, "Energy and security of supply" <http://ec.europa.eu/energy/security/index_en.htm>, 07/04/2011.

[20] Andoura S., Hancher L., Van Der Woude M., "Towards a European Energy community", Notre Europe, March 2010, pp. 25.

[21] Ibid., pp. 25-26.

[22] Kariņš (footnote 9), p. 6.

[23] Maigre M. (footnote 3), pp. 6-7.

[24] Andoura S., et al., (footnote 20), p. 58.

over, the latter serve as a transit area, since 27% of natural gas and about 10% of crude oil supplies are directed from the Commonwealth of Independent States (CIS) to EU countries via the territory of the new EU-8 member countries which include the Baltic States.[25]

Market reforms have been implemented both domestically and regionally with the new objective to develop regional electricity and gas markets in Central Europe and the Baltic States as they increasingly conform to the Internal Energy Market Directive. "Harmonisation and convergence of regulation, notably fair cross-border access to networks and customers, are crucial to overcome the constraints of traditional dominant vertically integrated companies, overly rigid long-term contracts, base load overcapacity and persistent price distortions".[26]

As has already been stated, Lithuania is the most dependent Baltic State on Russian energy imports and has very limited reserves of oil and gas. On the other hand, it is the only Baltic State that has an oil refinery (the "Mažeikiai" refinery) as well as a Soviet relic, the already closed Ignalina Nuclear Power Plant (INPP), which are the country's major strategic energy assets.[27] Indeed, the INPP supplied the "78.4% of Lithuania's total energy production", though in December 2009, "to comply with the EU accession treaty requirements", the INPP was closed thus having left "the Lithuanian government to face serious challenges in finding a new balance and in diversifying the sources of imports of electricity."[28] In this predicament, "the new Nuclear Power Plant (NPP) in Visaginas is the biggest hope for energy security not only for Lithuania, but also for Latvia and Estonia", although "political discussions and controversy among the various stake holders have hampered the project".[29] As a matter of fact, even in conjunction with its regional partners Estonia, Latvia and Poland, Lithuania lacks experience and financial resources and would not,

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[25] EU-8 countries: Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovak Republic and Slovenia which joined the EU in May 2004; <http://www.iea.org/country/n_country.asp COUNTRY_CODE=LV&Submit=Submit>, 07/04/2011.

[26] Ibid., <http://www.iea.org/country/n_country.asp COUNTRY_CODE=LV&Submit=Submit>, 07/04/2011.

[27] Maigre M. (footnote 3), p.3; Ibid., pp. 5-6.

[28] Ibid., p. 3; Ibid., p. 5-6.

[29] Ibid., p. 5.

therefore, be able to implement the new NPP project on its own.[30] This is the biggest project in the Baltic States, and it will be a "good test case - i.e. whether real energy policy co-ordination and co-operation between the three Baltic countries and Poland" is actually feasible.[31] According to Arvydas Sekmokas, the Lithuanian Minister of Energy, the construction of the new Visaginas NPP is "one of the most important national projects that will reduce [Lithuania's] energetic and geopolitical dependence on the single source [...] while the integration of [Lithuania's] power system into the unified market of the Baltic Sea Region will allow us to improve the security and reliability of electricity supply to domestic consumers – that is one of the most important strategic tasks".[32]

As far as Latvia is concerned, it should be highlighted that it has neither domestic oil or gas production, nor refineries. Nevertheless, Latvia used to play an important role in transiting Russian oil to the Baltic Sea through its Ventspils oil terminal; however, its importance has decreased since the opening of Russia's Baltic Pipeline System and Russia's own Baltic Sea port at Primorsk in December 2001.[33] Currently Latvia plays a role in Russian gas exports to the Baltic States with its "Inčukalns", an underground gas storage facility, which is used to convey part of the gas to Latvia and neighbouring countries during winter.[34] Even though it does not constitute a permanent source of gas supply for all the Baltic States, plans have been made to enlarge "Inčukalns" storage capacity from 2,3 to 3,2 billion cubic metres (bcm), as well as to build an immense 50 bcm storage facility in Dobele at Kurzeme (South-Western Latvia).[35] Many concerns have been raised over the decision to finance it, as well as the controversial construction of a new 400 MW gas- powered plant is forecasted by 2015-2025, to be used as EU strategic reserves.[36]

Estonia is totally dependent on imports of Russian gas; it has no oil refineries (it is importing 17.5% of oil products) and is a net electricity exporter,

[30] Ibid., pp. 5-6.

[31] Ibid., p. 6.

[32] <http://www.vae.lt/files/lithuanian_energy_quarterly_2010_q2.pdf>, 07/04/2011

[33] <http://www.iea.org/country/n_country.asp?COUNTRY_CODE=LV&Submit=Submit>, 07/04/2011

[34] <http://www.iea.org/country/n_country.asp?COUNTRY_CODE=LV&Submit=Submit>, 07/04/2011

[35] Maigre M. (footnote 3), p. 4.

[36] Ibid., p. 4.

i.e., 60% of Estonia's domestic energy production comes from oil shale, which, however, generates high levels of "CO^2, SO^2 and NOx emissions, as well as huge amounts of ash waste destined for landfill".[37] In order to comply with the EU environmental standards and requirements, expensive auxiliary technologies will be needed, which consequently will have impact on the price of electricity.[38] Nevertheless, the Estonian National Energy Development Plan until 2020, adopted by the Government and Parliament in 2009, foresees a more diversified Estonian energy portfolio. At the same time, in April 2009, the Estonian government adopted a decision to support the construction of a LNG terminal in order to increase energy diversification in Estonia.[39] Therefore, EU directives on emission standards, together with new CO^2 trading schemes, make it challenging for Estonia to find an economically viable solution, which does not surrender national energy security interests by increasing dependence on Russia.[40]

According to this brief overview, it appears clear that the high dependency on Russian energy supply has at least a fourfold set of concerns regarding Baltic energy security:

1) significant dominance of Russia over the Baltic political and economic scene, even though the Baltic States are integrated into the EU and NATO. Therefore, economically, the Baltic States are attempting at channelling their trade ties with Russia to other markets. Hence, even if the Baltic States are able to reduce their dependency on Russia as a trading partner, they will heavily rely on Russian natural resources, gas and oil in particular, primarily due to their crucial position as a transit area of energy resources. Given these considerations, the situation will barely change in the foreseeable future;[41]
2) in the European energy market, the important transit function of the Baltic States between the exporter (Russian Federation) and the importer (the EU-27) of energy sources, has severe influence on the po-

[37] Ibid., p. 3.

[38] Ibid., pp. 3-4.

[39] Ibid., p. 4.

[40] Ibid., p. 4.

[41] Ibid., pp. 6-13.

litical and economic situation of each Baltic country. Their task is not an easy one to tackle. Continuously, indeed, they have to re-shape and re-balance their overall positions and relations with Russia when geo-political distortions in the previous political-economic-energetic situations take place. Summing up, it can be said that this function has to deal with, on the one hand, the fear of the big neighbour that is using energy as a weapon to exert its influence in other countries' domestic policy-making, and on the other, with the need of releasing such heavy energy dependency, that, therefore, have manifold economic-political implications within each Baltic States;

3) the "lack of domestic energy expertise and deficiencies in strategic energy policy planning" since "the growing dominance of the energy topic among national security issues is not accompanied by a growth in the number of domestic energy experts. [...] Estonia, Latvia and Lithuania are short of professionals who have a combination of technical knowledge and a broad political-strategic outlook in energy policy"; [42]
4) the relatively small size of the Baltic government sector in Estonia and Latvia is paradoxical compared to the objectives the two countries would like to achieve.[43] Although Lithuania cannot be excluded from such statement, since it also present a rather small government sector, it has to be highlighted that in January 2009, the Lithuanian Ministry of Energy was established, an "institution responsible for the state supervision of top-priority energy projects", which deals with responsibilities connected with the implementation of projects vital for state energy security, namely the construction of the new nuclear power plant, electric energy bridges to Poland and Sweden, a gas pipeline to Poland and an LNG terminal".[44] Considering the small size of these countries, the co-operation between the Baltic States at decision-making level should be based on a flexible, solidarity-like and extremely co-operative structure.

[42] Ibid., p. 2.

[43] Ibid., pp. 10-12.

[44] Ibid., pp. 11.

2. The controversy over unconventional gas

2.1. A "quiet revolution" in Europe, too?

Unconventional gas is believed to be one of the most challenging resources to tackle energy dependency: it is a rather understudied area, especially in Europe, while its potential is undefined, unclear and arguable. Unconventional gas can be defined as: "[...] natural gas that cannot be produced at economic flow rates nor in economic volumes of natural gas unless the well is stimulated by a large hydraulic fracture treatment, a horizontal well bore, or by using multilateral well bores or some other technique to expose more of the reservoir to the well bore."[45]

The most common types of unconventional gas are tight sands, coal bed methane (CBM) and gas shales, the latest of which constitutes some of the largest components of remaining natural gas resources in the United States.[46] Nevertheless, outside the US, unconventional gas resources represent an area still to be explored, characterised by a long-term potential, since technology improvements play an important role in increasing natural gas supply.[47] As far as oil, coal and renewable fuels are concerned, unconventional gas could indeed lead to a transformation in the European energy sector, considering that natural gas fits with the targets to reduce carbon emission, since it causes lower carbon emissions than other fossil fuels (i.e. carbon, coal, petroleum).[48]

As a matter of fact, shale "acts as both a source of gas and as its reservoir", since "natural gas is stored in shale in three forms: free gas in rock pores, free gas in natural fractures, and adsorbed gas on organic matter and mineral surfaces".[49] Abundant shale gas resources are distributed mostly in North Amer-

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[45] National Petroleum Council, "Unconventional gas",Working Document of the NPC Global Oil & Gas Study, Topic paper #29, 2007, p.5, <http://www.npc.org/Study_Topic_Papers/29-TTG-Unconventional-Gas.pdf>, 07/04/2011

[46] Mäkinen H., Shale gas – a game changer in the global energy play?, Expert article 467, p.31, 01/2010, <http://www.tse.fi/FI/yksikot/erillislaitokset/pei/Documents/BRE2010/BRE_1_2010_Web.pdf>, 07/04/2011

[47] Ibid., p. 31.

[48] Ibid., p. 31.

[49] National Petroleum Council (footnote 40), p. 17.

ica, Latin America, and Asia Pacific, though recent explorations revealed that there should be a remarkable, though modest, quantity of it also in Europe.[50]

Tony Hayward, the former CEO of British Petroleum (BP), describes the shale phenomenon as a "quiet revolution" that has recently radically transformed the market of gas in the US.[51] American oil companies have known for decades about this new and abundant source of natural gas, but "always dismissed it because it was too expensive and difficult to extract".[52] Recently, "a drilling technique known as *hydraulic fracturing*, " [...] has made it much easier and cheaper to extract gas from shale, coal and tight gas".[53] Indeed, "gas price has reacted accordingly, crashing by 60% in the past year, severing the long-standing link with the oil price", and within two decades, shale gas is predicted to meet half America's demand, thus turning "the country into a net exporter".[54] While experiencing the "quiet revolution", American oil companies have started to hunt for unconventional gas in the European soil as well, hoping "to repeat a trick that yielded big gas supplies in America"; however, the size of such unconventional gas reserves in Europe is still unknown.[55] According to the recent estimates of the International Energy Agency (IEA), unconventional gas reserves in Europe constitute 35 trillion cubic meters - almost half of which is thought to be in shale, which explains the decisions made by multinational companies, such as "Shell", "Conoco Philips" and "Exxon Mobil" that are negotiating deals to explore the Baltic Sea Basin, and especially Poland, Sweden and Germany shale reserves.[56]

The shale gas revolution has already spread in the US and has profoundly transformed the North American natural gas market. Forecasts are made for a shale gas boom in Europe, too. It is undeniable that the so-called "quiet

[50] Ibid., p. 17.

[51] "The hunt for shale gas in Europe: bubbling under", The Economist, 03/12/2009, <http://www.economist.com/node/15022457?story_id=E1_TVDNNQVS>, 07/04/2011

[52] Fortson D., "Shale gas blasts open world energy market", The Sunday Times, 01/11/2009, <http://business.timesonline.co.uk/tol/business/industry_sectors/natural_resources/article6898015.ece>, 01/12/2010

[53] "The hunt for shale gas in Europe: bubbling under" (footnote 46).

[54] Fortson D. (footnote 44).

[55] "The hunt for shale gas in Europe: bubbling under" (footnote 46).

[56] Ibid., "The hunt for shale gas in Europe: bubbling under".

revolution", is spreading beyond the borders of the US, entering national discourses in the EU where it is supposed to:

- provide energy independence and jobs;
- boost the EU's onshore industry;
- provide less expensive (in the long-run) and more environmentally-friendly fuel;
- assure a steady supply of a fuel that is more climate-friendly than other fossil fuels. [57]

These factors make natural gas the crucial fuel of the future in terms of climate change, particularly in combination with the expansion of renewable sources. The "flexibility of natural gas power plants allows quick and efficient changes in their level of output in order to accommodate any variability in electricity demand and supply in the grid that might arise due to the intermittence of renewable energy".[58] Therefore, unconventional gas may change the global geopolitics of natural gas when new supplier countries have emerge and reliance on only a few suppliers has decreased; nevertheless, unconventional gas exploration in Europe is currently in its embryonic stage and both the size and the exploitability of the European unconventional gas reserves remain highly uncertain.[59] Indeed, since there are considerable geological differences with North America, the technologies that have been developed so far in the US cannot simply be transferred to Europe, but rather, should be adapted to European geological setting.[60] Besides, considering the environmental impact of the shale gas exploitation in densely populated Europe, drilling might be more problematic than in the US, especially bearing in mind some EU countries' environmental awareness which could lead to particularly stiff opposition by locals due to the possible contamination of water supplies.[61] Considering the fact that European shale is geologically deeper than that of the US, and bearing in mind the high labour costs in the EU as well as the regulatory and

[57] Kefferpütz R., "Shale Fever: Replicating the US gas revolution in the EU?", No. 210/June 2010, Centre for European Policy Studies, CEPS Policy brief, p. 4.

[58] Ibid., p. 4.

[59] Mäkinen H. (footnote 40), p. 31.

[60] Ibid., p. 31.

[61] Ibid., p. 31.

environmental standards, shale gas is economically less attractive in Europe.[62] Indeed, BENTEK Energy and WoodMackenzie studies' "estimate the break-even gas price for US shale" to "lie between $3 and $7/mmbtu, while for the EU that price is estimated to be above $10/mmbtu"[63]. Henceforth, new studies are required, since it is believed that before 2020, only minimal production volumes will be produced.

Despite all these uncertainties concerning the potential of Europe's shale gas reserves, several oil and gas companies are already exploring European soil, especially in Poland and Sweden, but also in Austria, France, Germany, Hungary, and in the UK. On the research front, the Gas Shales in Europe (GASH) is the first European interdisciplinary shale gas research initiative to fill this knowledge gap and to focus on the potential gas shales in Europe.[64] According to the IEA, the figures available so far have underlined that Europe is a region that should have approximately 115 trillion cubic feet (tcf; compared to the 16,112 tcf worldwide), Western Europe alone may hold around 15 trillion cubic meters (tcm) in shale gas, enough to supply Germany for roughly 175 years.[65] Nevertheless, so far there have been only few significant political steps made inside the EU regarding shale gas developments.

It is still worth mentioning that, even though shale gas production in Europe will require years to start, Europe can benefit from shale gas before that time by decreasing natural gas prices and growing LNG supply.[66] On the other hand, whether European and worldwide shale gas reserves would prove to be wide and their extraction cost-effective, shale gas could turn out to be a game changer, and perhaps, as many believe, the EU will also witness a game-changing rush towards shale gas in the coming years.[67]

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[62] Ibid., p. 31.

[63] Kefferpütz R. (footnote 51), p.5; Million British thermal unit (MMBTU), approximately the amount of energy needed to heat 1 pound (0.454 kg) of water 1 °F (0.556 °C).

[64] Mäkinen H. (footnote 40), p. 31.

[65] Kefferpütz (footnote 51), p.4; Trillion Cubic Feet (tcf): natural gas is generally priced and sold in units of a thousand cubic feet, while units of trillion cubic feet (tcf) are often used to measure large quantities of natural gas. U.S. Department of Energy, Office of Fossil Energy, National Energy Technology Laboratory, "Modern shale gas: development in the United States", April 2009, p. 3.

[66] Ibid., pp. 4-5.

[67] Ibid., p. 5.

As the analysis in this chapter has shown, it would be a mistake to present European unconventional gas as a panacea for European energy security concerns, at least in the short- and medium- term.

3. Case study. Shale gas: potentials, prospects and possible scenarios in the Baltic Sea Basin

3.1. Setting the scene

So far we have contextualised the "energy question", addressed the dependency on energy supply of the EU in general and the Baltic States in particular, and have underlined the opportunities and shortcomings of shale gas in Europe. This chapter will focus on shale gas potential in the Baltic Sea Basin.

European shale gas resources are still under exploration, though a recent study by the US Energy Information Administration has emphasised that, as far as Eastern Europe is concerned, the concentration of estimated shale gas is situated in Poland, marginally in Lithuania and Kaliningrad Oblast' (Russian Federation), and Ukraine.[68] More specifically, estimated technically recoverable shale gas resources in the Baltic Sea Basin are significant in Poland (187 tcf), remarkable in Sweden (41 tcf) and Denmark (23 tcf), marginal in Lithuania (4 tcf) and Germany (8 tcf, Baltic shore).[69] Before proceeding further, the US example needs to be briefly overviewed, since it is characterized by rich shale reserves, advanced technology and scientific shale studies, development as well as normative records within the area of impact on nature, and a society of exploration and drilling operations. As a matter of fact, what should be considered is not only the US as the most advanced and experienced country in the field of shale gas, but also the role of US companies as investors seeking to explore EU, and especially Polish, shale reservoirs.

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[68] US Energy Information Administration, "World Shale Gas Resources: An Initial Assessment of 14 Regions Outside the United States", April 2011, <http://www.eia.gov/analysis/studies/worldshalegas/pdf/fullreport.pdf> 11/04/2011, pp. VI 1-26.

[69] Ibid., US Energy Information Administration (footnote 68), p. 4.

Due to the reasons mentioned above, the American shale experience will be taken into consideration and will be followed by an analysis of the Polish case, since it is one of the countries with the greatest shale reservoir in the Baltic Sea Basin and one with major (US) investments in shale explorations.

3.1. The American experience

By far the "cleanest burning" of all the fossil fuels, abundant US natural gas resources (it is estimated that there is over 1,744 tcf of technically recoverable natural gas) provide 22% of the US energy and, therefore, play an important role in meeting the country's energy demands.[70] As a result of the advancements in technology and the consequent "economically recoverable reserves" that were previously thought to be uneconomic, the "US has increased their natural gas reserves by 6% from 1970 to 2006".[71] Indeed, technological advancements, such as horizontal drilling and improvements in hydraulic fracturing, together with the rapid rise in natural gas prices have witnessed the emerging potential and have proven the economic feasibility of shale gas production.[72] Nevertheless, estimates of shale gas resources are likely to change as new information, additional experience and advancement in technology become available.[73]

To date, the most active US shales are the Barnett, the Haynesville/Bossier, the Antrim, the Fayetteville, the Marcellus, and the New Albany Shale, each of which has a unique set of exploration criteria and operational procedures.[74] In these shales, practices for drilling in urban settings have been developed, providing opportunities for safe, environmentally sound drilling. Meanwhile the use of horizontal drilling has not introduced new environmental concerns; rather, it has significantly reduced surface disturbances, impacts from dust, noise, and traffic as well as impacts to wildlife – the negative consequences associated with traditional drilling.[75] Where shale gas

[70] U.S. Department of Energy (footnote 57), pp. EX-1-6.

[71] Ibid., p. 7.

[72] Ibid., p. 9.

[73] Ibid., pp. 14-16.

[74] Ibid., pp. 16.

[75] Ibid., pp. 14-25.

development has met with urban and industrial settings, regulators and industry have developed special practices to help reduce community impacts to sensitive environmental resources, and interference with existing businesses.[76] Thus, the US experience is worth to be mentioned, especially given its "complex set of federal, state and local laws and programmes that address every aspect of exploration and operation".[77] Implemented through state and local agencies, these comprehensive laws and programmes enforce an array of requirements designed to protect human health and the environment during drilling, production, and abandonment operations.[78] An additional consideration regarding shale gas development is the potential for low levels of naturally occurring radioactive material (NORM) to be brought to the surface.[79] While NORM may be encountered in shale gas operations, there is "negligible exposure risk for the general public and there are well established regulatory programmes that ensure public and worker safety" [80]; gas field emissions are controlled and minimised through a combination of government regulations and voluntary avoidance, minimisation, and mitigation strategies.

3.2. The Polish case

"Shale fever is now spreading beyond the borders of the US, entering national discourses in the European Union where it is seen to provide energy independence and jobs, as well as cheaper and more environmentally-friendly fuel".[81] As has already been mentioned above, the explorations that have been conducted so far have revealed that Poland, Sweden and Germany seem to be particularly rich in shale basins. According to the findings of a study carried out by "Advanced Resources International" study, Poland

[76] Ibid., p. 25.

[77] Ibid., p. 25.

[78] Ibid., p. 25.

[79] NORM (Naturally Occurring Radioactive Material). Low-level, radioactive material that naturally exists in native materials, Ibid., pp. 76-82.

[80] Ibid. pp. 76-82.

[81] Kefferpütz (footnote 51), p. 1.

in particular, could have recoverable reserves for "more than 200 years of its own consumption".[82] It possesses an estimated 187 tcf of technically recoverable shale gas resources, which are located predominantly in the Baltic Basin (101,611 mi²) and marginally in the Lublin (11,882 mi²) and Podlasie (4,306 mi²) Basins.[83]

At the governmental level, Poland is not only currently assessing and documenting shale gas resources on its territory, but it is one of the first among the member states to have called on the EU to increase its focus on shale gas. Indeed, Polish Foreign Minister Radoslaw Sikorski stated that shale gas should be at the heart of the EU debate on energy security.[84] Notwithstanding that, the high enthusiasm regarding the potential of shale gas in Europe should not create unreasonable illusions, bearing in mind European peculiarities.

Although the geology of Poland looks quite promising for commercial opportunities for the exploration of unconventional gas, the effective amount of recoverable gas reservoirs is unclear, as well as whether the price of streaming it will be competitive with that of Russian supplies or future LNG shipments. Indeed, the peculiarities of Polish geology and the densely populated areas where the Polish shale gas has been located require an adaptation of American extracting infrastructures and technologies, thus making shale gas in Poland even more costly both in terms of research and implementation.[85] Moreover, the attractiveness of Polish shale gas is threatened by the fact that multi-billion investments will be required only for exploration and installation of the shale infrastructure.[86]

During the conference on "Energy Security and the Role of Shale Gas: American Experience and Polish Prospects", which took place in Warsaw in

[82] Kefferpütz (footnote 51), p. 1; tcm is the acronym for Trillion Cubic Metres, the European version of tcf, A.N., (see footnote 57).

[83] US Energy Information Administration (footnote 68), p. V-2; mi²: square mile, A.N.

[84] Kefferpütz (footnote 51), pp. 1-4.

[85] Ibid., Kefferpütz (footnote 51); Bay A., "Shale Gas Activity in Poland and a Comparison to "Conventional" Gas Development, Worldwide Exploration Marathon Oil Corporation, "Energy Security and the Role of Shale Gas: American Experience and Polish Prospects conference" Warsaw University of Technology, April 2010, <http://www.shale-gas.itc.pw.edu.pl/en>, 07/04/2011.

[86] Ibid., Bay A. (footnote 85).

April 2010, many US oil and gas companies presented their research findings on the potential of shale gas in Poland.[87] It appeared that:

- the attractiveness of the Polish shale gas is witnessed by an appealing fiscal regime for investments in exploration, while the consistency of Polish plans for infrastructure modernisation and reduced carbon intensity alongside an increased use of gas in power generation and transmission corroborate the statement that shale gas development in Poland is adequate;
- technical key challenges for shale gas are connected with embryonic, but potentially large Polish shale reserves, which requires numerous wells to determine the viability of the endeavour as well as continued innovation and experimentation. Moreover, there are technical concerns about the impact of the process on multiple wells of shale gas. The main concern, however, has to do with the difficulty of managing the cost base of shale gas, for example, following the requirements of local certificates for importing goods, machinery and skilled personnel to Poland. Issued by relevant Polish institutions, these certificates are required for import of equipment from other countries, but the paperwork process is reportedly extremely time-consuming and expensive;
- commercial key challenges of shale gas development in Poland require highly specialised equipment, skills and personnel, alongside competitive gas prices and market access as well as cost-efficient wells and services. Clearly, not all of them are currently available in Polish environment;
- investors need regulatory certainty given the fact that shale gas development implies multi-billion dollar investments over the forthcoming decades. Therefore, an appropriate and clear regulatory environment is required, as well as an explicit position of the Polish Government on how and to what extent it is going to interpret and apply those regulations.[88]

More specifically, several aspects of current regulations and legislation in Poland "may pose a challenge to successful and timely implementation of large

[87] "Energy Security and the Role of Shale Gas: American Experience and Polish Prospects conference" Warsaw University of Technology, April 2010, <http://www.shale-gas.itc.pw.edu.pl/en>, 07/04/2011.

[88] Ibid.

scale shale gas developments".[89] Geological and environmental issues should be addressed, first of all, with clear regulations as in the US case. Besides, the concession system should be adapted. At the national level, bills on the new geological and mining law are at the parliamentary stage, as well as the existing "Act On Freedom Of Economic Activity", the "Act On Environmental Protection Law", "The Act On The Provision Of Information On The Environment And Its Protection, Public Participation In Environmental Protection And Environmental Impact Assessments", should be revised in order to allow an appropriate normative framework for shale gas development.[90] At the EU level, the directive (94/22/EC) of the European Parliament and of the Council of 30 May 1994 on the conditions for granting and using authorisations for the prospect, exploration and production of hydrocarbons, has clearly not been updated to address the issues at stake.[91] The procedure to obtain the concession rights, from exploration to production, is rather complex, lengthy and costly. Notwithstanding that, by 1 April 2010, 291 concessions for exploration of minerals deposits as well as 394 concessions for exploitation of minerals from deposits were issued. [92]

The objective of this section was to provide an overall view of shale gas development in Poland, which, in terms of timing, is quite pessimistic. Indeed, given the situation described above, it is rather improbable that there will be production of Polish shale gas in the near future, although the country meets the prerequisites for development in the long run.

In any case, as the technology migrates from the United States to Europe, and CSEE countries establish incentives and a regulatory framework for unconventional gas production, this potential new source of gas is bound to draw considerable attention from governments and local firms alike.[93] The degree to which this technology is utilized in the region over the medium- to long-term may depend on the success of U.S. companies in Poland. On the other

[89] Ibid.

[90] Ibid.

[91] Ibid.

[92] Ibid.

[93] Ibid.

hand, "Gazprom is already lobbying against the exploration and development of unconventional gas in Europe in order to dampen competition with its own exports".[94] It may "use its considerable influence in Brussels in order to secure EU environmental laws or regulations that will delay or kill efforts to use the new technology in Europe, particularly in those CSEE countries now more vulnerable to "Gazprom" monopoly pressure".[95]

Conclusions

Although the recent developments of the Nord Stream project have cut off Russia's once-preferential transit area, the Baltic States, Russia may attempt to gain influence over this area again in the future, since the "economic sphere and especially energy, provides Russia differentiated opportunities to approach its Baltic neighbours. [...] Indeed, Russia seeks to influence local energy politics [...] by establishing lobby groups, encouraging and sustaining [...] interaction between local business circles and the political elite".[96] Hence, Baltic energy security as well as that of Europe is considering the prospects of shale gas development to lessen the dependency on Russian gas supplies. If this endeavour proves productive, and providing that the connection grid between EU countries has been intensified, the "quiet revolution" the US have experienced will take place on the European soil as well.

Although major US oil and gas companies have shed light on the potential of shale gas in Europe in general and Poland in particular, and are about to explore the feasibility of this endeavour, the enthusiasm is softened by reality. As has been reported in this article, the demographic, political, regulatory, environmental and social differences between the US and the EU are "putting the brakes on the development of shale gas in Europe".[97] These factors make it highly unlikely that Europe will undergo a shale gas revolution transforming its gas market any time soon. The decline in EU conventional production is

[94] Smith K.C., Bringing Energy Security to East Central Europe. Regional Cooperation Is the Key, Centre for strategic and international studies, CSIS, April 2010, pp.1-19, p.17

[95] Ibid., p. 17.

[96] Maigre M. (footnote 3), p. 8.

[97] Kefferpütz (footnote 52), p. 5.

unlikely to be replaced by shale gas in the short-term, hence LNG and pipeline imports will remain important for the foreseeable future.

Only future developments will solve the enigma of the feasibility of shale gas production in the Baltic Sea Basin and, more generally, in Europe. Meanwhile efforts to tackle dependency will be in vain unless a more coherent, effective and unitary EU common energy policy as well as solidarity mechanisms between EU states and a clearer binding legislation to regulate EU-Russia energy dialogue are established. On the Russian side, indeed, the rise of unconventional gas and the emergence of LNG market in Europe give a strong signal to re-think its internal energy policy. As Shadurskiy states, "to stand up to the surging competition Russia will have to improve the efficiency of the energy industry and gas industry in particular"[98].

[98] Shadurskiy A., " Unconventional gas- is there a quite revolution and what does it mean for the Russian energy policy?, Expert article 555 Baltic Rim Economies, 23.6.2010, p.48, <http://www.tse.fi/FI/yksikot/erillislaitokset/pei/Documents/BRE2010/BRE%203-2010/BRE_3_2010_50.pdf>, 07/04/2011