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ASSESSMENT OF POLITICAL VULNERABILITIES ON SECURITY OF ENERGY SUPPLY IN THE BALTIC STATES

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ABSTRACT

The article argues that despite the evident link between political environment and security of energy supply, political elements are not sufficiently represented in contemporary scientific literature, namely in indexes that are designed for the assessment of security of energy supply. In an attempt to fill this gap, the article presents an innovative methodology for quantitative assessment of the political vulnerabilities on security of energy supply and applies it to the analysis of the Baltic States.

The proposed index determines the plausibility of the occurrence of threats of a political nature on the security of energy supply and defines it as political vulnerability. The application of index methodology to an analysis of the Baltic States has revealed that the overall political vulnerability on security of energy supply is the highest in Lithuania, considerably lower in Latvia, and the lowest in Estonia. The analysis has shown that political vulnerability has increased in Lithuania due to the closure of Ignalina NPP and an increase in energy import quantities from politically unstable countries, such as Russia. On the contrary, political vulnerabilities on the security of the energy supply have decreased in Latvia and Estonia due to the increase of consumption of indigenous energy. However, preliminary calculations show that political vulnerabilities should decrease considerably in 2015 in Lithuania due to the diversification of the natural gas supply.

KEYWORDS

Security of energy supply, political vulnerability, Baltic States, index methodology

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INTRODUCTION

The security of the energy supply is influenced by a wide range of political aspects. Political decisions can disrupt the flow of energy supplies, cause fluctuations in energy prices, and determine the functionality of energy infrastructure. Most of the former Soviet republics have experienced this linkage between political aspects and security of energy supply in one way or another¹. For example, in Lithuania, independence aspirations in early 90's were countered with energy blockades by the Soviet Union. A couple of years later, steep price and natural gas supply cuts affected the parliamentary election in Lithuania. Moreover, Lithuania's rigid position not to sell its strategic crude oil refinery "Mažeikių nafta" to companies associated with Russian state was met with periodical oil supply disruptions that were finalized by the closure of "Druzhba 2" oil pipeline in 2006.² Lithuania's persistence in implementing the Third energy package was met by the unilateral decision of Russian state-owned company "Gazprom" to increase the prices of natural gas compared to countries in the region³. Finally, if the statements in the most recent report of Lithuanian State Security Department are to be trusted, then it is evident that Russia will continue to use energy as a tool to achieve political goals in the Baltic States and the European Union.⁴

Despite a clear connection between political aspects and security of energy supply that is evident in the Baltic States and beyond, contemporary scientific literature cannot offer much guidance for measuring the impact of political elements on security of energy supply. The absolute majority of research in which the security of energy supply in Baltic States was directly or indirectly analysed has been based on qualitative methodologies. It either focused on most relevant energy security issues of Baltic States⁵ (A. Grigas;⁶ A. Molis and J. Gliubutė⁷; G. Česnakas⁸;

¹ For example, Robert L. Larsson argues that energy lever was used to create pressure on Lithuania, Latvia, Estonia, Ukraine, Belarus, Moldova, Georgia, and such actions had affected Europe. He also explicitly states that there is a direct linkage between the stability of Russian energy supply flow and political considerations of Russian Government (Robert L. Larsson, *Russia's Energy Policy: Security Dimensions and Russia's reliability as Energy Supplier* (Stockholm: FOI-Swedish Defense Research Agency, 2006), 3-7).

² Giedrius Česnakas, "Energy Security in the Baltic-Black Sea Region: Energy Insecurity Sources and their Impact upon States," *Lithuanian Annual Strategic Review* 10 (2012): 158-165.

³ Same measures were not carried out against Estonia and Latvia due to their more flexible position on the implementation of the Third energy package.

⁴ VSD, "Grėsmių nacionaliniam saugumui vertinimas," (2015): 16 // <http://www.vsd.lt/files/documents/635633000992101250.pdf>.

⁵ They have focused either on all Baltic States or one of them.

⁶ Agnia Grigas, "Energy Policy: The Achilles Heel of the Baltic States": 73, 74; in: Agnia Grigas, Andres Kasekamp, Kristina Maslauskaitė, Liva Zorgenfrei, and Jerzy Buzek, eds., *The Baltic States in the EU: Yesterday, Today, and Tomorrow* (Paris: Notre Europe, 2013).

⁷ Arūnas Molis and Justina Gliubutė, "Prospects for the Development of Nuclear Energy in the Baltic Region," *Lithuanian Annual Strategic Review* 10 (2012): 140-149.

⁸ Giedrius Česnakas, *supra* note 2: 158-168.

G. Vitkus;⁹ M. Maigre;¹⁰ N. Mužnieks;¹¹ T. Tarus and M. Crandall;¹² R. Gabrielsson and Z. Sliwa;¹³ T. Janeliūnas;¹⁴ T. Janeliūnas and A. Molis;¹⁵ Z. Baran;¹⁶), or it was concentrated on foreign policies of the Baltic States and representation of their national energy security interests in international organizations (A. Molis (a);¹⁷ A. Molis and T. Vaišnoras (a);¹⁸ A. Molis and T. Vaišnoras (b);¹⁹ R. Vilpišauskas (a);²⁰ R. Vilpišauskas (b);²¹ Ž. Vaičiūnas²²).

The few studies that actually attempted to measure the impact of political elements on the security of energy supply faced various shortcomings. A. Molis²³ developed a methodology for assessment of risk intensity to energy security in the Baltic States and it was based on scenario-building and risk assessment tools. He introduced six types of risks; however, two of them ("Turbulent national minorities" and "Lukewarm attitude towards innovations") are questionable in terms of their impact on energy security. Furthermore, all the assessments and results were based on assumptions and opinions of experts.

Another attempt in measuring the impact of political aspects on the security of energy supply in the Baltic States was introduced by J. Augutis, et al.²⁴ They introduced an integrated index to quantitatively assess energy level for the Baltic

⁹ Gediminas Vitkus, "Russian Pipeline Diplomacy: a Lithuanian Response," *Acta Slavica Iaponica* 26 (2009): 26–44.

¹⁰ Merle Maigre, *Energy Security Concerns of the Baltic States* (Tallinn: International Centre for Defense Studies, 2010), 8–12.

¹¹ Andris Sprūds, "Latvian Russian Energy Relations: between Economics and Politics": 110–117; in: Nils Mužnieks, ed., *Latvian – Russian Relations: Dynamics since Latvia's Accession to the EU and NATO*, (Riga: University of Latvia Press, 2011).

¹² Triinu Tarus and Matthew Crandall, "Is Russia a Threat to Estonian Energy Security?" *Baltic Journal of Political Science* 1 (2012): 88, 89.

¹³ Risto Gabrielsson and Zdzislaw Sliwa, "Baltic Region Energy Security-The Trouble with European Solidarity," *Baltic Security & Defence Review* 15 (2013):145–158.

¹⁴ Tomas Janeliūnas, "Lithuanian Energy Strategy and its implications on Regional Cooperation": 192–202; in: Andris Sprūds and Toms Rostoks, eds., *Energy: Pulling the Baltic Sea Region Together or Apart* (Riga: Zinatne, 2009).

¹⁵ Tomas Janeliūnas and Arūnas Molis, "Energy Security of Lithuania: Challenges and Perspectives," *Lithuanian Political Science Yearbook* (2005): 204–211.

¹⁶ Zeyno Baran, *Lithuanian Energy Security: Challenges and Choices* (Vilnius: Centre for Strategic Studies, 2006), 4–6.

¹⁷ Arūnas Molis, "Rethinking EU- Russia Energy Relations: what do the Baltic States want?" *SPES Policy Papers* (February 2011): 15–26.

¹⁸ Arūnas Molis and Tomas Vaišnoras, "Energy Security through Membership in NATO and the EU: Interests and Achievements of Lithuania," *Lithuanian Foreign Policy Review* 32 (2014): 25–30.

¹⁹ Arūnas Molis and Tomas Vaišnoras, "Išorinė bendroji ES energetikos politika ir Lietuvos interesai": 336, 337; in: Dovilė Jankniūnaitė, ed., *Ambicingas dešimtmetis: Lietuvos užsienio politika 2004-2014* (Vilnius: Vilniaus universiteto leidykla, 2015).

²⁰ Ramūnas Vilpišauskas, "National Preferences and Bargaining of the New Member States since the Enlargement of the EU: the Baltic States- Still Policy Takers?" *Lithuanian Foreign Policy Review* 25 (2011): 26–31.

²¹ Ramūnas Vilpišauskas, "Lietuvos Europos politika: prioritetai ir jų (ne)įgyvendinimas": 264, 265; in: Dovilė Jankniūnaitė, ed., *Ambicingas dešimtmetis: Lietuvos užsienio politika 2004-2014* (Vilnius: Vilniaus universiteto leidykla, 2015).

²² Žygimantas Vaičiūnas, "Common European Union Energy Policy on the Making and the Interests of Lithuania," *Politologija* 55 (2009): 102, 103.

²³ Arūnas Molis, "Building Methodology, Assessing the risks: the Case of Energy Security in the Baltic States," *Baltic Journal of Economics*, Vol. 2, No. 11 (2011): 68, 76, 78 // DOI: <http://dx.doi.org/10.1080/1406099X.2011.10840501>.

²⁴ Juozas Augutis, et. al., *Lietuvos energetinis saugumas. Metinė apžvalga 2011-2012* (Kaunas: Vytautas Magnus University, 2013), 29, 30, 31.

States. The assessment was based on 68 indicators that were divided into three types of blocks: technical, economic and socio-political. Socio-political indicators were divided into geopolitical and social indicator groups; however, political elements were underrepresented and indicators were mostly based on the level of dependency and had not included the domestic political environment.

Indexes that do not focus on the Baltic States share a similar tendency for avoiding the political aspects. Domestic political elements are usually omitted in the indexes, rejecting possibilities that they might negatively impact the security of energy supply. The best case to illustrate the flaws of this approach is Ukraine, where ineffective governance and lack of regulation quality have led to disruption of oil and natural gas supply in a number of cases and prevented development of energy projects that could allow increase diversification of energy supply—namely, the case of 2004-2005, in which a lack of transparency and corruption elements in Ukraine led to the “disappearance” of more than 7.8 billion m³ of natural gas. This was a strong variable, which led to the disruption of natural gas supply and transit via Ukraine in the beginning 2006. Until 2006 Ukraine was considered an unreliable partner in natural gas and oil transit as resources passing via Ukraine were diverted by various business groups due to the lack of strong central authority and possibilities to control and regulate the sector. The lack of transparency in the deals for supply of energy resources in Ukraine and Belarus increased their energy insecurity and allowed Russia to use energy instruments in its foreign policy more intensively. The lack of competences in the Ukrainian government had not allowed the construction of a liquefied natural gas terminal in 2010 and hindered the diversification of the supply of natural gas. These examples illustrate the importance of domestic variable—strong government having adequate regulation capabilities for security of energy supply.

There are many indexes that fail to assess domestic political environment or face other shortcomings in terms of reflection of political elements. Energy security assessment indexes, suggested by IEA,²⁵ and M Scheepers²⁶ et al., ignore the domestic political environment. Indexes developed by Lars H. Röller, J. Delgado, and Hans W. Friederiszic²⁷ approximate the external supply risks with a measurement of import dependency, but they do not take into consideration specific political risks associated with each supplier or domestic political elements of energy importing country. Hence, assumptions that domestic production is

²⁵ International Energy Agency, “Energy Security and Climate Policy. Accessing Interactions” (2007): 62, 63 // https://www.iea.org/publications/freepublications/publication/energy_security_climate_policy.pdf.

²⁶ Martin Scheepers, Ad Seebregts, Jacques de Jong, and Hans Maters, *EU Standards for Energy Security of Supply* (Clingendael: Energy Research Centre of the Netherlands and Clingendael International Energy Programme, 2006), 13–20.

²⁷ Lars-Hendrik Röller, Juan Delgado, and Hans W. Friederiszick, *Energy: Choices for Europe* (Brussels: Brugel Blueprint Series, 2007), 12–20.

absolutely reliable and that the imports decrease reliability fails to assess the full complexity of domestic political elements of a country being measured.

Some indexes fail to capture the full spectrum of primary energy sources, namely the indexes suggested by E. Gupta;²⁸ C. Coq and E. Paltseva;²⁹ and M. Frondel and Christoph M. Schmidt.³⁰ The former focuses only on the external supply of oil, while the latter ones put emphasis on fossil fuels. The index of U.S. Chamber of Commerce Institute for 21st Century Energy³¹ measures only relative security, as annual results are compared to 1980.³² Finally, the index proposed by C. Coq and E. Paltseva³³ simultaneously measures both primary energy resources and secondary energy (petroleum products) and this aspect skews the results³⁴.

The impact of political elements on security of energy supply is underrepresented in the indexes discussed above. In an attempt to fill this gap, the article aims to construct a quantitative methodology for the assessment of the impact of political variables on the security of energy supply by combining domestic energy production and import variables with quantitative political variables and to test it on the Baltic States. A combination of the aforementioned variables would not only allow the introduction of a more sophisticated representation of political elements in the indexes that measure security of energy supply, but it also would be another step in the energy security studies of the Baltic States³⁵ that are currently dominated by descriptive analysis.

The article argues that the political aspects of the security of energy supply should be assessed as level(s) of vulnerabilities; therefore, it begins with the introduction of two key concepts that will be used during the process of methodology building: security of energy supply and political vulnerability. The

²⁸ Eshita Gupta, "Oil vulnerability index of oil-importing countries," *Energy Policy* Vol. 36, No. 3 (March 2008): 1198–1201 // DOI: <http://dx.doi.org/10.1016/j.enpol.2007.11.011>

²⁹ Chloe Le Coq and Elena Paltseva, "Measuring the security of external energy supply in the European Union," *Energy Policy* Vol. 37, No. 11 (November 2009): // DOI: <http://dx.doi.org/10.1016/j.enpol.2009.05.069>.

³⁰ Manuel Frondel and Christoph M. Schmidt, "Measuring Energy Security—A Conceptual Note," *Ruhr Economics Papers* 52 (2008): 6–8.

³¹ U.S. Chamber of Commerce Institute for 21st Century Energy, "Index of U.S. Energy Security Risk: Assessing America's vulnerabilities in a global energy market," (2013): 34 // <https://www.uschamber.com/sites/default/files/documents/files/2013-esri.pdf>.

³² In index it is argued that the 1980s were the worst for the U.S. energy security, however, this index only allows to compare the change of the level of energy security, by showing how much it has improved or worsened compared to 1980s.

³³ Chloe Le Coq and Elena Paltseva, *supra* note 29: 4478.

³⁴ The Baltic States provides a good example in explaining how the results are skewed. Latvia and Estonia import 1/3 to 2/3 of petroleum products needed from Lithuania, which has an oil refinery. The disruptions to the oil supply to Lithuania directly affect Latvia and Estonia, at least in the short-term, as they would need to search for diversification of supply of petroleum products. Considering Lithuania as the source of petroleum products when assessing security of oil supply to Latvia and Estonia would not reflect the real situation. This is because Lithuania would be assessed as a more reliable supplier than Belarus or Russia, not taking into account that oil is imported from Russia.

³⁵ The Baltic States are chosen for testing the methodology due to two main reasons. First of all, they are net energy importers. Second of all, it is not common to assess the impact of political elements on security of energy supply to the Baltic States by using quantitative methodology. The studies are dominated by descriptive research.

article proceeds with a discussion of how to measure political vulnerability. The following parts are devoted to the representation of the index methodology, its application to the analysis of political vulnerabilities on security of energy supply in the Baltic States and the analysis of likely impact of newly commission LNG terminal on security of energy supply in Lithuania.³⁶

1. THE CONCEPTS OF SECURITY OF ENERGY SUPPLY AND POLITICAL VULNERABILITY

Contemporary scientific literature is rich in definitions of energy security. For instance, Benjamin K. Sovacool finds more than 45 different definitions of energy security,³⁷ while V. David argues that "energy security is like a Rorschach inkblot test – you can see whatever you want to see in it."³⁸ Therefore, it does not come as a surprise that energy security definitions can be grouped by their focus on different aspects, such as availability, affordability, efficiency and environmental and social stewardship.³⁹ Despite the fact that political scientists have failed to agree on a common energy security definition, it can be argued that failure to ensure the physical availability of energy to its end consumers makes problems, which are related with other energy security aspects, far less relevant.⁴⁰ Therefore, the most important dimension or the basic fundamental starting point of energy security is the physical availability of energy resources.

The availability of energy resources in countries which cannot meet their energy needs by indigenous production, has to be ensured by importing energy from producer countries.⁴¹ This aspect consequently makes the security of their energy supply closely linked with the political environment of those countries, from which the energy is imported. This linkage is accurately captured by energy security definition of Scheepers et al.: "Diversification of energy sources, diversification of imports, long-term political stability of importing regions, and the resource base in those regions."⁴²

Not only does this definition provides a clear link between political elements and energy security, but it also shows that the security of energy supply remains at

³⁶ Data for the year of 2015 is not available, therefore, only the potential impact can be calculated.

³⁷ Benjamin K. Sovacool, "Introduction: Defining, Measuring and Exploring Energy Security": 5; in: Benjamin K. Sovacool, ed., *Routledge Handbook of Energy Security* (London and New York: Routledge, 2010).

³⁸ *Ibid.*, 3.

³⁹ Marilyn A. Brown, et. al. "Forty Years of Energy Security Trends: A Comparative Assessment of 22 Industrialized Countries," *Energy Research and Social Science* 4 (2014): 66.

⁴⁰ Juozas Augutis, et al., *Lietuvos energetinis saugumas. Metinė apžvalga 2014-2015* (Kaunas: Vytauto Didžiojo universitetas, 2016): 6.

⁴¹ For more information on types of countries in global energy security systems see: Giedrius Česnakas, "Construction of Energy Security System: Analysis of Elements, Levels and their Links," *Politikos mokslų almanachas* 6 (2009): 66–76.

⁴² Benjamin K. Sovacool, *supra* note 37: 5

the core of the energy security concept. This assumption is based on the observations of the evolution of the energy security concept. The first definition of energy security, provided by the Sir Winston Churchill before WWI, was that "safety and certainty in oil lie in variety and variety alone."⁴³ Only later the concept was expanded to involve economic, environmental, social and other elements; however, if security of supply is not ensured, all other elements of energy security become irrelevant.

The global energy structure and structures of individual countries (infrastructure, domestic production, imports, prices, emissions, energy efficiency and efficiency of energy policy) directly depend on global and domestic political environments. The approach of A. Correljé's and C. Linde's⁴⁴ that "local political instability in production or transition countries brings about general uncertainty" should be rejected. The vulnerabilities on security of energy supply might emerge from suppliers as well as consumers, as B. Shaffer argues: "supply disruptions can be initiated by various states (producer, transit and consumer) along the supply chain."⁴⁵

The security of supply directly depends on the political elements of suppliers as well as consumers. The oil embargo after Yom Kippur war in 1973, oil supply disruption after 1979 Iranian revolution, spike of oil prices after Iraq's invasion into Kuwait in 1990, and the oil and natural gas supply disruptions from Russia to Ukraine, Belarus, Georgia, Moldova, the Baltic States in the period of 1990-2015, all indicate how closely security of supply is connected to political elements. This clearly indicates that the assessment of security of energy supply by combining political elements and connecting them with energy supply quantities is valid and viable.

The impact of political aspects on energy security should be assessed according to level of vulnerabilities rather than elements defining a precise level of energy security. According to Marvin S. Soroos⁴⁶, the vulnerabilities emerge when societies or countries lack the means to limit the harmful impacts of threatening events or actions that occur. According to E. Gnansounou⁴⁷, vulnerability of a system is the degree to which that system is unable to cope with selected adverse events. Indexes of vulnerability on security of energy supply (taking into account

⁴³ Mario Tagarinski and Andrius Avizius, "Energy Security for the Euro-Atlantic Region": 5; in: Stephen Stec and Besnic Baraj, eds., *Energy and Environmental Challenges to Security* (Springer: Dordrecht, 2007).

⁴⁴ Aad Correljé and Coby Van der Linde, "Energy Supply Security and Geopolitics: A European Perspective," *Energy Policy* 34 (2006): 539 // DOI: <http://dx.doi.org/10.1016/j.enpol.2005.11.008>.

⁴⁵ Brenda Shaffer, "Natural Gas Supply Stability and Foreign Policy," *Energy Policy* 56 (2013): 122 // DOI: <http://dx.doi.org/10.1016/j.enpol.2012.11.035>.

⁴⁶ Marvin S. Soroos, "Global Change, Environmental Security, and the Prisoner's Dilemma," *Journal of Peace Research* 31 (1994): 321.

⁴⁷ Edgard Gnansounou, "Assessing the energy vulnerability: Case of industrialised countries," *Energy Policy* 36 (2008): 3735 // DOI: <http://dx.doi.org/10.1016/j.enpol.2008.07.004>.

production and supply of only primary energy) show not the level of security, but the plausibility of the occurrence of threats to security on energy supply.

Therefore, the methodology should allow for assessing the vulnerability of energy supply (which is dependent on political aspects) by indicating the likelihood of disruption of supply of primary energy due to political elements. The methodology does not aim to set thresholds for political security of supplies, but to assess tendencies and probabilities. Probability type indexes usually avoid setting thresholds; in fact, most of the indexes that have been analysed in the introductory chapter avoid setting thresholds.

2. MEASURING POLITICAL VULNERABILITY

In order to measure the political vulnerabilities of the security of energy supply, an appropriate data base has been chosen. The criteria for selecting the data base are based on four general requirements. First, the data has to be publically available. Some researchers use databases that are either publically not available or too expensive for many of their peers, thus lowering the possibilities to repeat the research. Second, the data base has to include as many countries as possible. A number of reputable databases are limited in geographic scope; they are created for particular regions and lack global coverage. Third, the data set has to present aggregated data. Forth, the data has to be renewed annually, allowing to track tendencies in long periods of time.

The Worldwide Governance Indicators (WGI) project corresponds to the aforementioned criteria; therefore, its data can be used for creation of indicators.⁴⁸ WGI aggregated and individual governance dimensions cover 215 economies over the period of 1996–2014 for all dimensions of governance: voice and accountability, political stability and absence of violence, government effectiveness, regulatory quality, rule of law, and control of corruption. WGI is publically accessible and renewed annually.

The WGI project provides a specific concept of governance that is applied in the methodology, arguing that governance is “the traditions and institutions by which authority in a country is exercised.”⁴⁹ This concept includes three important dimensions of governance: the process by which governments are selected, monitored and replaced; capacity of the government to effectively formulate and implement sound policies; and the respect of citizens for the state and institutions

⁴⁸ WGI project is funded from the Knowledge for Change Program of the World Bank, however, it does not reflect the official views of the World Bank.

⁴⁹ Daniel Kaufmann, Aart Kraay, and Massimo Mastruzzi, “The Worldwide Governance Indicators. Methodology and Analytical Issues,” *Policy Research Working Paper* 5430 (2010): 4.

that govern it.⁵⁰ Referring to this perception of governance it can be argued that these factors represent the political situations of individual states and reflect their impact on energy policies and security. WGI covers the most important political aspects affecting energy security: quality of government and political institutions, transparency of selection procedures of the politicians, inner political stability of the state, quality of political decisions and other aspects.

Different options to measure political vulnerability exist. According to Kaufmann and Kraay, no combination of indicators can provide a completely reliable measure of governance of particular dimension.⁵¹ In the proposed methodology four (out of six) dimensions covered by WGI are important for the assessment of political vulnerability on security of energy supply, which are: political stability and absence of violence, government effectiveness, regulatory quality and rule of law. WGI dimensions include groups of indicators (either rules-based indicators or outcome-based indicators)⁵² as indicators alone are insufficient to measure political vulnerability.

The Stability and Absence of Violence/Terrorism dimension reflects perceptions of the likelihood of political instability and/or politically motivated violence, including terrorism. It basically measures perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means. This indicator reports stability of the government and frequency of different forms of violence and conflicts. This integrated indicator includes 7 representative sources and 2 non-representative sources. The sources include: Economist Intelligence Unit Riskwire and Democracy Index, World Economic Forum Global Competitiveness Report, Cingranelli Richards Human Rights Database and Political Terror Scale, iJET Country Security Risk Ratings, Political Risk Services International Country Risk Guide and other. The indicator focuses on: armed conflicts, violent demonstrations, social unrest, international tensions / terrorist threat, government stability, internal conflicts, external conflicts, etc.

The political stability of supplier countries and consumer countries defines the capabilities of suppliers and consumers to control their territories and thus to ensure the security of the energy infrastructure, and to prevent the possibility of opposing groups or terrorists damaging the energy infrastructure. History shows that political tensions and revolutions directly affect supply of energy resources,

⁵⁰ *Ibid.*

⁵¹ Daniel Kaufmann and Aart Kraay, "Governance Indicators: Where Are We, Where Should We Be Going?" *Policy Research Working Paper* 4370 (2007): 26, 27.

⁵² Rules-based indicators measure whether countries have legislation that ensures suitable governance, while outcome-based indicators measure whether the compliance to the aforementioned legislation is enforced. More information about the methodology of the WGI and each of the indicators, which are discussed in this chapter, can be found here: <http://info.worldbank.org/governance/wgi/index.aspx#home>.

such as in the example of the Islamic Revolution in Iran. External elements have a great impact on energy supplies, such as during the Iraq–Iran war in the 1980s, when oil tankers and oil fields were targets of military operations, and during the invasion of Iraq to Kuwait in 1990 led to the destruction of oil fields⁵³ and a price spike. During the Russian–Georgian war Russia shelled the territory where transit oil pipelines passed. External conflicts lead to changes of agreements of energy resources supplies. For example, after the annexation of Crimea, Russia suspended discounts and later natural gas supplies to Ukraine and explained that this was the consequence of Ukraine's debt.

Terrorism is a huge threat to the security of energy supply. From 1998 to 2007 there were 232 terrorist attacks against the energy transportation infrastructure⁵⁴. The 2010 Heritage Energy Game⁵⁵ demonstrated that there are significant vulnerabilities in the domestic and international energy network to coordinated terrorist attacks on oil infrastructure. That scenario showed that attacks in the United States of America and Saudi Arabia would create oil supply disruptions of historical proportions. If the consumer does not control its territory, it is not capable of ensuring exports and supply of energy services to domestic consumers. Political instability hinders the implementation of laws and effective regulation as well, thus hindering implementation of energy projects and reliability of energy supply.

Government effectiveness captures perceptions of the quality of public services, the quality of the civil service, and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies. This indicator consists of 6 representative sources and 10 non-representative sources. The representative sources include: Economist Intelligence Unit Riskwire & Democracy Index; World Economic Forum Global Competitiveness Report; Gallup World Poll; Institutional Profiles Database; Political Risk Services International Country Risk Guide; and Global Insight Business Conditions and Risk Indicators. The indicator focuses on: quality of bureaucracy and institutional effectiveness, excessive bureaucracy, transport infrastructure, infrastructure disruption, state failure, policy instability, and spectre of basic services. It has to be underlined that not all concepts measured are ideal to include in measuring political vulnerability on security of

⁵³ Samil Sen and Tuncay Babali, "Security Concerns in the Middle East for Oil Supply: Problems and Solutions," *Energy Policy* 35 (2007): 1518 // DOI: 10.1016/j.enpol.2006.05.001.

⁵⁴ Peter Toft, Arash Duero, and Arunas Bieliauskas, "Terrorist targeting and energy security," *Energy Policy* 38 (2013): 4412 // DOI: <http://dx.doi.org/10.1016/j.enpol.2010.03.070>.

⁵⁵ The Heritage Foundation, "Coordinated Terrorist Attacks on Global Energy Infrastructure: Modelling the Risks" (2011) // http://thf_media.s3.amazonaws.com/2011/pdf/sr0088.pdf.

energy supply, but the integrity and broad coverage of countries outweigh the disadvantages of the indicator.

The effectiveness of the government is the direct outcome of capabilities of the state to implement sound and efficient energy policy, as well as the consumer to be predictable in ensuring compliance with market principles. The quality of public administration (bureaucracy) as well as policy stability defines how sound the policy or supply of resources is, and how predictable it is. This also defines the business environment, and barriers, as well as how much political control is on business relations in energy sector, as well as separation between energy and foreign or domestic policies. It is clear that these indicators reflect such events as the oil embargo of 1973⁵⁶, problems and lack of transparency in natural gas supply between Russia and Ukraine in a number of cases (not transparent structure of natural gas prices, supply disruptions of natural gas and oil in number of cases due to the non-transparency in Ukraine or Russia's political decisions) since the dissolution of the Soviet Union as well as non-transparency of energy relations (gas and oil) between Russia and Belarus (disruptions, price jumps and discounts in relation to political decisions). Government effectiveness also allows for indicating how resilient government is to corruption, which is a latent threat.⁵⁷ The good example here is Ukraine and energy supply problems that occurred because of the corruption in the state. This also indicates capabilities for coping with pressure from interest groups, ensuring stability of supply⁵⁸ and sound formulation of energy prices, following market rules.

The regulatory quality captures the abilities of governments to formulate and implement sound policies and regulations permitting and promoting development of the private sector. The integrated concept includes 6 representative sources and 9 non-representative sources. The representative sources include: Economist Intelligence Unit Riskware and Democracy Index; World Economic Forum Global Competitiveness Report; Heritage Foundation Index of Economic Freedom; Institutional Profiles Database; Political Risk Services International Country Risk Guide and World Justice Project Rule of Law Index. It focuses on measured concepts such as: unfair competitive practices; price controls; discriminatory tariffs; excessive protections; discriminatory taxes; investment freedom; financial freedom; ease of setting up a subsidiary for a foreign firm; tax inconsistencies; and others.

⁵⁶ Daniel Yergin, *The Prize: The Epic Quest for Oil, Money & Power* (New York: Free Press, 2008), 588–591.

⁵⁷ Ivar Kolstad and Tina Søreide, "Corruption in Natural Resource Management: Implications for Policy Makers," *Resources Policy* 34 (2009): 216, 217 // DOI: 10.1016/j.resourpol.2009.05.001.

⁵⁸ Margarita M. Balmaceda, "Corruption, Intermediary Companies, and Energy Security: Lithuania's Lessons for Central and Eastern Europe," *Problems of Post-Communism* 55 (2008): 24, 25 // DOI: 10.2753/PPC1075-8216550402.

Indicated problems in the regulation sector hinder the development of the energy sector according to market rules, where interests of consumers and suppliers would be in equilibrium. Governments have a great impact on regulations and the competitiveness of energy companies. This element might become a tool for governments to force the energy companies to act according to political interests of the government. Energy companies then are awarded or punished by changing regulations. This might lead to decisions of companies to disrupt or change policies of energy supply. For example, Russian energy companies act as Russia's "ambassadors"⁵⁹, while in many countries producers (usually state owned companies) enjoy better positions than other private companies. This indicator reflects the capabilities of energy companies to conduct their operations without regard for the political interests of the state. According to Lars H. Röller, J. Delgado, and Hans W. Friederiszick, security of supply might be affected not by economic rationales, but by the political interests as: "government – controlled foreign monopolist may restrict output beyond what a monopolist may do, in order to extract political concessions."⁶⁰

According to the WGI, the rule of law dimension reflects the extent to which agents have confidence in and abide by rules of society, and in particular the quality of contract enforcement, property rights, the police, the courts, as well as the likelihood of crime and violence. This dimension also includes elements like security of property rights of energy companies, and independence of public institutions (police, courts, and supervising institutions) from government. The integrated concept includes 8 representative sources and 14 non-representative sources. The representative sources include: Economist Intelligence Unit Riskwire & Democracy Index; World Economic Forum Global Competitiveness Report; Heritage Foundation Index of Economic Freedom; Institutional Profiles Database; Global Insight Business Conditions and Risk Indicators and others. The dimension focuses on measured concepts like: fairness of judicial process, enforceability of contracts, confiscation/expropriation, reliability of police services, judicial independence, efficiency of legal framework for challenging regulations, property rights, confidence in the police force, degree of judicial independence vis-à-vis the state and others.

The rule of law is an important element of security of energy supply because problems in this area, related with decisions of governments and individual politicians, affect the operation of public and private energy companies. This pushes energy companies to act not by the market principles, but strategically, according to the decisions and political interests that might lead to energy supply uncertainty

⁵⁹ Isabel Grost and Nina Poussenkova, *Petroleum Ambassadors of Russia: State versus Corporate Policy in the Caspian Region* (Kent: Rice University, 1998), 16, 17.

⁶⁰ Lars-Hendrik Röller, Juan Delgado, and Hans W. Friederiszick, *supra* note 27, 13.

and possible disruptions, that cannot be foreseen or prepared for. The examples of problems in the energy sector due to lack of rule of law can be provided from Russia. The Russian state on numerous occasions has seized control of oil and natural gas extracting regions and removed or limited investments of foreign energy companies. A good example is the Sakhalin II natural gas production project in 2006, when investments of Japanese companies were limited and Gazprom was included as the main owner of the project. The same happened with the oil company "YUKOS" in 2004: in 2011 the Kovykta natural gas field was taken over by including environmental institutions. In 2006, Venezuela's government nationalized the oil sector and oil extraction and exports dropped sharply⁶¹. The case of Venezuela shows that energy resources become not only instruments of foreign policy, but due to the lack of rule of law, all sectors are affected and it has a direct effect on consumers. If this would be a sole supplier, the consumer country could experience negative consequences.

The WGI does not distinguish between countries of different political regimes, only between practices in those activities defined by the indicators. However, most democratic countries perform better in those concepts that are measured and included into indicators in comparison to non-democratic countries.

The voice and accountability and the control of corruption are not included in the methodology of political vulnerability on security of energy supply. The former is not relevant to the methodology of the index because it measures political categories that are not directly related with security of energy supply: e.g. perceptions of the extent to which a country's citizens are able to participate in selecting government, as well as freedom of expression, freedom of association or free media. Inclusion of this indicator would skew the results as it would make clear differences between democratic and non-democratic countries and democratic countries would perform better.

Data provided by the control of corruption indicator is covered by other applied governance indicators (Government effectiveness, regulatory quality, rule of law). They measure quality of public administration, quality of implementation of political decisions, political consistency and planning, and bureaucratic quality. The authors of the WGI methodology claim that the indicators complement each other.

The political dimensions provided by the World Bank and the WGI have significant advantages over the other indexes. First, they measure all the dimensions of governance. Second, the methodology of the WGI combines features of both rules-based indicators and outcome-based indicators, diminishing

⁶¹ Thomas F. McLarty, "Latin America"; in: Jan H. Kalicki and David L. Goldwyn, eds., *Energy and Security. Strategies for World in Transition. Second Edition* (Washington and Baltimore: Woodrow Wilson Center Press and Johns Hopkins University Press, 2013).

disadvantages that might be manifest while using only one particular group (either rules-based or outcome-based indicators).

There are a lot of challenges in quantifying socio-political aspects. Socio-political data significantly differs from technological, economic and environmental data. The aforementioned types of data can be assessed as objective data in comparison to socio-political data, as they can be objectively calculated and compared to technical regulations, costs, emissions, etc. It is more challenging to include socio-political elements in quantitative assessment of energy security.⁶² The socio-political data is usually "secondary type data". This means that the data is a product of transformation of various primary data into aggregated values (defined by experts), like in the Global Terrorism Index, the Global Peace Index, the Freedom in the World Index, or the Failed States Index. The secondary type socio-political data is based on the assessments of experts and its objectivity remains questionable.⁶³ The Corruption Perceptions Index, which only indicates perceptions about corruption, not the actual number of corruption cases or actual "shadow economy", can be provided as an example. In the case of Global Peace Index values, some sub-indexes are assessed in expert panels, and the assessments depend only on the perceptions of experts. Due to the previously outlined importance of political elements for assessing vulnerability of energy security, there is a need to find and include the best accessible socio-political data that is wide in its geographic scope. This leads to the challenge of data accessibility and scope.

For the previously mentioned reasons, the WGI aggregated and individual governance indicators are the best choice for similar indexes as the indicators cover 215 economies over the period of 1996–2014, for all dimensions of governance: voice and accountability, political stability and absence of violence, government effectiveness, regulatory quality, rule of law, and control of corruption. Despite the aforementioned challenges, the importance of political elements, as has been outlined in this chapter, indicates the need to include them in an assessment of the political vulnerabilities on security of energy supply.

3. THE ASSESSMENT OF POLITICAL VULNERABILITY ON SECURITY OF ENERGY SUPPLY

The political vulnerability assessment on security of energy supply presents a single unified index, which is based on the values of two groups of indicators. First group represents quantities (import and domestic production) of primary energy

⁶² Juozas Augutis, et. al., *Lietuvos energetinis saugumas. Metinė apžvalga 2012-2013* (Kaunas: Vytautas Magnus University, 2014), 14.

⁶³ For example, it can be assumed that there would be different assessments about reliability of Russia as a supplier of energy resources between experts from Ukraine and Spain.

sources: crude oil, natural gas, solid fuels, and renewable and nuclear energy⁶⁴. The data is applied from Eurostat database⁶⁵, and is converted into a unified metric of tons of oil equivalent⁶⁶. The second group consists of relevant elements of the political aspect(s): political stability and absence of violence, government effectiveness, regulatory quality and rule of law. These Worldwide Governance Indicators are converted into unified percentile metrics where 0% is the minimal meaning – indicating the worst case, and 100% is the maximum meaning, indicating the best case.

The index of political vulnerability on security of energy supply is calculated as follows:

$$PVSS_k = 100 - \sum_{j=1}^m D_{kj} \cdot \left(\sum_{i=1}^n E_{ji} \cdot (w_1 \cdot PSAW_i + w_2 \cdot GE_i + w_3 \cdot RQ_i + w_4 \cdot RL_i) \right)$$

$PVSS_k$ – political vulnerability to security of energy supply in country k ;

D_{kj} – share of particular primary resource in total production and import of primary energy resources in country k ;

m – number of resources.

E_{ji} – share of country I in the total primary energy production and import quantity of resource j in country k ;

n – number of countries;

$PSAW_i$ – Political Stability and Absence of Violence value of country i ;

GE_i – Government Effectiveness value of country i ;

RQ_i – Regulatory Quality value of country i ;

RL_i – Rule of Law value of country i ;

w_{1-4} – weight assigned to relevant elements of political nature (for the calculations in this research equal weights of 25% were assigned)⁶⁷.

The equation proceeds in two main steps. In the first one, outlined in major brackets, the political vulnerability on security of energy supply in particular energy resource sector (natural gas, crude oil, solid fuels, renewable or nuclear energy) is calculated. The shares of different countries in the total gross inland consumption of particular energy resource (E_{ji}) are multiplied by a sum of values of relevant elements of a political nature ($PSAW_i$; GE_i ; RQ_i ; RL_i) of countries of origin i that are weighted against set weights (w_{1-4}).

⁶⁴ Secondary energy sources were excluded from the index due to occurring overlap in the calculations: it is not possible to link the secondary energy with the origin of resources, from which the energy was produced.

⁶⁵ If one would like to use this index for analyzing the countries outside the European Union, other statistical databases, such as the one of International Energy Agency or U.S. Energy Information Administration, can be used as well.

⁶⁶ The calculation was grounded on the methodological advice of experts affiliated with Lithuanian Energy Institute and guidelines and guidelines of International Energy Agency.

⁶⁷ Such values were set after extensive discussions with experts of Energy Security Research Centre.

The second part of the equation, which is outlined before the major brackets, accounts for general political vulnerability on security of energy supply in country k ($PVSS_k$) by taking into account all five types of energy resources and their suppliers. Values of political indicators (calculated in the first step) are multiplied by their shares of different energy resource in gross inland consumption of primary energy resources in country k . The final value is calculated by adding them up and subtracting from 100. Corresponding to the statements above, this value will illuminate how politically vulnerable energy consumer is in regard of all primary energy resource supply. The higher the value, the more vulnerable the country is.

In order to make the formula easier to comprehend, a hypothetical example is introduced that operates with fictional data. Country X uses three primary energy sources: crude oil, natural gas, and nuclear energy. Crude oil accounts for 50% of gross inland primary energy consumption, while the remaining two sources accounts for 25% each. Crude oil is supplied by two countries, referred to as A (25%) and B (75%). All of the natural gas is supplied by country C, while the nuclear energy is produced domestically. The political indicators show that Country X has a value of 60%, A has a value of 50%, while B and C have 40% each. This data allows for two conclusions. The first one refers to political vulnerability on security of energy supply in a particular energy sector, while the second one refers to political vulnerability on energy supply security in all energy sectors.

Hence, security of oil supply of country X is 42.5%, 40% in the natural gas sector, and 60% in the nuclear energy sector.⁶⁸ Further calculations allow for assessment of the political vulnerability on security of energy supply in a given year for country X. Since the majority of gross inland primary energy consumption is covered by crude oil, it has biggest weight in calculation of the final value, while natural gas and nuclear energy have lower weights. Therefore, the political vulnerability on security of energy supply of this hypothetical country X is 53.75% (46.25% before the subtraction from 100).

The index consists of a number of sub-indexes with each of them representing political vulnerability on security of energy supply for particular energy source. Thus sub-indexes can be used separately or combined with other indicators in different indexes. The political vulnerability on security of any resource (oil, natural gas, etc.) supply can be calculated for any country consumer.

In sum, this methodology provides greater importance to energy resources that dominate the energy sector of a particular country at a given time. It also

⁶⁸ In order to illustrate the level of political vulnerability in specific energy sector and use it as sub-index, the aforementioned values has to be subtracted from 100 manually and it is not included in the equation.

emphasizes the importance of the most important suppliers, as the largest importers may cause more problems for energy supply or make it more stable.

4. POLITICAL VULNERABILITIES ON SECURITY OF ENERGY SUPPLY OF THE BALTIC STATES FROM 2004 TO 2011: OBSERVATIONS AND EXPLANATIONS

The application of the introduced methodology has revealed that the average level of political vulnerability on security of energy supply of the Baltic States was 43.76% throughout the period of 2004–2011. The least vulnerable country was Estonia—there political vulnerability on security of energy supply averaged 33.75%. Political vulnerability on security of energy supply was higher in Latvia (45.23% on average), while vulnerability was the highest in Lithuania (52.32% on average; see Figure 1 below).

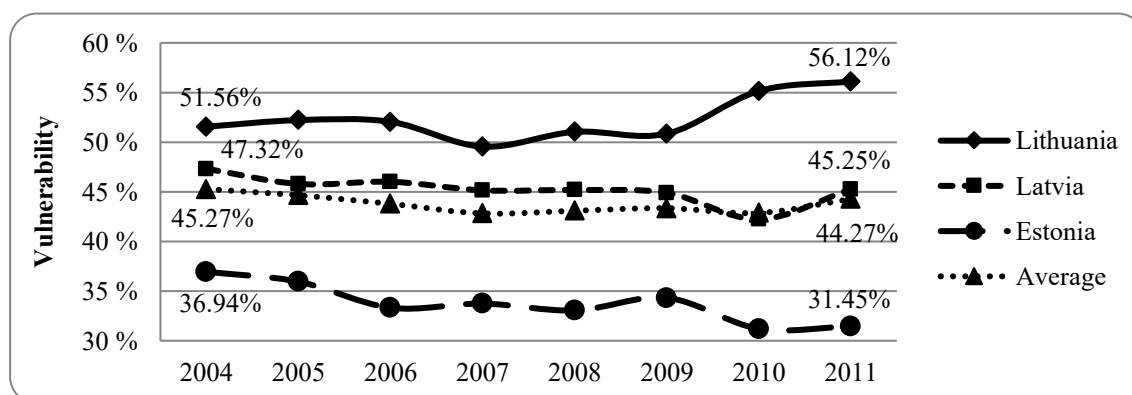


Figure 1. Dynamics of political vulnerability on security of energy supply of the Baltic States⁶⁹

The results lead to two interesting observations. First, despite geographical proximity, a similar degree of integration with Russia's energy system, and other similarities, the methodology indicates that the energy sectors of the Baltic States are unequally exposed to political vulnerabilities. Furthermore, political vulnerability of the Baltic States' energy supply had different development patterns. Political vulnerability on security of energy supply greatly decreased in Estonia (by 5.49 percentage points), the decrease was also observed in Latvia (by 2.7 percentage points), at the same time exposure to vulnerability in Lithuania increased by 4.56 percentage points. The diverging results require proper explanation, outlining the causes for such divergence, and explaining the application of the methodology itself.

⁶⁹ Source: authors' calculations (data from the Eurostat and the World Bank).

The results of the index can be explained by exploring the overall gross inland energy consumption patterns and the balance between the usage of domestic and imported energy resources to cover national demand. In relation to the pattern of gross inland consumption, it should be underlined that Lithuania consumes twice as much primary energy then Latvia and Estonia combined (see Figure 2 below).

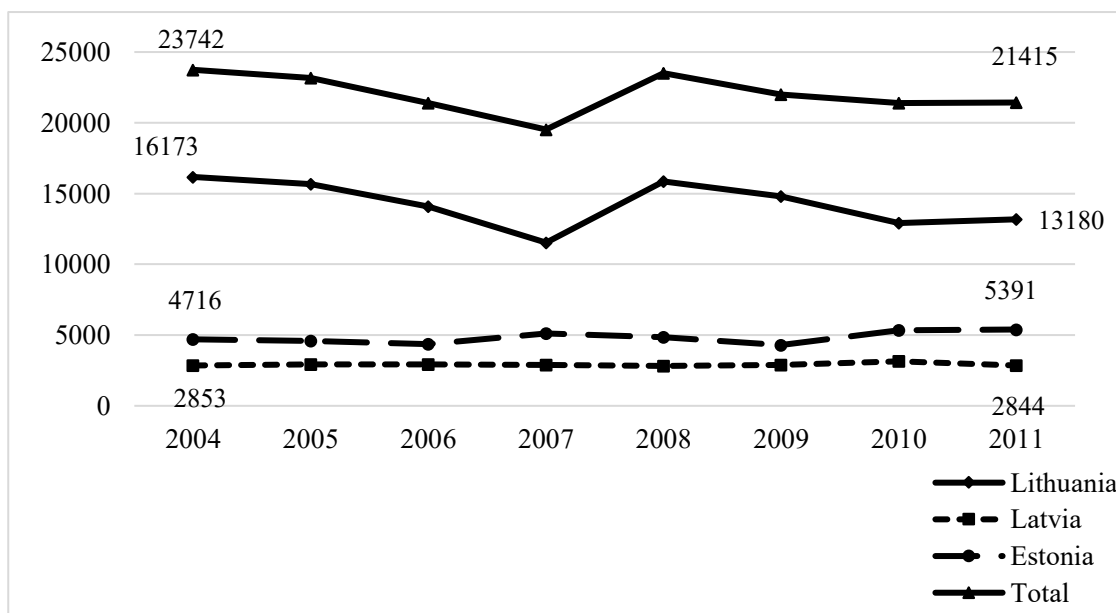


Figure 2. Patterns of gross inland primary energy consumption of the Baltic States (ktce)⁷⁰

However, the pattern is brought up not to suggest that Lithuania's energy security level is considerably lower due to fairly large energy consumption in comparison with the other Baltic States. The point is to indicate that most of Lithuania's gross inland consumption of primary energy is covered by imports, while Latvia and Estonia mostly rely on domestic primary energy resources. Therefore, political vulnerability to Lithuania's security of energy supply is mostly dependent on the political environment of its trade partners in energy. In contrast, the political vulnerabilities on security of energy supply in Latvia and Estonia depend more on their national political environment due to the larger share of domestic primary production covering their national demand (see Figure 3 below).

⁷⁰ Source: authors' calculations (data from the Eurostat).

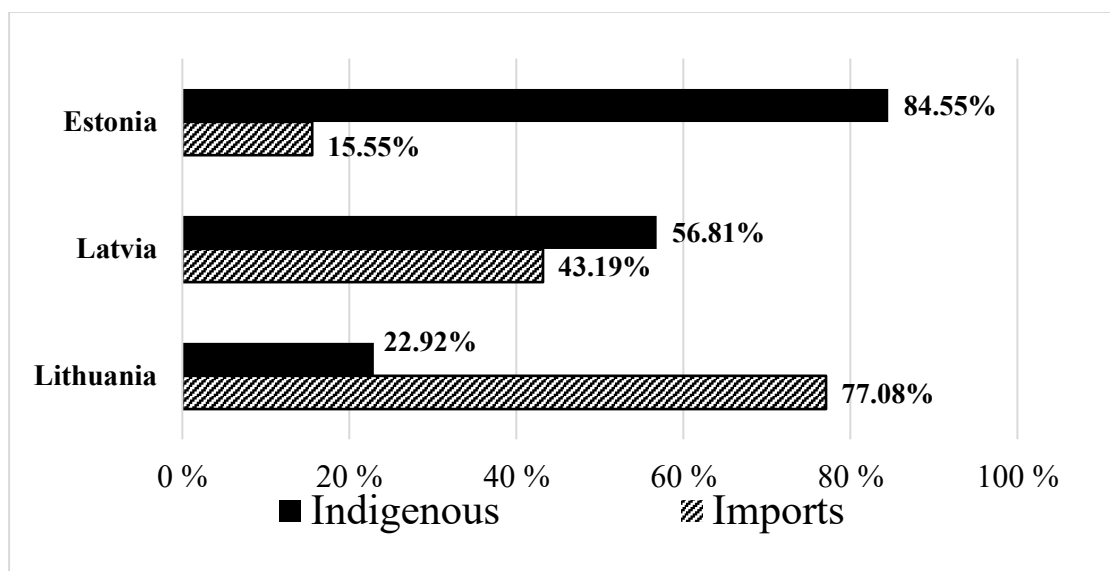


Figure 3. Average ratio of imported and domestic primary energy in the Baltic States (2004–2011)⁷¹

The vulnerabilities of the security of Lithuania's energy supply depends more on the political environment of its energy trade partners, while, in contrast, Latvia and Estonia's mostly depends on countries' own political aspects, which can be affected more by domestic political decisions. Since the absolute majority of Lithuania's primary energy imports came from Russia (on average 92.09%), its vulnerability was mostly dependent from Russian political aspects, where political vulnerability reaches 57.81% on average. Consequentially, a rather fair political environment in Lithuania, as vulnerability reaches 34.67% on average, does not bring a substantial weight to calculations due to the majority of its gross inland energy consumption being covered by import (77.08%) mainly from Russia. Despite the fact that the absolute majority of Latvia and Estonia's primary energy imports also come from Russia, the balance between domestic production and imports decreases Russia's importance as regards the political vulnerability on energy supply, and the domestic political environment has a greater impact. For these reasons Estonia and Latvia enjoy a lower vulnerability rate in comparison to Lithuania.

Russia, on the other hand, is only insignificantly dependent on Lithuania's energy market. In 2011 Lithuania's share in Gazprom's natural gas export was only 1.34% of all natural gas exports; the shares of Latvia and Estonia were even smaller, respectively 0.5% and 0.29%.⁷² Lithuania imported only 3.66% of Russia's

⁷¹ Source: authors' calculations (data from the Eurostat).

⁷² Gazprom, "Annual Report 2011" (2011): 74–78 // <http://www.gazprom.com/f/posts/51/402390/annual-report-2011-eng.pdf>.

crude oil exports, while Latvia and Estonia had not imported crude oil at all. Small markets suggest that reliability of supply would be lower due to the high dependency asymmetry; however, the case of Ukraine and energy conflicts with Russia suggest that the dependency is not as important as it would seem. The Baltic States in 2011 imported only 2.13%, while Ukraine, being the biggest importer, imported 18.8% of total natural gas exported by Gazprom.⁷³ However, this does not mean that Baltic States were 8.63 times more vulnerable than Ukraine.

The changes in the political vulnerability on security of energy supply for the Baltic States are not connected to the changes in the Baltic States' energy trade partners. Russia remained a predominant energy supplier for the Baltic States in the analysed period, while other trade partners (Belarus, Poland, Ukraine, etc.) played only a minor role. The explanation lies in the domestic energy policies of the Baltic States, namely in changes of primary energy production and imports.

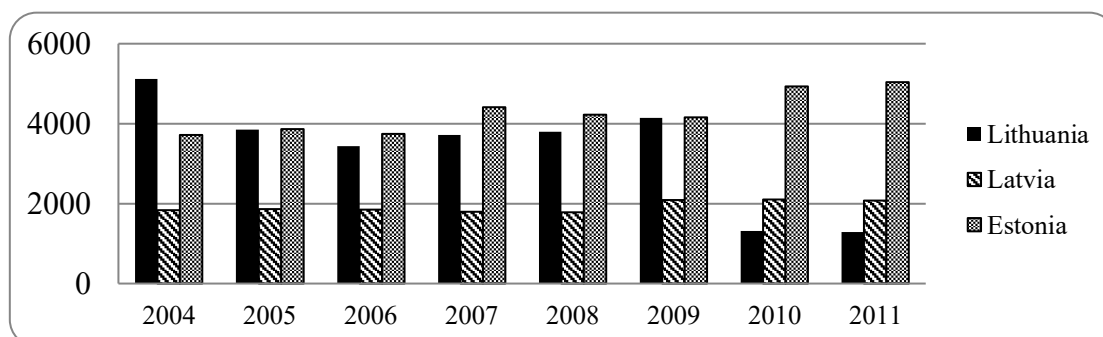


Figure 4. Changes in quantity of primary energy production in the Baltic States 2004–2011 (ktoe)⁷⁴

Figure 4 above shows that Estonia and Latvia managed to increase domestic primary energy production in the analysed period, while Lithuania closed Ignalina's nuclear power plant in 2010 due to accession to the European Union. After the closure, Lithuania's domestic primary energy production rate decreased more than fourfold compared to 2004. Changing patterns of domestic primary energy production caused changes in primary energy imports (see Figure 5).

⁷³ *Ibid.*

⁷⁴ Source: authors' calculations (data from The Eurostat).

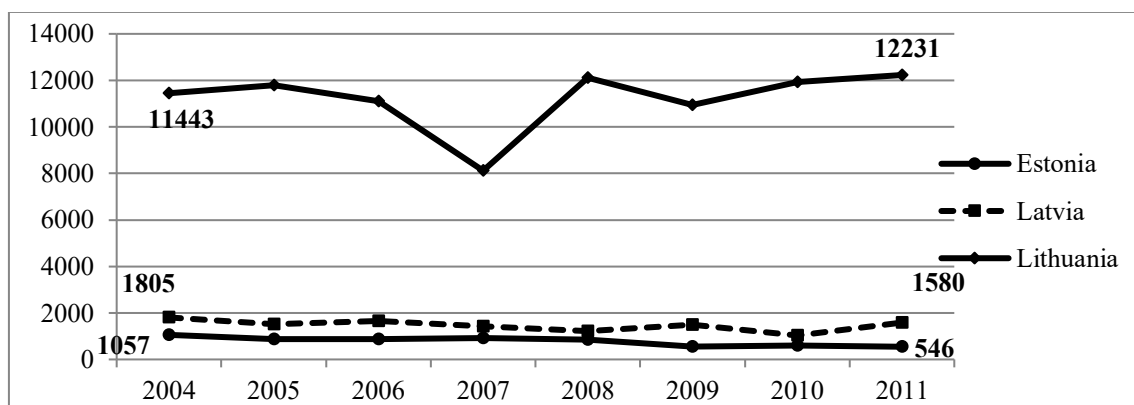


Figure 5. Changes in primary energy import quantities of the Baltic States in 2004–2011 (ktoe)⁷⁵

The quantity of Lithuania's imported primary energy increased, while in Latvia and especially in Estonia it gradually decreased. Though Russia remained relatively unreliable, as WGI data shows, but also the dominant supplier of energy, the increase in domestic primary energy production and the decrease of primary energy imports in Latvia and Estonia had a positive impact, because the political vulnerability on security of energy supply decreased. The vulnerability of Latvia and Estonia decreased due to the reduced impact of Russia and increased importance of national political aspects to security of energy supply. Contrary to Latvia and Estonia, domestic energy production in Lithuania decreased, which naturally led to an increase in imports. Therefore, the impact of political aspects of Russia became more important to the political vulnerability on security of supply for Lithuania, thus increasing vulnerability.

In sum, the methodology has exposed the political vulnerabilities of security of energy supply, and fluctuations in vulnerabilities of the Baltic States in the analysed time frame. Furthermore, the proposed method has managed to highlight the causes for fluctuations in the levels of political vulnerability of security of energy supply in the Baltic States.

5. THE IMPACT OF NATURAL GAS SUPPLY DIVERSIFICATION ON THE POLITICAL VULNERABILITIES OF SECURITY OF ENERGY SUPPLY IN LITHUANIA

The year 2015 was marked by fundamental changes in Lithuanian energy system due to the start of commercial activity of Liquefied Natural Gas Terminal. The fundamental purpose of the project was to enhance energy security of

⁷⁵ Source: authors' calculations (data from The Eurostat).

Lithuania by diversifying natural gas imports; therefore, it is relevant to analyse what kind of impact it might have on political vulnerability of the security of energy supply in the country. Even though the proposed index is not able to evaluate the factual impact,⁷⁶ it can project it by constructing a scenario.

The goal of the proposed scenario is to measure how political vulnerability on security of energy supply for Lithuania can change, if Lithuania will import 50% of natural gas from Norway, assuming that a liquefied natural gas (LNG) terminal had already been in operation since 2004. It is worth underscoring that the focus in the scenario is only on political vulnerability and no price aspects are included.

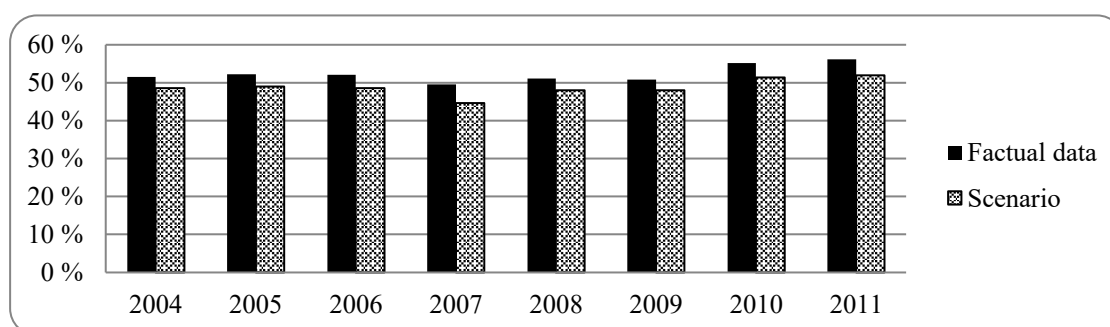


Figure 6. Comparison of actual political vulnerability of security of energy supply and scenario where 50% of natural gas is imported from Norway⁷⁷

If Lithuania imported 50% of its natural gas needs from Norway and the remaining 50% from Russia, political vulnerability on security of supply to Lithuania would decrease by 3.54 percentage points on average (Figure 6). Imports from politically more stable and reliable countries decrease vulnerability. This shows that the diversification of energy supply to Lithuania from politically more stable and reliable countries is needed in oil and solid fuel sectors.

CONCLUDING REMARKS: ADVANTAGES AND LIMITS OF THE INDEX

The article has argued that political aspects are not sufficiently represented in existing quantitative assessments of security of energy supply. The aforementioned indexes either ignored them or the assessed importance was not sufficient to reflect the political impact. Therefore, the article came up with an index of its own with the emphasis on political aspects, which influences the vulnerability on security of energy supply to a great extent. Furthermore, the proposed index was applied to assess the political vulnerability on security of energy supply in the Baltic States.

⁷⁶ Data on energy quantities is published in Eurostat only after few years.

⁷⁷ Source: authors' calculations (data from the Eurostat and the World Bank).

The results of this application allow for discussing advantages and limits of the proposed index methodology.

The main advantage of this methodology is its universal applicability for net energy importers. The index provides assessment of political vulnerabilities on security of energy supply for a particular country by combining energy production and import data with political elements, which are important to security of energy supply. At the same time, each indicator can be used by researchers separately, to assess political vulnerabilities of energy supply in particular countries and energy sectors. Index as well as sub-indexes can be combined with other indicators or included in different indexes. Furthermore, it operates on data, which is publicly available. A wide range of political elements can be accessed from Worldwide Governance Indicators, while data on energy quantities can be accessed from various databases, such as International Energy Agency, U.S. Energy Information Administration, Eurostat, national databases, etc.

The suggested methodology abandons the dichotomy between suppliers and consumers, positioning suppliers as possible sources of threat and consumers as the possible objects of threat. In the proposed methodology political aspects have direct connections to supply of primary energy resources. The index includes the impact of political aspects proportionally related to the quantity of domestic primary energy production, and primary energy imports by country of origin.

Avoidance of overcomplicated calculations and publicly available data makes the index user friendly, allows for broad application, and the results can be perceived by experts and newcomers alike. Furthermore, the methodology allows not only to identify where political vulnerabilities are located, but to construct various scenarios in relation to new infrastructure projects. Such scenarios could help the decision makers to understand the changes in political vulnerability that would occur, if patterns of primary energy supply are changed.

The proposed index methodology, however, has a number of limitations. The index shows only the plausibility of the occurrence of threats of political nature on security of energy supply. High vulnerability does not necessary mean that energy resources supply disruptions will occur; this only allows for comparison of how vulnerable different countries are, and that certain actions might help to decrease such vulnerability. Furthermore, the index does not include technical variables. The inclusion of technical aspects would increase complexity of the index. In this context it has to be mentioned that the 'N-1' principle is not included in the index, as it is usually applied in electricity generation sector, and application of such principle to other energy sectors would not represent the practices of primary energy imports. The only sector for which the 'N-1' principle could be applied is

natural gas transportation; however, particularities come into effect, like technological limitations as different pipelines have different directions, and at the same time states cannot be certain that during supply disruption they will have possibilities to buy and import gas from gas storage facilities, as this depends on the policies of the owners of storage facilities. All other primary energy resources can be transported in different manner, ranging from pipelines to road and rail transportation. The index focuses only on the actual levels of imports and domestic consumption of resources, while not taking production and transportation infrastructure into account.

States are able to change domestic political elements more easily in order to decrease political vulnerabilities. However, this aspect is not included in the index for number of reasons. First, capabilities to impact political dynamics are very particularistic for each state, as each state has different state power of controlling political processes that depend on political context. Despite that, authors assume that this, at least in some part, is reflected by the element of government effectiveness. Second, each state has different capabilities to change or expand domestic production of particular resource, and this depends on resources and infrastructure the state has. The need of gathering vast amount of sensitive information that is usually not disclosed would limit the applicability of index methodology.

The methodology does not include the aspect of dependency between suppliers and consumers. It would seem logical that the higher the asymmetric dependency of consumers on suppliers the more vulnerable consumers have to be. However, Russia–Ukraine energy conflicts show that, despite Ukraine remaining one of the biggest Russian natural gas consumers and a strategically important partner for natural gas export to Europe, this had not decreased political vulnerability on security of energy supply for Ukraine⁷⁸. At the same time, the problem remains of how weights should be assigned for small and big consumers alike.

Finally, it has to be highlighted that socio–political data is usually considered “secondary type data”, so different researchers argue how objectively political elements in methodology represent political vulnerabilities on security of energy supply. The article confirms that chosen political elements indeed have impact on security of energy supply. This index remains one of the steps in the creation of a universally applicable quantitative assessment of political vulnerabilities on security of energy supply.

⁷⁸ In 2014, Russia was not supplying natural gas to Ukraine for a period of five months due to the military intervention. Shorter supply cut offs in natural gas were observed in 2006 and 2009.

In sum, it is safe to argue that the proposed index could be applied to assess the political vulnerabilities on security of energy supply. The index indicates that the overall political vulnerability for Lithuania in the period of 2004–2011 increased by 4.56 percentage points, while at the same time the vulnerability of Latvia decreased by 2.07 percentage points and the vulnerability of Estonia decreased by 5.49 percentage points. The main issue in the increase of vulnerability was increased imports from Russia, which according to data from WGI lacked political stability and absence of violence, government effectiveness, regulatory quality and rule of law, when compared to the Baltic States. Political vulnerability on energy supply for Latvia and Estonia decreased because these countries increased domestic production of energy resources. These strictly quantitatively based findings do not diverge from the general intellectual knowledge that high political vulnerability on security of energy supply for the Baltic States is due to high dependency on energy supplies from Russia.

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