

# MASTER THESIS

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To what extent has Lithuanian energy policy in the gas sector resulted in an increase in Lithuanian energy security during the period 2009 – 2015?

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## **Summary**

Lithuanian gas sector was highly dependent on the sole gas provider for more than 20 years. This was considered as a threat for energy and even the national security of the country. However, various decisions were implemented to increase energy security in the gas sector during the period 2009 – 2015. This investigation is focuses on the gas sector and the projects accomplished in order to determine to what extent Lithuanian energy policies in the gas sector have resulted in an increased of energy security during the investigated period in terms of availability, affordability, reliability and sustainability. The methodological background of the thesis grounds the theory that assumes other theories and new emerged concepts while investigating. The best methodology for revealing those findings involved semi – structured interviewees with the company representatives and experts in the gas sector. In addition, some prior comprehension of the topic was needed in order to get familiar with the concepts of availability, reliability, affordability and sustainability. Background information about the Lithuanian gas sector was also necessary in order to perceive the most significant events in the gas sector and gain insights into the project implemented. All this information was further used when evaluating the increase in the Lithuanian energy security in the gas sector for the period between 2009 – 2015.

## **Abstract**

Lithuanian gas infrastructure was created during the Soviet times so the gas was mainly coming from Russia until 2014. Lithuania's inability to provide natural gas resources from other suppliers was perceived as a threat to the Lithuanian energy security, yet some significant projects were implemented in order to increase this security. This problem became even more relevant after the closure of Ignalina Nuclear Power Plant when the imports of gas increased for Lithuania on 2009. Moreover, oil halt for Lithuania in 2006 and Ukraine gas cuts in 2009 became the determining factors to pay more importance for the matters of energy security in Lithuania. However, there were still a number of doubts if Lithuanian government actions resulted in an increase in Lithuanian energy security. As a result, the aim of this thesis is to investigate to what extent has Lithuanian energy security increased in gas sector during the period 2009 – 2015.

The main objectives are to comprehend how the concept of energy security is described in the theoretical term in order to perceive how availability, affordability, reliability is defined by the literature. Moreover, in order to analyse the increase of energy security it is essential to possess a prior understanding about the Lithuanian gas sector. Therefore, the presentation of the project implemented is also described in this thesis. Another aim is to learn to what extent those projects contributed to the increase of energy security in the previously described dimensions of availability, affordability and reliability and sustainability. Those objectives serve as a tool to reach the main purpose and answer the research question of to what extent has Lithuanian energy policy in the gas sector resulted in an increase in Lithuanian energy security during the period 2009 – 2015?

This investigation is a qualitative research based on the relativist philosophical background that claims that reality does not consist only of scientific laws, but is also determined by the views of people. Social constructionist designs were chosen as well because the experiences and opinions of people take the first place over the objective facts in this research. Grounded theory was chosen as the best analytic technique in order to uncover the theories that are grounded. Both primary and secondary data was collected. Secondary data was collected in order to get familiar with the topic of energy security and to gain more insights into the events in the Lithuanian gas sector while primary data in order to investigate how energy security increased in the gas sector during the period investigated. The data was collected through the semi – structured interviewees with the company representatives and the experts in the gas sector of Lithuania and the analysis of two Lithuanian Energy Strategies (2007; 2012). It was analysed

using NVivo qualitative research software using coding. The main ideas, quotes and sentences were highlighted and distinguished to represent the codes. Those codes were then grouped to the concepts that enabled the theory to emerge.

The empirical part of the thesis focused on the analysis of the events in the Lithuanian gas sector, and the analysis of the ideas that have emerged during the interviews with the company representatives, gas experts and from the analysis of the Lithuanian energy strategies. The main dimensions of energy security were separated according to the importance. Availability was the most important element for Lithuanian energy security during the period investigated, and affordability was described secondly, while reliability and sustainability were considered as less important.

The finding of the thesis was presented after each empirical chapter as well as in the final conclusions. Lithuanian energy availability in the gas sector increased significantly because Lithuania currently receives gas not only from Russian supplier, but also from Norway. Also, there is an opportunity to get it from all over the world. Lithuanian energy affordability in the gas sector resulted in the higher prices of gas compared with 2009, but the project implemented resulted in the lower gap between the Lithuanian and European gas prices. Lithuanian reliability in the gas sector also increased because the alternatives created provided an opportunity to possess gas supplies in case it was halted by the Russian supplier. However, not much was accomplished in order to gain more gas supplies in the case of emergency. Reliability was also increased by switching from one to more suppliers in the market. The last and the newest element of energy security is sustainability. Sustainability of energy security in the gas sector also increased, but by switching from the use of gas to the use of renewables, so there were doubts if Lithuanian gas sector has any future at all. However, the questioned respondents indicated how gas could substitute oil in the transport sector. That would make gas part of the sustainable mix. As a result, the analysis conducted has proved that that policies pursued by the Lithuanian government resulted in the increase of the availability, affordability, and reliability of Lithuania's natural gas supplies. In conclusion, the research questioned of to what extent has Lithuanian energy policy in the gas sector resulted in an increase in Lithuanian energy security during the period 2009 – 2015 has been answered.

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## **Introduction**

Lithuanian natural gas infrastructure was constructed during the Soviet era and even after gaining the independence the country has remained highly dependent on Russian gas supplies, with Russia as the sole wholesale gas supplier. The existence of the pipeline infrastructure connecting Lithuania with the world's largest gas exporter, together with political priorities that focused primarily on political and military security, meant that the topic of energy security was not prioritized immediately after the independence (Grigas, 2013: 39). But during recent years Lithuania has performed most actively of the Baltic States with regard to their efforts to increase the country's energy security. Those efforts were highly visible in the leasing of a floating LNG terminal "Independence" in order to diversify the country's gas supplies. Moreover, the implementation of the Third Energy Package in 2014 was also important for creating more diversified internal transmission, supply and distribution of both gas and internal gas market.

However, there has been criticism of the Lithuanian government's energy policies and actions that are questioning the conditions of the LNG terminal construction, transparency in the implementation of the Third Energy Package, and the need to build a new pipeline connection with Poland. This criticism comes from not only several members of the Lithuanian Government, but also from the participants of the energy industry. A. Janukonis ex – Lithuanian District Heating Association Chairman of Board talks about the EU Third Energy Directive and claims that "The existence of UAB Lietuvos energija contradicts all the possible requirement of the EU 3<sup>rd</sup> Energy Package and symbolize open political hypocrisy" (A. Janukonis blog, 2014). Additionally, he criticizes the construction of LNG terminal by pointing out that "LNG terminal project is irrational and is not needed for Lithuania" (A. Janukonis Blog, 2013). Politician A. Skardžius doubts that the price of gas will be lower after the terminal is built, and it would have cost less if the terminal had been constructed with more private investment (Delfi, 2014). There are only a few examples of such criticism that will be discussed later in this work. Therefore, the aim of the thesis is to address the question of "To what extent has Lithuanian energy policy in the gas sector resulted in an increase in Lithuanian energy security during the period 2009 – 2015?"

In order to answer this primary research question, several secondary questions were addressed during this investigation:

1. How is the concept of energy security defined in theoretical terms?

2. What is the historical evolution of the Lithuanian gas sector?
3. What are the main dimensions of availability, reliability, affordability and sustainability in Lithuania?
4. How did Lithuanian energy security change in each of those dimensions?

The first chapter outlines the methodological approach and the philosophical background in order to justify the logical progress of the research. This chapter consists of four parts. The first part addresses the ontological and epistemological assumptions of the research and justifies the selection of a grounded theory approach as the most appropriate one for this qualitative research project. The second part explains the main data sources analysed, including primary and secondary data. The third part discusses how this data was collected. The fourth part explains how the data analysis was conducted by combining narrative and descriptive methods as well as coding the data collected from the interviews and analysing them with NVivo qualitative research software. The final part of this chapter reflects on the limitations of this research methodology. The methodology chapter of this thesis helps the reader to better comprehend the logic behind the chosen methodology and the process of the investigation itself.

The second chapter describes the key components of the concept of energy security, which are availability, reliability, affordability and sustainability of energy supplies. In doing so, this chapter explains more deeply what each of those components means, and what conditions are needed in order to create available, reliable, affordable and sustainable gas supplies for the country. This chapter then considers possible threats to energy security in general as well as threats to energy security that are specific for the gas sector. The purpose of this chapter in the structure of the thesis is to deconstruct the concept of energy security and its discussion in the academic literature, so that it may be applied to the case study of the Lithuanian gas policy.

However, the comprehension of the research methodology and knowledge of the key concepts does not enable the reader to draw the full picture of the situation under the examination if he/she does not possess a prior understanding of the Lithuanian gas sector. As a result, it is vital to familiarize the reader with the historical development and the most important events in the Lithuanian gas sector. For this reason, the third chapter provides background information about the Lithuanian gas sector. In doing so, it describes the current situation and the key indicators of the gas sector, recalls the main historical events that have influenced the energy policy of the country, and considers the contemporary events that makes the greatest impact on Lithuania's energy security. Therefore, this chapter will help the reader to perceive the reasons

why energy security is so significant for Lithuania, and how the Lithuanian government makes attempts to increase it.

The fourth chapter is the empirical heart of the thesis. Here, data on the Lithuanian gas sector, supported by qualitative data in the form of expert interviews, is applied to the theoretical concept of energy security in order to illustrate the key findings about the energy security in Lithuania in terms of the availability, affordability, reliability, and sustainability of Lithuania's gas supplies. The analysis of Lithuanian Energy Strategies of 2007 and 2012 that could be considered as the reflection of the Lithuanian Government opinion is conducted in order to comprehend how each element related with energy security (availability, affordability, reliability and sustainability) is perceived in Lithuania, and which of them is considered to be the most important one. This documentary analysis is enhanced by conducting interviews with the key players in the energy sector. The expertise of these key actors is a vital tool in enabling the researcher to understand and interpret the data. The opinions and considerations of the interviewees were then supported by the descriptive data analysis of official information from Lithuanian government and companies' websites or other official data. This chapter, therefore, presents and highlights the outcomes of the investigation and answers the research question regarding the extent to which Lithuanian energy security in the sphere of natural gas increased between 2009 and 2015.

The final chapter places the findings of the research on Lithuanian energy security in a broader context. In doing so, it suggests how Lithuanian energy policy and the decisions taken by Lithuanian politicians and commercial actors could serve as an example for the rest of the Baltic countries. It will also underline the key findings of the research and make suggestions regarding the possible future avenues of research in relation to this topic. As a result, it is expected that this thesis will not only provide a deeper perception of Lithuanian energy security, but also offer conclusions that have broader application, particularly in relation to the Baltic neighbours of Lithuania.

## **Methodology**

### ***Methodological approach***

The conducted investigation is an applied research, which aims at evaluating Lithuanian gas policy in the period during 2009 – 2015 in regards with its energy security. The research is aimed at evaluating the efficiency of this policy and the impact of the decisions and projects taken. It includes both primary and secondary data. Primary data was collected in order to figure out the opinions and views of those related with the topic and collect relative supporting data. Secondary data was collected in order to find out more about energy security, to reflect the previous findings, to avoid repetition and to add something new to what was already accomplished.

However, as Easterby-Smith, Thorpe, and Jackson claim in their management research books: methodology for conducting research should come from different ontological and epistemological assumptions (Easterby-Smith, Thorpe, Jackson, 2012: 17). So, some philosophical background and theories are discussed first in order to explain the corner stone of the chosen methodology.

Ontology explains how the researcher sees the reality. It concerns the question how the world is built and if there is or not the real world that is independent from our knowledge (Marsh & Furlong 2002, 18). This research relies on the philosophy of relativism, which claims that reality is not based only on scientific laws but is also created by people (Easterby-Smith, Thorpe, Jackson, 2012: 20). As a result, there could be several definitions of energy security made by different countries and political parties because the relativistic view helps to remain more flexible in describing the key concepts of the thesis.

Moreover, epistemological assumptions are also essential in order to learn how to investigate the reality. For this reason social constructivism seems to be serving as the best theory because the experiences and opinions of people take first place over the objective facts in this research. It also helps to create a better general perception of the topic, to gather data that could prompt new ideas and display the whole picture and complexity of the energy security.

Social constructionist designs based on the grounded theory analytic techniques to qualitative research will be used in order to carry out the investigation of the topic of energy security in the Lithuanian gas sector. Grounded theory is not a method itself, but more generally, it is a way to discover theories that are grounded. Glaser and Strauss in their “Discovery of Grounded Theory” describe it as an inductive approach to the theory generation from the data, which was

systematically obtained and analyzed (Glaser and Strauss, 1967). As in the hypothetico – deductive approaches, the investigation starts with the theory and moves from the definition of the concepts to their observation in the real world. The grounded theory is reverse and focuses firstly on the empirical observation and then to the definition of the key concepts and the theory. (Locke, 2001: 37). However, there have been various debates about the prior research of the topic. The ideas of the pioneers of the grounded theory Glaser and Strauss take different positions when talking about the familiarization with the topic. Glaser believes that there should not be any prior assumptions and the theory should “emerge” from the data (Glaser, 1978, 1992), whereas Strauss emphasizes that some prior research of what is done should be conducted and then a mechanical process should be applied for the data analysis (Strauss, 1987, Strauss and Corbin 1998). In this work, however, the attempts to combine both approaches were accomplished. On the one hand, the “deductive” element in this research is based on the fact that the research is not conducted without any prior knowledge, because later described theoretical framework is the introduction to the topic of energy security and provide some prior understanding and reveal the theory of energy security. On the other hand, the “inductive” element comes from the fact that energy security could be interpreted in subjective ways and is based on the relativist philosophical background. So, the primary data collected in the form of official statistical data supports the “deductive” element and realistic view that evaluates the data without any subjective interpretation against the benchmarks of availability, reliability, affordability and sustainability. The primary data collected in form of the expert interviews is the “inductive” element based on the social constructivist approach and relativistic view that states that reality is subjective. Consequently, this grounded theory based approach is used in order to understand how key actors in this situation understand energy security. The combination of both these investigation methods will reveal some new emerging ideas while evaluating the projects implemented in order to increase energy security in Lithuania.

Furthermore, grounded theory approach was also chosen for analyzing the data by breaking it into codes that will be given the proper names. The set of codes will then be grouped as concepts, and these will form the categories. The relationships between categories will then be used for the theory formation. The theory will emerge, as the data will be collected, so it is wise to analyze the secondary data first, which will later be the basement for the interview questions. Later on, each interview will generate its codes and concepts and will serve as the basement for the further interviews until there will not be any other new concepts and it will be possible to form the theory.

Grounded theory in this research is the most appropriate approach to reveal the key concepts of energy security in the Lithuanian energy policy. It allows a researcher to review big amount of information from the interview transcripts and analyse the official opinions of the Lithuanian politicians that are revealed in the official documents such as Lithuanian Energy Strategies of 2007 and 2012. However, there are some limitations related with the validity and reliability. Firstly, it is always harder for the researcher to remain unbiased when the qualitative research is conducted. Additionally, it is difficult to analyse and present big amount of data as well as distinguish the most significant details of the research. Moreover, the data analysed could be subjective and lead to lower reliability and validity of the research design.

### ***Data collection***

Information collection was mainly based on gathering language data from energy experts, company representatives and university professors for supporting this data by the official statistics and information. The data collection period lasted from the beginning of February until the end of March. The research as planned took place mainly in Lithuania together with analyzing secondary data from Lithuania. Lithuania was also the main place for the information gathering for the analysis of the primary data. The interviews were arranged with the help of the existing contacts with the professors in Lithuania, Russia and Norway. Then the snowball technique was used in order to organize the rest of the interviews. This was implemented through the communication of the experts in the related field by interviewing them and then asking if there was somebody else that could be interviewed in order to gain more knowledge and new viewpoints. They were also asked what official sources might be relative for this research to support their views and prior findings.

There were two main data collection techniques used in this research. Firstly, the data was collected through the semi-structured in-depth interviews. Those kind of interviews were chosen as the best alternative because there was some prior understanding of the , and some structure was needed in order to touch the key concepts of availability, reliability and affordability and sustainability. However, one of the key questions of this investigation is to reveal what energy security means for Lithuania, so some space was also left in order to uncover new interesting and unexpected areas of the topic. As a result, there were some key questions asked in order to reveal the attitudes of the respondents but some space was left to create free flow of new ideas of the respondents. The main objective was to create the balance between the discussions of key components of energy security and the chance for the respondents to explain their views and priorities.

The interviews were conducted in Lithuanian. They were all audio-recorded as all the respondents agreed with that. However, some parts of the recordings are not revealed in order to minimize their concerns about confidentiality. The interviews were then transcribed by the researcher and translated into English. There was no need to apply a professional translator as I am Lithuanian and I can also speak English. Finally, the transcribed interviews were translated and then used for further analysis.

### ***Data analysis***

The most important thing for analysing a big amount of data is to make conclusions or to form a theory. For these reasons the grounded analysis, which has strong relations with the grounded theory, was used. All the primary data collected through the interviews and strategies' analysis was analysed using coding. However, the same was not done with the secondary data because it was used in order to gain insights into the historical development of the gas sector and the key concepts of energy security. So, the only part of the primary data collected was analysed using coding techniques.

Firstly, the information was put together in order to reveal what kind of attitudes there were found about the Lithuanian energy security and look what other interview question could be asked if there was some information missing. Those views were then grouped in order to link them with the key concepts of availability, reliability, affordability and sustainability. Then the main ideas, quotes and sentences were highlighted and distinguished to represent codes. These codes were then grouped to concepts that reflect the key ideas of the respondents. In this stage some patterns between the concepts emerged and helped to categorize the data and develop the theoretical codes from which the theory emerged using the patterns between the concepts and the categories.

Primary data was analysed using the qualitative analysis software NVivo in order to more easily manage, analyse and structure huge amount of data collected. There were 2 sources of data – interview transcripts and primary official data supporting the finding of the interviews. The emerging concepts were coded and were known as nodes. After coding there were various different nodes, which revealed very similar ideas. Those nodes were then merged into one in order to avoid repetition. Primary data of the Lithuanian Energy Strategies was analysed first in order to create various nodes. Then the data from the interviews was analysed and a new concept was added to the existing nodes or used to create new ones. There were some free nodes which were not connected in any way to one another. It was done in order to let the

concepts to emerge as it is suggested in the grounded theory approach. The structure was then created using the tree nodes. There were the parent nodes of availability, reliability, affordability and sustainability created and the free nodes were assigned to them as sub – categories. This combination of pre-defined parent nodes and free nodes gave the balance to the research that served for the understanding of the key dimensions that lie beyond the term of energy security in Lithuania.

### ***Methodological limitations***

First difficulty lies in the collection of data because some of the data important for the analysis was considered as confidential. For instance, the data needed for the analysis of affordability was mainly based on the price of gas for Lithuania and this information was mainly presented in the Nacional Commission for Energy Control and Prices as the average gas price. However, it was not possible to figure out the real prices that wholesale suppliers charge to the importing companies of Lithuania.

Moreover, there were various interviews conducted using the snowball technique, but it was difficult to access and conduct interviewees with the key experts in energy security because of the time constraints and their willingness to participate. As a result, the effectiveness of the investigation depended highly on the willingness of the interviewees to participate and their attitudes and opinions on the topic.

Additionally, there were some plans to interview not only Lithuanian energy experts, but also some related actors in Russian and Norwegian companies or academics in those countries in order to reveal their attitudes and opinion about the topic. However, it was not possible due to the time and financial constraints.

There were also some problems in attributing the child nodes to the parent nodes and finding connections between them because various concepts emerged that were not connected with each other.



## **Theoretical framework: Key concepts in the study of energy security**

### ***Key concepts in the study of energy security***

Energy is vital for the continuous economic development of each country. It is a source of wealth and competition, economic and technological development. That's why energy security is becoming more and more important topic in the energy policies of the countries. Some writers and politicians are equalizing energy security to energy independence and have used those terms interchangeably (Pascual, Elkind, 2010; 2). However, another claim that the term is broader than this and could be divided into various dimensions like availability, affordability, reliability and sustainability. Availability and reliability have been considered as the most important dimensions of energy security until the oil crises in 1973. The geopolitical tensions and the rising oil prices that ended up in the embargo of the oil exports have triggered the considerations that energy security should also mean energy provisions at the affordable price (LEI, 2015:7). Furthermore, growing environmental concerns and proved that energy usage contributes to the global climate change, has increased the importance of the sustainability when considering energy security of the country. As a result, in order to ensure the energy security it is highly important to take into account various dimensions of the definition.

There are two different perspectives when analysing energy security. One comes from the economic view that claims that energy security is nothing but the myth (Noël, 2008) and it is market forces that should deal with the energy matters. Therefore, governments should interfere only when market fails. Another view is a political one that claims that nationalization of energy sources and politicization of the energy management increase the need of governmental intervention. Yergin (2000) also suggests that energy security should indeed be matter of the national security (CEPS, 2009). However, those definitions are more complementary then contrary and will be combined in this work.

Moreover, there are many definitions of energy security and they differ for the producing and consuming countries but it is clear that it should combine and harmonize the interests of the producing, consuming and the transit countries as well. For the producing countries energy security is equalized to the security of demand. As the Deputy Director of the Department of Economic Cooperation of the Ministry of Foreign Affairs of Russian Federation Michael I. Savva described in his presentation of "Institutional aspects of EU – Russia Energy cooperation" energy security for producing countries is: "Sustainable demand and non-

discriminatory access to markets in order to sell the energy at a competitive price” (Savva, 2013).

However, as the investigation focuses mostly on energy security of the consuming country, further Lithuanian definitions will describe the notion from the consumer side, which could be seen as the security of supply (Savva, 2013). Most common definitions of energy security for consuming countries are:

- “Uninterrupted availability of energy sources at an affordable price. Energy security has many aspects: long-term energy security mainly deals with timely investments to supply energy in line with economic developments and environmental needs. On the other hand, short-term energy security focuses on the ability of the energy system to react promptly to sudden changes in the supply-demand balance” (IEA, 2016).
- “Unimpeded access to natural resources and uninterrupted supply of energy at a low price” (Savva, 2013).
- Energy security—the continuous availability of energy in varied forms, in sufficient quantities, and at reasonable prices” (UNDP, 2001).
- “The concept of maintaining stable supply of energy at a reasonable price in order to avoid the macroeconomic dislocations associated with unexpected disruptions in supply or increase in price” (CEPS working paper. Bohi & Toman, 1996).
- “Energy supply security must be geared to ensuring...the proper functioning of the economy, the uninterrupted physical availability...at a price which is affordable...while respecting environmental concerns...Security of supply does not seek to maximize energy self-sufficiency or to minimize dependence, but aims to reduce the risks linked to such dependence” (CEPS working paper. European Commission, 2000, p. 2).
- “A condition in which a nation and all, or most, of its citizens and businesses have access to sufficient energy resources at reasonable prices for the foreseeable future free from serious risk of major disruption of services” (CEPS working paper. Barton, Redgewell, Ronnel & Zillman, 2004).

The most important element of energy security is availability that was described as a sufficient supply in the market for consumers to purchase. Affordability was defined as a reasonable price that does not prevent consumers from purchasing the energy supplies they need. Reliability, which is a synonym for uninterrupted, continuous and undistorted supply of energy is also included. Furthermore, there is a notion of sustainable supply that was mentioned in both CEPS

working paper (2009) and by Pascual and Elkind (2010) as an important, but a considerably new element of energy security. All of them will be discussed more deeply in this research paper in order to figure out the underlying meaning of those definitions.

### ***Availability***

First and the most important element of energy security is availability, which means that energy resources are available for the consumer country. There are supplies on the market that the consumers could purchase and there is an infrastructure created (pipelines or LNG terminals in the gas market) for this gas to reach the customer. However, availability is not so easy to reach and there are various components lying under the definition. In order to establish availability we need particular components like energy market with mutually interested parties to trade goods and services (in this case gas) that would be able to agree on the terms and conditions of the contract. Huge capital investments are also needed in order to create infrastructure, which construction is usually costly and time consuming. There should also be some technological advances made because not all the resources, which are known, could be extracted with the current technological level. And, of course, some particular regulatory and legal framework should be created in order to trade natural resources and comply with the environmental regulation. (Pascual and Elkind, 2010: 121 - 124). The ones mentioned before are just a few preconditions in order to form available supply of natural resources, but are vital to reflect about the range of supplies because by increasing it, the availability of energy resources increases as well.

### ***Affordability***

When we talk about energy affordability it is important to keep in mind that there is never a global shortage of energy resources, but there might be a regional shortage if there is no infrastructure to access those resources, or, if there is infrastructure, but no resources. So, the price of gas is crucial element in order to ensure energy security. The two main reasons are the following ones:

1. If consumers cannot afford energy supplies, such supplies are not really available to them even if there are pipelines and suppliers who are able to deliver energy supplies;
2. Volatility – consumers want to plan ahead regarding their expenditures, and so they want stable prices.

Low or high prices are absolute terms and need comparison to something, and what is low for one is not necessary low for another. In fact, the expectations related with the energy prices

and the ability of the country to cope with some extreme changes in the prices are more important than the price itself. So, volatility of the energy prices is also important aspect when analysing affordability (Pascual and Elkind, 2010: 126 - 128). Affordability is firstly related with the price of the resources and price volatility that would make the gas affordable in the regional gas market.

### ***Reliability***

Reliability of supplies means uninterrupted supply of natural resources because energy is the most important thing for the sustained economic growth of the country. Consumers want to be sure that their existing supplies will continue to be delivered and will not be lost unexpectedly. Dependence on the single supplier can be dramatic in case that supply was halted. As a result, possessing the wider range of suppliers reduces the impact on a supplier being unreliable. Reliability also includes energy intensity.

The latter is very important because more intensive use of energy resources make the country more sensitive to the price fluctuations of the energy commodities. Furthermore, it is important to find ways how energy reliability could be increased and various proposals were suggested by Pascual and Elkind (2001) as a diversification of the sources of supply, supply chain elements and infrastructure, increased storage capacities, more effective use of energy and good knowledge of market information. Increased reliability mainly means lower risk for the country.

### ***Sustainability***

There are various considerations should or should not sustainability and the climate change be included when analysing the matters of energy security. Hartley and Medlock (2008) claim that they should be dealt independently, especially when it comes to the policy implications. Climate change experts do not usually take into account the energy supply and demand matters when analysing the climate change and sustainability issues. However, sustainability is becoming more and more important part of the energy policies, especially in the developed countries. Also, there is no surprise that sustainability is becoming important for the energy security as well. These are the various reasons why it is important to pay attention for the energy security policy to be environmental friendly:

- Investments in the energy related projects are usually long – term and the decisions made today will have huge effects in the longer – run as well.

- Energy projects require a huge investment in the technologies so it should be kept in mind that environment is important in creating them.
- Both sustainable use of energy and energy security could be increased by less intensive use of energy. It is important to point out that both could have different purposes but some common means to be reached.

However, as Lithuania only deals with sustainability to comply with EU regulation, this matter will not be so widely touched in the investigation (CEPS, 2009). Moreover, it is known that sustainability is taken into consideration more when natural resource prices are high, so there is not so much information, yet in order to evaluate how essential the sustainability will be in the face of low oil and gas prices.

### ***Threats to energy security***

In order to create energy security in the country it is significant to comprehend not only what is needed for the country to be energy secure but also to know the factors that could impede the creation of the security. As a result, various risks should be taken into account. According to the CEPS working paper there are various long – term security of supply risks for the European countries:

Geopolitical risk according to CEPS is described as a “potential government decisions to suspend deliveries because of the deliberate policies, war, civil strike or terrorism.” This risk is strongly related with the fear that oil and gas resources could be used as the political weapon. Lithuanian Energy Institute (LEI) in its “Lithuanian Energy Security Report” has also described the Socio – Political threat that is close to the previously mentioned geopolitical threat but includes also the aggressive attitudes of the supplier country towards the consumer country, taxation for the energy extraction and consumption, big energy market concentration and the formation of the monopolies, interruption in the gas transit chains and the level of corruption. Indeed, the definition proposed by the LEI is much wider and helps to better identify the possible threats. Lithuania in fact has a high geopolitical or socio-political risk exposure because it was dependent on the sole gas supplier for more than 24 years. Lithuanian gas import prices were and still are sensitive to the political decisions. Moreover, the gas is still mainly coming from Russia and passes Belarus and both have a high corruption rates. And Russia is nowadays considered as politically unstable country as well. Therefore, Geopolitical risk is the most important when considering the energy security of Lithuania. (LEI, 2015:10 - 15)

Geological risk refers to the “possible exhaustion of an energy source” (CEPS, 2009:3). As the majority of the world hydrocarbon reserves are in the Middle East and Eurasia and the world consumption of natural resources is growing, it could be harder for the European countries to access them. Therefore, it raises an importance for Lithuania to ensure that the energy resources will be available in the long – run.

Technical risks “include system failure owing to weather, lack of capital investment or the generally poor conditions of the energy system” (CEPS, 2009:3). 18% of the Lithuanian gas pipelines were older than 46 years in 2009. However, there were only 7 accidents registered due to the good maintenance in the period during the period 1960 – 2010 (LEI, 2015:9). That is why it is completely important to take into account the infrastructure of the gas pipelines and the maintenance of the newly constructed LNG terminal in order to avoid the occurrence of the technical accidents.

“Economic risks mainly cover erratic fluctuations in the price of energy products on markets” (CEPS, 2009:3). This could be determined by the supply and demand of energy resources but could also be caused by the speculative political actions. Lithuania was paying the highest wholesale gas price compared with other European countries (EC Quarterly Gas Report, 2015). Therefore, the price of gas was highly analysed and discussed question in the political elites. So any increase of the gas price makes the gap between Lithuanian and European wholesale gas prices even wider.

“Environmental risks describe the potential damage from accidents (oil spills, nuclear accidents, etc.), or emissions such as greenhouse gas emissions” (CEPS, 2009: 3). Lithuania is in a quite good geographical location where the possibility of the natural disasters is very low so the risk of environmental disaster is not very important. However, the importance of the sustainable use of energy resources is growing and Lithuania has to take into account the growing concerns related with the climate change and comply with the European Union policy regarding the issue.

By the way, the nature of the threats differs in terms of the possibility to forecast and neutralize them. It is easier to identify and prevent the occurrence of the technological and environmental risks but it is much harder to foresee the geopolitical and economical threats thus it is much complicated to avoid them. That is why Lithuanian energy security policy should take into account those threats and their possibilities of occurrence in order to increase the energy security of the country.

### ***Energy security risks specific to the natural gas sector***

Gas sector has its own specific features: high fixed upstream cost, physical constraint to reach the market, it is usually transported by the pipeline which create mutual dependence between the producer and consumer and is usually traded in the regional, rather than global markets (LNG of course could change the picture). Moreover, gas is usually used for the electricity generation and heating and could possibly be substituted which is not the case in the oil sector that is mainly used for the transportation. Therefore, it is obvious that the gas sector has its own specific risks. There is also the distinction between the short – term and the long – term risks security of supply. By the short term – security it is meant the sufficient supply and the avoidance of the interruptions. Long – term supply the long – term reliability and the investment in the adequate infrastructure. The risks of energy security in EU possess two dimensions as well. External dimension is linked to the gas dependency and there are three risks: investment and facility risks, exporters reliability risk and transit risk. Internal risks are development of the internal EU gas market and the liberalization of the gas sector (CEPS, 2009: 14).

### ***Conclusion***

It is clear that Lithuania encounters challenges in its gas sector, in terms of energy security. In this chapter, four key elements in the concept of energy security were identified: availability, affordability, reliability, and sustainability. Therefore, to address the main research question of whether Lithuania's energy policy resulted in an improvement in the country's energy security in the gas sector between 2009 and 2015, it is necessary to analyse the extent to which improvements have been made with regard to these key elements. To gain a deeper comprehension of how these elements are understood, and prioritized, it is necessary to analyse Lithuanian government policy documents and conduct interviews with key actors in the sphere. The results of this research are discussed in Chapter 5.

However, before we can discuss the results of Lithuanian government policy, it is necessary to gain a perception of the concrete developments that took place in Lithuania's gas sector between 2009 and 2015. It is to this question that the attention will be turned to the next chapter.

## **Background information about the Lithuanian gas sector**

### ***The non-gas sector context: Lithuania's energy relations with Russia***

Lithuania together with other two Baltic countries gained its independence in 1990. Since then their foreign policies have focused mostly on the political and military security and the accession to EU and NATO (Grigas, 2013: 39) so energy security was left apart even though all three countries – Lithuania, Latvia and Estonia have been very dependent on Russia in their oil and gas exports. When it comes to oil - it was mutual dependency because Russia was using Baltic ports for its oil exports to the Western countries so cut offs could not be permanent because they would harm Russian companies. This was the case until the year 2000 when Russia completed the construction of the Primorsk port. The inauguration of the port ended these two side relationships between the Baltics and Russia and enabled the latter to use the “oil weapon” in order to gain its political and commercial objectives. Russian companies were interested in obtaining shares in the Baltic oil companies SIA Ventspils Nafta and AB Mažeikių nafta. As this was not the case, the oil provisions through the branches of the Druzhba pipeline were halted indefinitely in 2003 in Latvia and in 2006 in Lithuania after the sale of those companies to non – Russian investors. These cut-offs resulted in the higher operational costs for the companies because the oil imported through the ports was more expensive than the Russian one. However, they did not terminate the production in the companies. The oil example show that Lithuanian and Baltic States were dependent on the Russian oil provisions until the certain point, but could survive even if it had been halted. Furthermore, this instance shows that Russia was able to terminate oil provisions due to unfavourable Baltic commercial decisions in regards to Russia. This could also be implemented in the gas sector, which is more vulnerable and dependent on Russia than the oil.

### ***The Lithuanian gas sector***

Lithuanian gas sector is highly significant for the Lithuanian economic development. Gas accounted for 32,4% of Lithuania's total primary energy consumption (2,2 million tonnes of oil equivalent (mtoe) out of 6,7 mtoe) in 2013 and was the second mostly used energy commodity after oil (EU Commission, 2015). 39.2% was used for the generation of heat and electricity of this gas consumption. 37.9% was used as feedstock (non-energy use) for the petrochemical sector, whereas 22.9% was consumed directly by industry, residential, commercial, transport, and agricultural sectors. The role of natural gas in Lithuania's economy and society is significant because Natural gas accounted for 46.6% of Lithuania's domestic



electricity generation. When the volumes of imported electricity were added, natural gas accounted for 19% of Lithuania's total electricity supply and 46,7% of Lithuania's heat generation. By combining direct consumption with the consumption through electricity and heat, natural gas accounted for 39,7% of Lithuania's industrial energy consumption and 28,0% of Lithuania's residential/ commercial energy consumption (IEA Statistics, 2014). That is the reason why Lithuanian gas sector is completely important for the heating, electricity generation and industry of the country.

However, the pattern of the gas consumption in Lithuania is changing. The usage of gas increased highly after the decommissioning of Ignalina nuclear power plants due to its lack of containment building from between 2004 and 2009 (Ignalina Nuclear Power Plan, 2016). It increased by 0,2 mtoe after the closure of the first reactor in 2004 and by 0,5 mtoe after the closure of the second reactor in 2009. But currently the consumption of gas is showing the falling trend and dropped strongly during the last 4 years from 2,7 mtoe in 2011 to 2,1 mtoe in 2014. (EU Commission, Energy Datasheets, 2015). High gas prices because of monopolistic supply and green energy support schemes were the main reasons for this decrease in consumption (Litgas, 2015).

Lithuania was highly dependent on the Russian company OAO Gazprom as the sole gas supplier. Lithuanian energy dependency ratio was 78.3% in 2013 of which 100% in the gas sector (EU Commission, 2015). The import dependency ratio will not change highly because Lithuania does not produce natural gas, but LNG terminal that commenced its operation in 2015 will make Lithuania dependent on more than one gas supplier. From the opening of LNG terminal Lithuania commenced to import gas from Russia and Norway, and there are plans to bring LNG from other suppliers as well. There are also some memorandum agreements signed in order to import LNG gas from USA through the newly created company UAB Litgas.

In addition, Lithuania has also implemented the 3<sup>rd</sup> Energy Package when the supply, transmission and distribution activities have been separated. After the implementation of the ownership unbundling Lithuania's main gas importers in 2014 were six companies. Four of them import gas directly from the OAO Gazprom. UAB Dujoteka imports gas from OAO Gazprom but through the company LT Gas Stream. And UAB Litgas, as it was mentioned before, imported its first experimental LNG shipment from the Norwegian company Statoil ASA. AB Achema was also importing gas from Russian OAO Gazprom, but received its first LNG cargo in through the terminal in 2015. There were various distributors in the market (AB Lietuvos dujos, UAB Intergas, UAB Druskininku dujos, AB agrofirma Josvainiai, UAB

Fortum Heat Lietuva and AB Achema) in 2014, but the main distributor with more than 98.2% market share was AB Lietuvos dujos (NCC report, 2015). AB Amber Grid which was separated from AB Lietuvos dujos in 2013 provides the transmission services. So Lithuania is in fact turning to the more diversified gas supply and changing its infrastructure in order to create more energy security in the gas sector. The historical sequence and the meaning of these events will be discussed further in this work.

### ***Lithuanian gas infrastructure***

Prior to Soviet occupation Lithuania was not dependent on the Russian gas, but it was partly self-sufficient and imported coal from the UK as well (Grigas, 2013: 41). The Soviet Union occupation altered the overall picture, and a new infrastructure was created in order to ensure the provision of Russian gas to the Baltic States. This pipeline system consists of 10 313 kilometres of pipelines (EnMin, no date). It has remained even after independence, and the single pipeline was providing gas to Lithuania from Belarus that was passing Lithuania and ending in Kaliningrad until 2014. There is also a pipeline from the Latvian Incukalns gas storage facility that could provide the gas to Lithuania in case of emergency. But it would not be able to ensure the permanent supply if the gas was cut off in Lithuania. Lithuanian gas infrastructure is shown in the picture No. 1. The previously mentioned infrastructure remained for a long time even after independence for various reasons:

1. The strongest reason was an economical one because the newly created Baltic States were primarily focusing on political and military security and the access to the international organizations, so the costs of diversification of the gas supply routes were not of the top importance at that moment.
2. Lithuania is the only one from the Baltic States serving as the transit country for the Russian gas because Kaliningrad is separated by Lithuania and Belarus from the Russian territory. This has served as the bargaining power for Lithuania in negotiations with Moscow because any supply interruption would result in the shortages for Kaliningrad. However, Russia in its energy policy have mentioned some plans to create the storage facility in Kaliningrad, connect Kaliningrad with the Nord Stream pipelines or build LNG terminal in Kaliningrad in order to increase energy security of the region. So this leverage could not be used for a long time.
3. Energy in the international relations literature is seen as of vital importance for the national security so political forces and parties influence highly the policymaking. Lithuanian domestic policies influence highly the foreign policies of the country and have some features mentioned by Agnia Grigas – Personalization that means that parties are highly influenced by one strong

leader positions and attitudes. Fragmentation when there are large number of small and weak parties and the ruling party is usually concluded by the coalition of couple of them. High degree of business interest penetration and their influence in the domestic and foreign policies and energy policy as well and populism which means that escalation of ideas are more important than real execution. That is why changing political parties and their altering views resulted in the policy of fragmented energy regarding the diversification of the gas imports.

It is worth noting that previously mentioned reasons have left the country with the Soviet infrastructure, which was vulnerable to the Russian decisions and nothing was changed even if Russia was perceived as quite a hostile country for all those years.

The vulnerability was firstly seen in the oil sector with the oil provision cut off for Mažeikių nafta in 2006. But this cut off was not that catastrophic what would be in case of the halt in the gas provision. The reason for this was that the ships to the Būtingė terminal could have provided oil. But there were no alternatives for the gas provisions in Lithuania at that time. That is the reason that made impact on oil cut off in Lithuania and other Baltic states that already signalled the usage of the natural resources weapon in the politics between Russia and Lithuania. Additionally, the same could have been done with gas. Another signal was the Ukrainian gas cut off in January 2009 which is the main transit country for the Russian gas to the Western European countries and resulted in the lower gas supply in Europe. This fact has showed that if Russia was able to decrease the supply for the main European gas players so it could do the same for the countries which are smaller players and getting only 2.5% of the Russian total gas imported to Europe. Those were the reasons why Lithuania has decided to focus more on the energy security in its energy policy and has planned and implemented various projects.



Picture No. 1 Lithuanian gas infrastructure (Source EEG, 2014)

### ***Gazprom antitrust investigation***

Gas prices are a very politicized topic in Lithuania because gas import prices have a huge impact on the Lithuanian households. The reason is that gas import price contributes from 36% to 55% of the final retail price (NCC Gas Price Structure, 2016). The prices have been constantly rising from 1990 and especially after the accession to EU and NATO. Lithuanian wholesale gas price was the highest in Europe for the long time (EC Quarterly Gas Report, 2015). That is why the topic of the price charged for Lithuania was never left apart and commenced again with the EU Commission investigation into Gazprom in 2012.

EU Commission opened proceeding against Gazprom on the 4<sup>th</sup> of September 2012, which was suspected of “...hindering the competition in the Central and Eastern European gas markets, in breach of EU antitrust rules” and “...abusing its dominant market position in upstream gas

markets in Central and Eastern European member states” (EU Commission, 2012). Gazprom was supposedly applying further anti-competitive practices:

1. Dividing gas markets by interrupting free flow of gas between the EU States;
2. Preventing the diversification of the gas supplies;
3. Imposing unfair pricing models on its customers by applying oil – linked gas pricing models (EU Commission, 2012).

The case was still unresolved on the 22 of April 2015 when European Commission officially filed formal charges against Gazprom by sending the Statement of Objection for Gazprom, claiming that:

- There were some proves about the territorial restrictions to all 8 countries that were included in the investigation (Bulgaria, the Czech Republic, Hungary, Estonia, Latvia, Lithuania, Poland and Slovakia);
- The second clause related with the commitment from wholesalers concerning gas infrastructure have been noticed in 2 countries – Bulgaria and Poland;
- Unfair pricing could be found in 5 member states (Bulgaria, Estonia, Latvia, Lithuania, Poland) (EU Commission, 2015).

It is worthwhile to mention that this does not conclude the final decision, and Gazprom still have some time to present its arguments, but if it was claimed guilty for the previously mentioned accusations it could result the company gaining a fine.

### ***The Lithuanian government investigation into Gazprom***

Lithuanian government commenced the investigation into activities of AB Lietuvos Dujos in 2011 claiming that Gazprom did not comply with the requirements of the privatization contract and charged discriminatory prices for Lithuania. Gazprom, however, claimed that the Lithuanian national court does not possess any rights to inquire into those activities. Gazprom initiated the lawsuit against Lithuanian government investigation into the activities of AB Lietuvos Dujos in 2011 (EnMin, 2011). Stockholm arbitration denied the claims of Gazprom and the final decision was mane on July, 2012. Arbitral tribunal confirmed that the Lithuanian government has a right to initiate the investigation into AB Lietuvos Dujos and rejected Gazprom claims to damages. They confirmed that Gazprom cannot deny the Government decision to examine the management of AB Lietuvos dujos. However, tribunal was in favour with Gazprom in regards with the gas prices. They decided that the gas charged for Lithuania cannot be analysed during the investigation of the activities of AB Lietuvos dujos and all the

claims in regard with the price should be dealt in the Stockholm Arbitration (EnMin, 2012). As a result, Gazprom investigation into Lithuanian government actions has resulted on the achievements for both sides. Moreover, this decision has resulted into Lithuanian initiative to investigate into Gazprom pricing for Lithuania.

Lithuania decided to initiate an arbitration case against Gazprom in 2012. The lawsuit was based on the claim that Lithuania was charged higher prices for the natural gas than Latvia and Estonia. According to the Energy Ministry of Lithuania “The lawsuit was related with natural gas overpayment of about 5 billion litas (Lithuanian currency until 2015, 1 euro – 3,45280 Lt., Lithuanian Central Bank, 2014). The investigation was based on the AB Lietuvos dujos privatization contract that claimed that “Gazprom should provide the gas to Lithuania for the prices that are fair and based on the formula indicated on the contract”, but the prices for Lithuania increased slightly due to the corrections of this formula during the period 2004 - 2012 (EnMin, 2012). Lithuania was demanding to compensate this overpayment for natural gas (EnMin, 2014).

Lithuanian government investigation should be finalized this year. However, AB Lietuvos dujos received a discount for natural gas for the period 2013 - 2015. This discount does not mean that Lithuania was compensated for the overall overpayment but is a first positive step to this direction (EnMin, 2014).

### ***Reforms in the Lithuanian gas sector in line with the EU Third Energy Package***

The Third Energy package has been carried out in order to “...improve the functioning of the internal energy market and resolve the structural problems”. One of the areas covered by the package is unbundling, which means “the separation of energy supply and generation from the operation of transmission network”. The unbundling could be reached by the following 3 ways:

- Ownership unbundling, where no supply or production company can possess a majority of shares or interfere in the work of the transmission operator;
- Independent System Operator, where energy supply for a company could still own the transmission operator, but the operation, maintenance and investment in the grid activities should be left for the independent companies.
- Independent Transmission System Operator, where a supply company could still own and operate the transmission operator, but it should be done through the subsidiary.

Lithuania chose the first option deciding to implement the Directive by creating the new company AB Amber Grid which would undertake transmission activities and unbundle it from

AB Lietuvos dujos which was previously providing 4 activities – gas transmission, distribution and supply. The problem here was that AB Lietuvos dujos after the privatization in 2004 was owned partly by Russian OAO Gazprom and partly by the German company E.ON Ruhrgas. OAO Gazprom was highly against this legislation and it ended up in threats of higher prices, international arbitration and media assaults (Grigas, 2013: 86). Gazprom has even filed an action with the Stockholm Arbitration Institute in 2011. However, it ended up for the victory on both sides. Even though OAO Gazprom was highly against the Third Energy Directive, it was still implemented in Lithuania.

The implementation of the Third Energy Package was finalized in 2014, and this is the structure that remained after the finalization of the Directive:

- Transmission operator - AB Amber Grid which was created in 2012. It was unbundled from AB Lietuvos dujos and obtained all the activities related with transmission, assets, rights, duties and employees in 2013 when it also obtained the temporary transmission operator license. The shares of AB Amber Grid were bought by UAB EPSO - G which is 100% owned by the Energy Ministry of Lithuania. 38.91% of the shares were obtained from E.ON Ruhrgas International GmbH. 37.1% was obtained from the Russian OAO Gazprom.
- Distributor – AB Lietuvos dujos remained the main distributor of the gas and is still keeping the major share in the Lithuanian distribution market. However, the shares were bought by UAB Lietuvos Energija which is 100% owned by the Lithuanian Ministry of Finance in 2014.
- Supplier – UAB Lietuvos dujų tiekimas, which was newly created by UAB Lietuvos Energija in 2013 in order to overtake the supply of gas from AB Lietuvos dujos.

In this way Lithuania was successful in implementing the most stringent of the EU proposed Directives, which helped to decrease one of the previously mentioned internal EU energy threats.

However, some of the Lithuanian partners in the gas sector – the sole gas wholesale supplier at that time – Gazprom was not absolutely content with this decision and initiated the investment arbitration case against Lithuania.

In 2012 Gazprom initiated the investment arbitration case against Lithuania due to the 3<sup>rd</sup> Energy Package. With this investigation Gazprom made attempts to prevent the reform of the Lithuanian gas sector. But, eventually, Gazprom decided to withdraw the lawsuit. That was the ending that Lithuania was expecting, and, according to the Energy Minister R. Masiulis: “There

are any basis for those claims and the charges are not reasonable, that's why this kind of ending – withdrawal – there was possible to expect” (EnMin, 2015).

### ***Construction of first Lithuanian LNG terminal “Independence”***

LNG terminal has been considered as the priority project for the creation of the natural gas market in Lithuania. It was firstly considered to build LNG terminal for 3 Baltic countries – Estonia, Latvia and Lithuania in order to increase the energy security of the region. However, there were some disagreements between the countries because each of them wanted to have the terminal on their territory. Even though, Lithuania was active in building it anyways even without the help of the neighbours and AB Klaipėdos nafta was given permission to carry out the LNG project in Lithuania (NCC annual report, 2015). Lithuanian LNG was designed as the floating LNG storage and regasification unit, which would be located on the southern area of the Klaipėda port. The capacity of the ship – 170 thousand cubic metres of LNG and it will be able to receive 1.4 bcm of gas first year. This amount could be extended to 4 bcm later. (Litgas, Apie Mus) Which is even more than the annual gas demand for Lithuania. However, in order to ensure the provision of the gas the addition pipelines should be built. Firstly, the pipeline connection between the city of Klaipėda and Kuršėnai that will ensure that 2 bcm could be provided to the Lithuanian gas system. Another project - the enlargement of the pipeline between Klaipėda – Kuršėnai that will make the whole amount of 4bcm available to the system (LNG Terminal Business Plan, 2013).

The provider of the ship was chosen by the public governmental procurement auction and is the Norwegian company Hoegh LNG. The cost of the project will be covered partly by AB Klaipėdos Nafta and partly by the Port of Klaipėda with their own or borrowed funds (LNG Terminal Business Plan, 2013). The project has been financed with the loans from the European Investment bank and the Northern Investment bank and with the warranty from the government. The planned capital expenditure for the terminal were planned to be about 300 million Lt (NCC Annual Report, 2015).

According to the Energy Ministry of Lithuania LNG terminal will help to increase the energy security:

- The country will no longer be dependent on the sole gas supplier and will be able to ensure the diversified gas provisions from various sources. The gas is already provided from two companies: Norwegian Statoil ASA and the Russian OAO Gazprom.



- The country will be able to independently obtain the gas demand needed for the primary consumption. The LNG terminal is able to provide the whole gas needed for the Lithuanian annual consumption.
- LNG terminal will help to create the national and regional gas markets and could also serve for the needs of the neighbouring countries;
- It will help the country to access the gas spot markets and increase the ability to negotiate the gas price (EnMin, 2015). It has helped Lithuania to decrease the gas price of OAO Gazprom by 20% (LEI, 2015).

In fact, the terminal has served a lot in increasing the energy security of the country. However, it is a project that required the high capital investment and will have a lot of influence on the Lithuanian population and the industry when compensating these costs.

UAB Litgas is a designated importer of natural gas via the LNG terminal that should provide 0,54 bcm (this amount has been changed to 0,35 bcm in 2015 of the lower consumption and the contract has been changed from 5 years till 10 until 2024) of gas each year in order to ensure the continued operations of the terminal. The company also carries out other activities like LNG supply for the national market and Baltic region, commercial overloading activities to the smaller tankers, LNG supply and ship bunkering services. UAB Litgas is owned partly by AB Lietuvos Energija (66.7%) and AB Klaipėdos Nafta (33.3%). According to the governmental procurement procedure decided by Lithuanian Energy Ministry LNG supplier for the required minimum volume of LNG should be chosen for the 10 years' period (Litgas). Norwegian company Statoil was chosen as the current supplier from 9 other companies and their 16 suggestions. According to UAB Litgas, the most economically viable conditions were proposed. As a result, Statoil will provide gas for 10 years until 2024. In 2015 UAB Litgas was merged with Lietuvos dujų tiekimas (Litgas).

All the government regulated energy producers are obliged to purchase the required minimum gas amount from the LNG terminal (Litgas). This does not include household consumers and not regulated energy producers.

Lithuania was highly dependent on the sole gas importer for more than 24 years and it was not active in altering the picture at the beginning. But various Russian actions in the oil and gas sector showed that Russia could use the “gas weapon” in order to influence the Lithuanian gas policies. Those reasons and quite sensitive infrastructure oblige the country to take an active position in increasing the energy security of the country.

### ***GIPL Pipeline***

There were some plans to connect Lithuanian gas systems with the European one by connecting Lithuania with Poland already in the first Energy Strategy of 1994. The Strategy of 2007 was considered in order to connect those systems already by 2015 in order to provide alternative provision to the Lithuania (LRS, 2007) According to the National Independence Strategy GIPL, the project is important at the regional level and will connect Lithuania with the European market. However, “Lithuania would not have full control over flows of gas in the pipeline”. The pipeline is not constructed yet, but preparatory works are already done. The analysis of the GIPL pipeline commenced in 2011 and it was confirmed in 2015. The project is currently on the phase of negotiation to carry out the construction works for building the infrastructure. It should be completed by December 2019. The main purposes of the project are to integrate Baltic gas market into the single European Market, to diversify the sources of supply, to increase energy security and reliability, to gain access to the LNG market and to increase competitiveness of the Lithuanian gas market (Amber Grid, 2016). In addition, it will bring benefits not only to Lithuania and Poland but also to other Baltic states and Finland as well and will end their long lasting isolation and dependency on the Russian gas supplies. (EC, 2015) The project is implemented mutually by Lithuanian gas transmission system operator AB Amber Grid and Polish Gaz - System S.A. The total construction cost is planned to be 558 million Euro. The project is gained subsidies from the Connecting Europe Facility (CEF) – 10,6 million euro for planning and 295,4 million euro for construction works (EC, 2015). The length of the pipeline is 534 kilometres, 357 km will be in Poland and 177 km in Lithuania (EC, 2015). GIPL pipeline would allow to transport 2,4 bcm to the Baltics. The reverse capacity 2 bcm. The increased capacity would allow to transport even more gas and reach Finland as well (if the Baltic connector would be built) and transport 4,1 bcm with some amendments of the system in Lithuania and Poland (Amber Grid, no date).

Poland would be the only country that would have a negative value of the project. So Lithuanian, Estonian and Latvian states would have to pay compensation of 85,8 million euro each. The pipeline map is shown in the Picture No. 2 *GIPL pipeline project map* below.



Picture No. 2 GIPL pipeline project map (Source: Amber Grid, no date)

### **Conclusion**

The Lithuanian government has implemented the 3<sup>rd</sup> Gas Directive provisions on unbundling, facilitated the construction of an LNG import terminal, pursued arbitration against Gazprom, and is currently supporting the development of a new pipeline connection with Poland. All of these are significant developments. In the following chapter, I will analyse the conceptions of energy security by the key actors in the Lithuanian gas sector, and the extent to which the developments noted above contributed to improvements in the availability, affordability, reliability, and sustainability of Lithuania's gas supplies.

## **Developments Lithuanian energy security in the sphere of natural gas (2009-2015)**

### ***Introduction***

Lithuanian energy policy and attitudes towards energy security and its evolution during the period 2009 – 2015 should be examined in the context of the Lithuanian Energy Strategy 2007 and National Independence Strategy 2012. The elaboration of both strategies were highly influenced by the previous strategies, global trends and climate change, popular support for nuclear power, Lithuanian dependence on the sole gas supplier, the need for cooperation with Poland and EU policies and guidelines (LRS; Energy Strategies of 2007; 2012). As a result, the strategies are the most important documents in order to determine the direction of the Lithuanian gas sector. They also reflect the view of the government regarding the matters of energy security. For that reason, the findings of the analysis of the strategies will be compared with the analysis of the semi – structured interviews that were conducted with the company representatives and experts from the energy sector.

First, the analysis of the historical importance of the topic of energy security will be conducted in order to figure out to what extent has Lithuanian energy policies in the gas sector resulted in an increase in the Lithuanian energy security during the period 2009 – 2015 and clear out when energy security became of the most importance for Lithuania. Then the stagewise development analysis will be conducted in order to find out at what stage of energy security (availability, reliability, affordability or sustainability) Lithuania is at the moment and what dimensions will be important after that.

Secondly, the analysis of energy security dimensions of availability, reliability, affordability and sustainability will be discussed. The elements related with each of these dimensions are composed and will be described according to the importance. Moreover, the events that have influenced those elements will be discussed as well. The opinions reflected in the strategies will then be compared with the opinions of the business representatives and experts in the field, and the conclusions will be drawn if energy security has increased on each of those dimensions.

### ***The growing importance of energy security***

The most important thing when analysing energy security is to comprehend how energy security is perceived in Lithuania. The term is best described in the National Energy Strategy 2007, where the assurance of energy security is based on various provisions, such as:

- 1) Energy security is an integral part of national security;

- 2) Ensuring of energy security requires a predictable, reliable, economically acceptable and environment-friendly energy supply;
- 3) Energy security covers the totality of the conditions ensuring the diversity of traditional and renewable primary sources of energy, diversity and security of energy supply and independence from dictate of a monopolistic supplier, availability of energy to the consumer at acceptable prices in a competitive energy market;
- 4) Lithuania links its energy security to the integration of the country's energy systems into EU energy systems and with an efficient EU and national energy policy, which should ensure that Lithuania's energy security is on a par with that of other EU states;
- 5) The Strategy, as adopted by Lithuanian Seimas by national consensus, must ensure a consistent implementation thereof that would be independent of a democratic change of the Government and a reliable energy security of energy consumers and the whole country.

In the strategy of 2007 it is mentioned the increase of the reliability of the gas supplies that has not been reached yet (LRS, 2007)

Lithuanian energy policy (especially that of gas) was highly dependent on the sole gas importer from Russia for almost 25 years. However, there were some considerations made about the possibilities to ensure gas provisions from the Western Europe already in the first Lithuanian Energy Strategy of 1994 (LRS, 1994). Moreover, energy security was described as the main strategic objective in all the later National Energy Strategies of 1999, 2002 and 2007 (LRS, 1999; 2002; 2007). The main strategic goal of the latest National Independence Strategy 2012 differed claiming that “the main goal of this Strategy is to ensure Lithuania's energy independence before the year 2020 by strengthening Lithuania's energy security and competitiveness.” However, the investigation conducted by the VDU doctor of Political Science G. Česnakas in his thesis of “Energy Security Challenges, Concepts and The Controversy of Energy Nationalism in Lithuanian Energy Politics” claimed that there is no clear definition what is meant by “energy independence”, and it could be understood as a parallel to the term “energy security” or “independence from Russia”. On the other hand,, energy security was mentioned in the strategy as a mean to reach the main goal of “energy independence”. But even though energy security was described as the most important purpose, there were no real actions taken in order to increase it until the construction of the LNG terminal. So it is very important to comprehend if respondents think that energy security was important straight after independence, and what were the reasons that influenced the creation

of infrastructure. All the respondents agreed that energy security was always important for Lithuania by providing the arguments as the following ones:

No.1: “It is not new that Lithuania had natural resources provision problems. There were some halts already after the blockade in 1994.”

No.2: “I believe that energy security was very important straight after the independence. But it was different of the amount of attention and resources that were dedicated to it.”

No.3: “I think that gas is important because it is one of the main energy resources for Lithuania, and energy security in the gas sector has always been significant.”

No.4: “Lithuania was considering transit to Kaliningrad as its safeguard for a long time. It did not possess any opportunities to cut off gas for Lithuania. In the times of blockade Russians were cutting everything they could. But Lithuania always remembered that and never forgot that something like this could happen.”

No. 5: “I would evaluate Lithuanian energy security as part of the national security. In addition, I would consider it as a part of Lithuanian political regime transformation and transition process from 1990. Because when you change political regime, you need to alter political system, economic system and all the institutions as well. You must change the energy sector because energy is a strategic part that will have an impact on other sectors as well.”

When the interviewees were asked why less was done in order to ensure energy security in the gas sector earlier, the respondents mentioned various reasons, such as the economic crisis in Russia that also affected Lithuania, political aspects like the government thoughts that selling AB Lietuvos Dujos to Gazprom will ensure reliability (No.2, No.4, No.5). There were also some considerations that Lithuanian policies are highly influenced by the global context and trends that help deciding on the need of the projects (No.2), and, of course, the technical aspect influenced the decisions in the energy sector (No.1). Some of the respondents claimed that Lithuania was and still is a transit country for the Russian gas to Kaliningrad and that ensured energy security (No.3 and No.4). There were also ideas that Russian influence on politicians was quite big and they were not willing to start the projects like LNG terminal that would be a game changer (No.4, No.5). Additionally, the respondents answered that the practical steps in order to develop LNG were taken around 2000, and that before the European – Russian tensions nobody thought that something could go wrong.

No.1: “LNG that you can transfer the gas with is quite a new thing in the market. They have started to develop around 2003 – 2004 but still were quite a sci – fi thing at the moment. Another reason was that gas was always there and there were no ideas that it could not be here.”

According to No.2: “Stabilization after the Russian crisis commenced in 2000, so it was possible to pay a little bit more attention for the project implementation. There were some intentions to implement the terminal already in 2004. When the gas for Ukraine in 2006 was halted after 6 months we saw the 3<sup>rd</sup> Package. There was another halt for Ukraine in 2009, but this time it was just bigger and more important. We saw as reaction BEMIP, grid integration as the response to the indirect threat”.

No.3: “When European and Russian relationship was friendly energy security did not have so much importance. We were fine with Russians, we only wanted to find a more reasonable formula for gas price calculations.”

No.4: “I remember that there were huge discussions how to find an alternative for this Russian gas coming to Lithuania already in 1999. There was much effort put to find alternatives already at that period of time.”

However, respondent No. 5 underlined that the worst situation was in 2009 after the closure of Ignalina Power Plant, and that was an impulse for the emergence of BEMIP plan and construction of LNG terminal.

Consequently, the topic of energy security was important through the whole existence of the country of Lithuania, and it is confirmed by both Lithuanian Energy Strategies and the interviewees questioned. But there were various economic, political and technological reasons why any projects were implemented earlier in order to increase it. However, energy security could be increased in various dimensions that will be discussed in the next chapter.

### ***The stagewise development of Lithuanian energy security***

Energy security could be divided into 4 dimensions of availability, reliability, affordability and the newest element sustainability. Those four dimensions could also be called stages because their importance shifted from availability and reliability to affordability and sustainability when we analyse energy security in the historical perspective. That is why it is important to comprehend what are the most important dimensions in the Lithuanian gas sector and at what stage of energy security Lithuania is at the moment.

According to the National Energy Strategy 2007, the natural gas is perceived as the “the most effective fossil fuel” and “the most promising” fuel in Lithuania, and the main purpose is to ensure “safe, efficient and reliable supply of natural gas” (LRS, 2007). However, it is already mentioned there that the usage of gas should be reduced and replaced by the usage of the biofuels until 2025. However, there is no clear distinction made about the strategic priorities in the short, medium and long term. There are some goals described for the gas sector that clearly show that Lithuanian gas policy was highly oriented into the diversification of the sources of supply of natural gas which is the most important aspect of availability. The previously mentioned objectives described are the following ones:

- Increase gas transit through Lithuania to Kaliningrad.
- Construct the underground storage facility of about 500 million m<sup>3</sup>.
- Create preconditions for long – term agreements about the usage of Incukalns storage facility.
- Conduct the feasibility studies about the possibility to construct LNG terminal in the port of Klaipėda.
- Conduct the feasibility studies about the possibility to construct a Lithuanian – Polish gas pipeline that would integrate Baltic gas supply system into the EU gas system.
- Increase reliability of the supply systems.
- Liberalize gas markets and develop internal gas market in Lithuania.
- Implement those policies according to the environmental standards.

Yet National Energy Independence Strategy 2012 has clearer view about the stagewise development of the Lithuanian gas sector that is based on the 3 main principles:

- 1) *Energy independence*. “Lithuania will cover its domestic energy demand from local and diversified sources. This is a necessary condition for reliable functioning of the energy system and prevention of energy supply interruptions” (LRS, 2012). Energy independence also includes the reduction of the usage of gas in the energy mix and start using more renewable sources. That is why diversification, increase of local production and more renewables are the most important aims for Lithuania at the moment and in the short run until 2020.
- 2) *Competitiveness*. “Lithuania will join European energy markets and reform existing energy sector monopolies. This will guarantee favorable energy prices for consumers and ensure sufficient investments into the energy sector to develop the missing energy infrastructure” (LRS, 2012). Therefore, market component, price and investment in the renewable infrastructure and more renewables are the most essential aims from 2020 to 2030.



3) *Sustainability*. Both production and consumption of energy must be based on the principles of sustainable development. When ensuring sustainability, the volume of emissions of greenhouse gas will be reduced by increasing energy production, transmission and consumption efficiency and encouraging energy production from environmentally friendly resources (renewable energy sources and nuclear energy) (LRS, 2012). Lithuania could gain freedom from fossil fuel and generate electricity mainly from renewable energy sources. More renewables, more efficiency and abandonment of the fossil fuels are the main purposes from the period from 2030 – 2050.

From the analysis of the National Independence Strategy 2012 it is clear that diversification is the most important purpose for Lithuania in the short – run, market creation and price will be of the highest priority in the middle – run, and sustainability will take the focus in the long – run. However, the increase of the usage of renewables is important during the whole period as well as sustainability seems to be of the main focus during the whole period. So, according to the strategy Lithuania is still on the first stage of energy security – availability.

Those stagewise priorities of the Lithuanian strategy documents are highly related with the theoretical definitions of availability, reliability, affordability and sustainability that were described in the first part of this paper. Availability of gas supplies was described as a top priority that ensures that there are supplies in the market and the infrastructure needed. Reliability means stable and steady supplies. Gas prices become more important when availability is created and the prices are high. And sustainability becomes important only when all the previous elements are ensured – on the last stage. Finally, the theoretical discussions of energy security in the academic literature are closely related with the “real world” policy and the current strategic priorities of the Lithuanian government.

However, the opinions of the respondents about the stage of energy security differed quite slightly because there were 2 types of experts questioned. The first group were academic experts from LEI or VDU that had more theoretical background on the topic of energy security and were abler to describe the stage. The business experts that were less clear about this stagewise approach and dimensions of energy security represented another group. Some prior explanation was provided to introduce them with the topic. Even though business representatives were more general in describing the stage of energy security there were mostly two main dimensions mentioned – availability and reliability that accord with the priorities described in the National Energy Strategies of 2007 and 2012.

According to No.2: “I think that Lithuanian energy security is still on the first evolution stages, that I believe are 4: first is the availability and reliability, then goes price, then environmental aspect. And then goes so-called clever, smart consumption, when you can choose where to get the resources from, what to use individually for each client. However, Lithuania is still on the first diversification (availability) phase or maybe on the transmission to the second phase of price.”

No.1: “The complex of all the components is important. It is worthwhile to keep in mind the physical opportunities (reliability), infrastructure, alternatives (availability), affordability (prices).”

No. 3: “Lithuania is on that stage where we already have 2 suppliers – LNG and Gazprom. (Availability). It is also crucial when the suppliers are reliable and you are not afraid to communicate with them (Reliability of the supplier).”

No.4 “For Lithuania now the most important thing is to have as much as possible of sources of supply. However, what Lithuania has today is the best situation that was ever been... because Lithuania like a gate between 3 big systems.”

No.5 “All of those 4 dimensions are important and I could not rate them as stages. But I think that that some might be more important than others. So for Lithuania the most important is availability and then goes affordability. And then goes reliability and sustainability according to the importance.”

So, availability was described as the most important element by Lithuanian Energy Strategies and by the expert interviews transcribed so the analysis how Lithuanian energy security in the gas sector increased during the period 2009 – 2015 will commence from the analysis of the stage of availability that Lithuania is at the moment.

### ***Lithuanian Energy Security: Availability of Gas Supplies***

Availability of the gas supplies means that gas is available for the consumer to purchase it, and there is a possibility to possess a physical provision of the resource. Availability is the basis for energy security because any other dimension could be considered if resources are not available. As a result, there should be diversified sources of supply in order to create availability. National Energy Strategy 2007 and Energy Independence Strategy 2012 also confirm that availability is the most crucial element that should be reached in a short – run. Some of the interviewees like No.2 also mentioned, “that secure provision is the most important element for energy security in general.” So, this chapter will discuss more broadly what

wholesale gas supplies were available to Lithuania in 2009, and how the situation changed until 2015. There will also be a discussion about the availability of the gas supplies from Russia, the LNG terminal as the mean to diversify sources of gas and a planned pipeline connection with Poland that will make European gas available to Lithuania.

However, it is important to remind that Lithuania's annual gas demand from 2009 to 2015. Lithuanian gas demand was 2,2 mtoe in 2009 and was increasing due to the closure of Ignaline Nuclear Power plants. The consumption reached its peak of 2,7 mtoe in 2011 and then started decreasing again. Gross inland natural gas consumption was 2,1 mtoe in 2014 according to Eurostat (Eurostat, 2016). Almost all of the gas consumed in Lithuania was imported. The sole importer of this gas was Russian company OAO Gazprom until 2014. That is why gas for Lithuania was available only from the sole gas importer.

#### *Russian gas available to Lithuania*

Both National Energy Strategy 2007 and Energy Independence Strategy 2012 underline the fact that Lithuania was dependent on the sole gas provider for more than 20 years, so gas supplies were and are definitely available from Russia. The country holds the largest natural gas reserves; it was producing 626 bcm of gas in 2013 and was the second largest gas exporter after USA in 2013. Russia is highly dependent on the revenues from fossil fuels and more than 50% of the federal budget revenues come from oil and gas and accounted for 14% of the total Russian export revenues in 2013 that makes Russia willing to sell its natural resources abroad (EIA, 2015). Some of the interviewees underlined this idea as well (No.1; No.2; No.4; No.5) by pointing out that “from that depends a lot of their budget and social benefits” (No.4) or “natural gas is a core business for Gazprom so I think that they have a huge experience in the field and they are quite competent in this field.” (No.3). This shows the fact OAO Gazprom have a long – term expertise in the field and from Russian public sector depends highly on the profits made by the company.

Furthermore, state – run companies dominate the sector producing 73% of Russia's total natural gas (EIA, 2015). The biggest company Gazprom has huge gas reserves, plenty of export capacity and was producing 443.9 bcm in 2014 (Gazprom). The company was created by restructuring USSR Gas Industry Ministry into Gazprom State Gas Concern in 1989 (Gazprom). Gazprom is also the only owner of almost all Russian natural gas pipelines and has a legal monopoly on the pipeline exports. “Access to pipelines capacity for exports as the 2006 Law on Gas Exports grants pipeline export rights exclusively to the owner of the UGS (Unified

Gas Supply) system, which is Gazprom” (EIA, 2015). That makes one company responsible for both – production and exports of gas to foreign countries through the gas transportation system that includes more than 161 000 kilometres of high – pressure pipelines.

As a result, the magnitude of the Russian dependence on natural resources supplies, the magnitude of gas reserves, huge amount of gas production, long and strong experience in the gas sector and the infrastructure make Russian gas available to Lithuania through the pipeline from Belarus shown in the picture No. 3 “*Natural gas pipeline system to Europe*”. This gas supplied from Russia was available in 2009 and is still available in 2015. Therefore, the situation did not change during the period from 2009 to 2015, and there is no increased availability of gas supplies on this dimension.



Picture No. 3 Natural gas pipeline system to Europe (Source: The Economist, 2014)

### Diversification

In order to make more gas supplies available one should diversify its sources of supply for making diversification as the most important part when analysing energy security of Lithuania. According to the National Energy Independence Strategy 2012, “Energy Independence” – the main short – term component of the strategy is perceived as:

- Diversification of energy resources (This part will not be analysed because the focus of the thesis is on the gas sector);
- Diversification of energy supplies (Including the local ones).

The respondents also claimed that diversification comes first. One of the respondents No. 2 cited Churchill and said that “the most important thing is the diversity of supplies and if you do not have that, you will be ready to pay a lot to secure this diversity or at least to get access to the resources”. Another interviewee No. 4 emphasized that “The most important thing for Lithuania is to have as much as possible of diversified sources of energy.” All of the interviewees mutually agreed that the biggest threat before the projects were implemented in Lithuania was Lithuanian dependence on the sole gas wholesale supplier. That led to the conclusion that diversification should come first for Lithuania.

Some of the respondents were not so strict about diversification and said that diversification is good but only when compared with price. No. 1: “It is always good to have more infrastructure but we should keep in mind how much it costs.” No.5: “I think that availability and affordability are the most important things at the moment.” Indeed, diversification is the factor that creates availability of gas and it is very important to diversify sources of supply in order to have more availability in Lithuania. Lithuania has already diversified its resources and is getting gas not only from the Russian Gazprom but also from Norwegian Statoil. It should also construct GIPL pipeline that will make European gas available to Lithuania.

Lithuanian LNG terminal sailed into the port of Klaipeda in 2014 and commenced its operation in 2015. The aim of the terminal, as defined by the Energy Independence Strategy 2012, is to diversify gas supplies and decrease dependency on the sole gas importer from Russia. All the interviewees also conceded that the terminal is a good solution for this purpose:

No.1: “In general LNG is a good idea”.

No.2: “Well, I believe more in this project, I am not so sceptical about it.” It is a good alternative, there are regional opportunities as well.”

No.3: “There were no doubts between the politics that we need LNG terminal. Gas price was too big. We only had Gazprom and there were no commercial opportunities, any bargaining power.”

No.4 “And the fact that we currently have the terminal as well is very important because before that we were dependent on that only gas pipeline from the east. To access the market terminal is the best option.”

No.5: “It is like a start in the region and have very positive feedback from EC and country representatives that are visiting it. It is an example how such a project could be implemented so fast.”

With the operation of the terminal the country is finally able to have the “sufficient local capacity to satisfy the internal energy demand” (LRS, 2012) because LNG terminal is able to provide the needed domestic demand of the country itself (The maximum capacity of the terminal is 4 bcm/ year. Lithuanian current consumption is about 2.7 bcm/ year). However, there were various critics from the respondents about the size of the terminal. They all agreed that the terminal might be too big for the country like Lithuania:

No.1: “LNG is too big and the terminal of 1 billion m<sup>3</sup> could have been enough”.

No.2: “Of course, if Lithuania would use 3,7 or 3,5 billion m<sup>3</sup> per year it would be perfect, but now when it uses 2,7 or 2,8 billion m<sup>3</sup> and it is decreasing because of the biofuel, then, of course, it is too big.”

No.3: “Well, I think there is one big minus – the terminal is too big. If everybody, related with the gas sector will be able to use 2/3 of its capacity, at least until 3 billion m<sup>3</sup>, that would already be great.”

No.4: “Well, if it was built by the private sector maybe it would have been smaller and with better calculated cost.”

No.5: “Yes, it is too big for Lithuania only. But LNG have a big potential how it could be used. It is not only used for heating and cooking how people usually think. There is a huge potential in the LNG retail markets and ship bunkering is another opportunity for LNG.”

Some of the interviewees even had considerations that the decision to build the terminal was not based only on logical and sound calculations but also on “political ambitions” (No.1 and No.4). They also agreed that the terminal was constructed to serve the whole Baltic region instead of one country:

No.1 claimed that “it could serve the whole Baltic region or more.”

No.2: “The beginning was that all 3 Baltic countries wanted to build it together. There were some thought that we will build it and others (other Baltic countries) will join. I guess that was the strategy.”

No.2: “If we talk that it is too big then, well it is perfectly fine for the whole Baltic countries to ensure the annual provision and it would work perfectly with the [Latvian] Incukalns storage facility.”

No.2: “If we would add all Baltic countries it is enough for the whole year. It is a good alternative, there is regionality as well.”

No.4: “I think that at some point this terminal will be used as planned for the whole Baltic region. Klaipėdos Nafta is already looking for the ways to enter those retail markets that AB Achema was making studies about when planning the terminal construction themselves.”

No.5: “The plan was to build this terminal as the regional. But there were various problems because other countries did not have an interest in it when Lithuania was already on the planning stage and there was no common legal base in all 3 countries. And there is no one even at the moment.”

However, all of the respondent were hoping that it would become regional and have a payoff to the Lithuanian investment in it. No.3 was saying that “Those plans are not failed. Nobody said that it will not be regional. Lithuanian LNG is still perceived as the regional in Brussels and not the plans Estonian/Finish LNG.” They also indicated 3<sup>rd</sup> Energy Package implementation in Estonia and Latvia (No.4 and No.5) that will open other Baltic market for the LNG gas from Independence terminal.

This information was confirmed by the UAB Litgas website saying that LNG terminal is able to provide 90% of the gas needed for the whole Baltic region (Litgas, Apie Mus).

So, the information above confirms that the terminal is a good solution to diversify energy resources but it is too big for the country like Lithuania and could provide more than just the amount needed for the country. But there were positive forecasts that this gas should be used in the whole Baltic region. Furthermore, LNG terminal does not only serve for the purpose of diversification but it also creates opportunities to access international gas markets, and it is very important to analyse what LNG is currently available for Lithuania.

#### *Norwegian gas available to Lithuania*

LNG terminal made Norwegian gas from Statoil ASA available for the Lithuanian consumers. LNG terminal began its operations with the first trial cargo in 2014. There was only one – designated supplier UAB Litgas in 2015, but the number of terminal users increase to 3 in 2016. That is why LNG terminal is currently providing Norwegian gas from Statoil to UAB Litgas, UAB Lietuvos dujų tiekimas and to AB Achema (SGD, 2016).

UAB Litgas has signed a 10 years contract with the Norwegian company to buy 0,54 bcm of gas each year as the minimum required amount of LNG for the terminal operation (Litgas, Apie Mus). UAB Litgas signed the contract for the period 2015 – 2024. According to UAB Litgas, there were totally 16 proposals submitted by 9 companies but Statoil ASA has proposed the most economically viable conditions and won the procurement procedure. (Litgas, Geriausias

SGD tiekimą pasiūlymas). There were some doubts among the interviewees about the conditions of this contract.

No 1: “The contract was for too long time and conditions were not favourable for Lithuania. Litgas was paying more for the gas than other business units.”

No.4: Well, long – term contract includes some risks, because you have formulas instead of real prices. So, if the contract would be for few years instead of 10 there will not be such a problem.”

But the interviewees No.4 also defended these contracts by emphasizing that “The contract with Statoil taking into account the price at that time and forecasted consumption of was great at the time of negotiation... The conclusion should be that not the contract was bad but the time frame was too long. It would have been better in this case to have a short – term contract.”

Fortunately, after negotiations with Statoil some conditions have been changed and the amount has been decreased this year to 0,35 bcm due to the lower consumption and UAB Litgas was fortunately able to renegotiate the terms and conditions of the contract with Statoil.

Another consumer for the LNG gas from Statoil is UAB Lietuvos dujų tiekimas that is planning to buy about 0,3 bcm of natural gas in 2016. It will amount for more than a half of all required volume for UAB Lietuvos dujų tiekimas. M. Mikalajūnas, CEO of UAB Lietuvos dujų tiekimas commented that the decision has been taken because of the increased LNG supply on the global markets that made it cheap enough to compete with the pipeline gas (LDTiekimas, 2016).

There is another consumer that decided to buy gas though LNG terminal – fertilizers producer AB Achema that is the biggest gas consumer in Lithuania. According to the CEO of AB Achema R. Miliauskas, “The decision to buy gas is built on the economical principle that is to buy raw materials for the production of fertilizers directly from the wholesale gas suppliers that are producing gas and are suggesting the best conditions and prices.” Gas prices bought from LNG terminal will be calculated based on NBP index (Achemos Grupė, 2016). That is the reason why AB Achema decided to gain some of its gas needs from Statoil. The exact volumes were not announced yet, but R. Miliauskas said to news portal Verslo Žinios that it should be about 4 or even 7 shipments that would consist of about 0,32 – 0,56 bcm of natural gas. AB Achema is planning to consume about 1,25 bcm in 2016 (VZ, 2016). All the interviewees also conceded that even if they were having some doubts that the terminal idea might not work but there are more and more users of LNG in Lithuania.



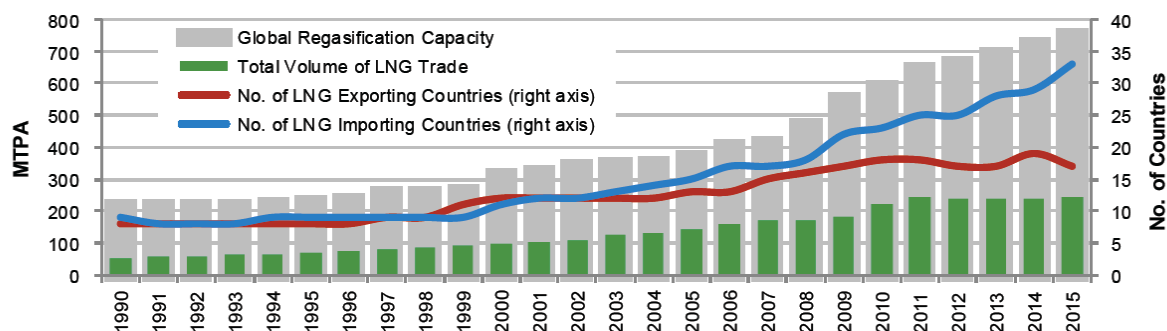
Therefore, there are currently 3 consumers that have decided to purchase gas from the LNG terminal and will get Norwegian gas to Lithuania. It confirms that from the end of 2014 Norwegian gas is also available for Lithuania and there are 2 main wholesale suppliers instead of 1 that was available in 2009.

Putting all the facts together, these three contracts should result in imports of just over 1 bcm via the Klaipeda terminal in 2016. This is equivalent to approximately half of Lithuania's anticipated gas demand in 2016. Dependence on Russia was cut by half and a new supplier (Statoil) was added to the market (Reuters, 2016).

#### *World gas available to Lithuania*

However, regional LNG market depends on the global supply and demand tendencies and there are opportunities for Lithuania to get LNG not only from Norway but from another country as well. Respondent No.4 says that "With the terminal we practically have access to the whole world." For this reason, it is important to understand what is happening in the LNG markets around the world. Gas is highly used commodity and accounted for 21,5% of global primary energy consumption in 2013 (EIA, 2013). Currently, two-thirds of international gas trade flows are delivered by pipeline and one-third in the form of LNG (BP, 2016: 28). However, LNG trade volumes continue to rise, as shown in Picture No. 4 that indicates *LNG Trade Volumes, 1990 – 2015* (BP Statistical Review, 2015;). There is even a question raised if LNG markets are "globalizing" and LNG could one day become the globally traded commodity (Sakmar, 2013; 1). However, it might not happen soon but events in every regional LNG market and worldwide changes in supply and demand does influence the availability of the LNG in Lithuania.

LNG trade has reached its peak with 244,8 MT traded in 2015 (IGU Report, 2016:4). There are currently 34 importing countries and 19 exporting countries. 28% of this trade has been on SPOT markets (GIIGNL report, 2016). Installed liquefaction capacity is 300MTPA (GIIGNL LNG Retail Handbook, 2015). Picture No. 4 shows LNG trading volumes between 1990 – 2015 so total volumes of LNG trade is growing. There is a growing number of LNG exporting and importing countries and more and more regasification capacity worldwide.

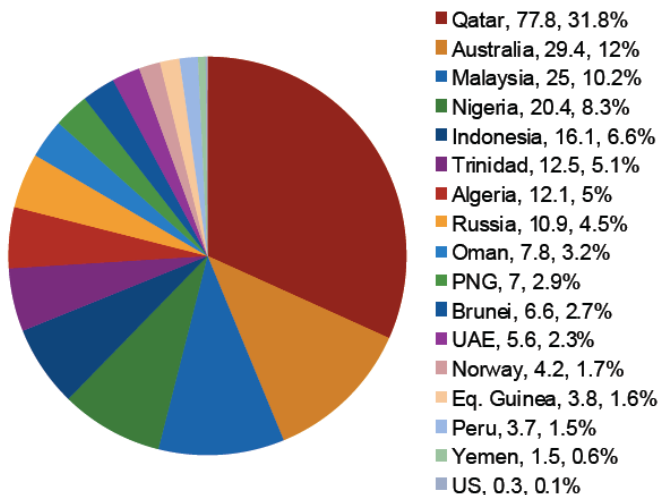


Picture No. 4 LNG Trade Volumes, 1990 – 2015 (Source: IGU World LNG Report, 2016)

Pacific basin is still the biggest consumer with the 72% of the total demand in Asia. (GIIGNL report, 2016). It is also planned that it will remain the main demand driver. The largest consumers are Japan and South Korea (53,2%), China (7,5%), Argentina 2,1%, Brazil (1,6%). However, and there are also some new importing countries in the Middle East and Europe (IGU Report, 2016). It is also estimated 73 MTPA expected an increase in regasification capacity by 2019.

Currently the largest gas suppliers are Qatar, Australia, Malaysia, Nigeria and Indonesia. The market shares of each country are shown in the Picture No. 5 So, almost 32% of LNG is supplied by Qatar and 41% of the volumes are supplied by Asia – Pacific region (GIIGNL report, 2016). However, it is planned that there will be new suppliers in the market - USA and Canada due to the shale gas, East Africa that is owing large gas discoveries and Asia Pacific brownfields expansion. (IGU Report, 2016). That will contribute the currently oversupplied LNG market with new volumes. That is why it is possible that new suppliers from USA, Asia – Pacific or East Africa could become new providers for the Lithuanian LNG terminal. New volumes from North America and Australia should be about 162 bcm by 2018 (Litgas, 2016). Australia is estimated to become the largest LNG exporter by 2018 with a total capacity of the 85 MT per year. The largest increase of the exports is estimated to occur between 2015 and 2017. Respondent No.4 also indicated the importance of international gas markets and especially Australia “Gas prices will fall if oil prices will remain at the same level as they are now because Australia is bringing huge amount of LNG to the market. This gas might not come to us but it will definitely bring the prices down and make more LNG available to Lithuania”. The USA has also commenced 4 new projects that will make 50MT production volumes between 2016 and 2020 (RBA, 2015). It is worth noting that the interviewee was completely positive with this American gas saying that “I was trying to evaluate how much LNG shipped from USA to Brasil would cost if we would bring it to Lithuania and my calculation resulted

as very positive and promising. USA gas might even compete with the Norwegian gas from Statoil.” So, LNG market is expanding by total volumes traded, new liquefaction and regasification units built and new exporters on the way. So this market analysis shows that Lithuania have opportunities to import LNG not only from Norway, but from other countries as well. And some steps are already implemented.



Picture No. 5 LNG Exports and Market share by Country (Source: IGU World LNG Report, 2016)

#### Other contracts

UAB Litgas has already signed 15 not binding agreements with the global LNG providers. Those contracts give an opportunity for the country to get a quick access to the international SPOT gas markets (Litgas, Apie Mus). Interviewee No.4 also agrees on this initiative to sign this kind of contracts by believing that “Ability to have an opportunity to buy from other supplier is always good because you can buy when you want but there is no obligation to buy if you do not want.”

UAB Litgas has also signed the contract with North American company Cheniere Energy that makes it possible to get gas already in 2016. It also signed the memorandum with Delfin LNG LLC in 2015 that is developing the first USA floating liquefaction project. The plans are that the terminal will commence operating in 2019 (Litgas, 2015).

Therefore, there are already real actions taken for Lithuania to get gas on the SPOT markets, and there are also first steps taken in order to get gas from the global LNG markets (mainly USA). So that confirms that Lithuania possesses more than 2 possible gas providers, while in 2009 it only had one. It makes gas more available from 2009.

### *European gas available to Lithuania*

GIPL pipeline is still on the planning stage with the purposes to connect Lithuanian, Latvian, Estonian and Finish markets with the European gas system that will increase energy security of the Baltic states and diversify gas supplies. The pipeline should be finished in 2019. Even though this period is not investigated in the thesis, it still draws a clear picture that Lithuania still keeps its short – term objectives of the Energy Independence Strategy 2012 in mind and keeps diversifying gas market in order to increase availability. It could also be forecasted that energy security in the availability dimension will be increased even more after 2015.

When it comes to respondents, there was no common opinion about this project. Some of them agreed by pointing out that “I think it is a good solution to increase the usage of the LNG terminal. If we could sell at least some gas from our terminal to Poland, it would already be better and the would be less maintenance cost.” (No.3). There were also claims that GIPL is “the trial to integrate Baltic States energy system through BEMIP and connect everything. So that the gas could freely flow all the directions” (No.2). “Well, when we talk about benefits we would have access to their LNG. There would be more competence between 2 LNG terminals. And competition is always good” (No.1). No.:5 commented that “GIPL project should be evaluated not only from the Lithuanian perspective, but also from the regional one. The European gas system is connected, so it should connect Baltic States as well”. Therefore, the positive sides of the project were Baltic country connection with the European markets and an opportunity to use for selling gas that is coming to Independence terminal.

Then again there were some doubts regarding the project. Respondent No.1 and No.4 were the biggest opponents of the project. The first doubt was based on the cost of the project. No.1: “We invested a lot in this (energy) security. And now we will invest even more to build more infrastructure”. No.4: “I have never really understood the reasoning behind this project because it is very expensive.” Both underlined the fact that same Gazprom gas would come to Lithuania: No.1: “Poland itself produces very little amount of gas. So it will be the same gas from Gazprom.”

No.4: “There will be the same Gazprom gas coming to Lithuania and I really doubt that it could be cheaper.” Respondent No.1 also considered that this project is more important for Poland that has North-eastern part of the country not fully provided with gas while interviewee No.3 doubt that GIPL connector would make Lithuania a transit country and said that “it is just win

– win situation for both Lithuania and Poland. But I really doubt that Lithuania would become a transit country for the gas coming from the Western countries.”

The project should increase energy security of the Baltic states, diversify the gas supplies and integrate Baltic gas market to the common European energy system, but there are various doubts regarding the necessity, cost and overall significance of the project.

#### *Conclusions: Availability of gas supplies*

Availability is a very important dimension of energy security in Lithuania, and the country is currently paying most of its attention to it according to information provided in the strategy documents by the respondents interviewed. Lithuania did not have diversified gas supplies until 2014, and there were only Russian gas from Gazprom available at that time. However, the situation changed significantly after LNG terminal construction. Lithuania currently possesses supplies from two main suppliers and availability to have gas from all over the world. Moreover, Lithuania is planning to build pipeline connection with Poland that would connect the country with the western Europe gas supplies. So Lithuanian gas availability has increased significantly by diversifying the sources of supply during the period between 2009 – 2015.

#### ***Lithuanian Energy Security: Affordability of Gas Supplies***

Affordability is described by the price that consumer pays for its gas supplies. In the National Energy Strategy 2007 affordability is described as “an acceptable price in a competitive energy market” or “economically justified prices that are affordable for the customers” (LRS, 2007). However, affordability was mentioned only a few times in this strategy. However, it was considered more in – depth in the Energy Independence Strategy 2012 and was described as the procurement of energy resources at “the most favourable”, “competitive” and “affordable” price. Most favourable price was mentioned 6 times while competitiveness - 4 times, affordability – 2 times. Affordability was also described as “economically reasonable”, “stable” and “fair” price. (LRS, 2012). Moreover, Lithuanian medium – term objective for the energy sector is competitiveness that underlines price and market components as the most important goals during the period 2020 – 2030. It is clear that affordability became more important in 2012 than it was in 2007. The respondents also agreed that affordability is very important, and some of them claimed that both availability and affordability have the same weight when analysing energy security dimensions of Lithuania. No.1 said that “More alternatives is always good but we should not forget how much it costs.” No.2: “Affordability is the second step after availability. ”No.3: “The investments taken should be clever in term of their price. Price is

always important.” No. 4 “Price is the ultimate indicator that everybody cares about and will care about.” No.5: “Both availability and affordability go together. Maybe availability goes first but affordability is always following it.” To conclude, interviewees claimed that affordability comes after availability as considered in the Energy Independence Strategy 2012. However, others suggested that those dimensions could not be separated and goes together with each other.

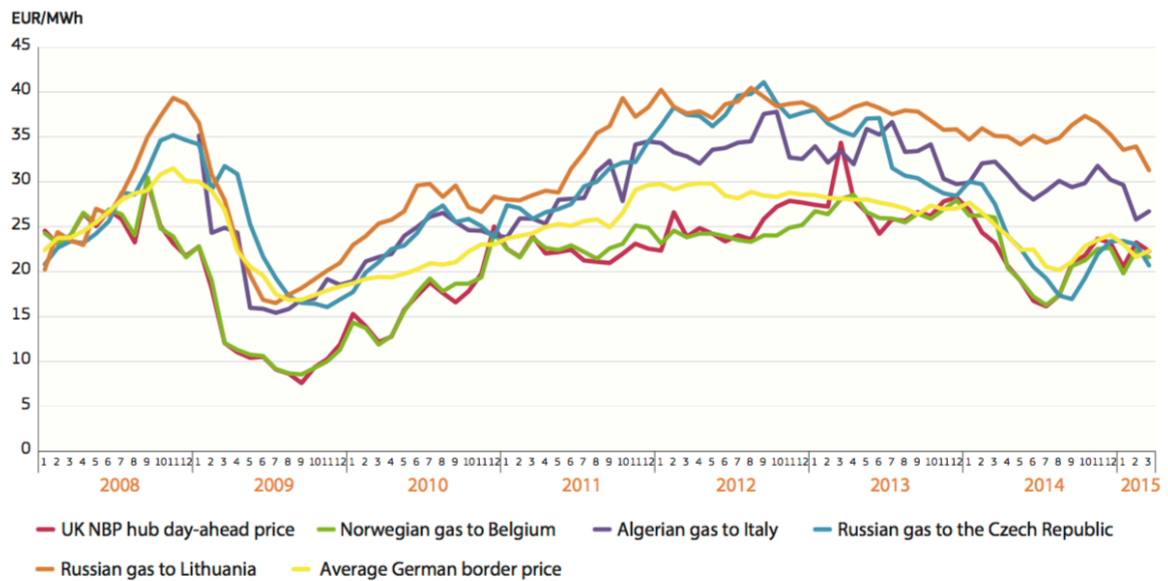
Moreover, definitions and suggestions of the interviewees above allow anticipating what will be analysed in this chapter. Firstly, the European wholesale gas prices and imported gas prices to Lithuania will be discussed in order to figure out how much was Lithuania paying for its gas supplies from Russia. Then the LNG gas price charged will be discussed in order to figure out how much is Lithuania paying for its gas supplies from Norway. Also, the market component will be described because market is the condition where the prices are determined. Additionally, the cost of availability will be described in order to figure out how much was spent and how much is planned to be spent in order to increase energy security in Lithuania.

#### *European gas prices*

European and Lithuanian gas prices were compared to the historical perspective in order to figure out how the prices changed and if they were following the same trend. There is no single price for gas and there is no single global gas market because gas was developing as the regional business (Gilardoni, 2008). Lithuanian gas price will be compared with the German border price, Norwegian gas to Belgium, Algerian gas to Italy and Russian gas to Czech Republic. These are appropriate prices for comparison because Russia (39%), Norway (29,5%) and Algeria (12,8%) are the main pipeline gas suppliers to Europe (Eurostat, 2015). Moreover, those prices are mainly based on the long - term contracts that were popular since the start of the gas industry in Europe and were indexed to oil prices with the a 6 to 9-month lag. And Russia is a strong supporter of this pricing model (Platts, 2011). Lithuania was also gaining the gas from Russia based on the price formulas indexed to oil prices. Furthermore, German Border Price is a good price to compare with because Russia is the main gas supplier for Germany (Destatis, 2016). It is also the biggest user of gas in Europe according to Gazprom statistics in 2015 (Gazprom, 2015). That is why it reflects how differently large Western consumers are priced compared with the smaller, more dependent Eastern Countries. Some interviewees highlighted that Lithuania was paying one of the highest prices in Europe for its gas supplies. No.3: “The gas prices were too high when we only had Gazprom as a supplier.” No. 5: “EC investigation into Gazprom was the basement for the Lithuanian Stockholm arbitrage case. It

just proves the fact that the prices charged were unreasonably high for Lithuania.” Picture No. 7 shows the Comparison of the Lithuanian Gas Price with the EU Wholesale Gas Prices. It clearly shows that prices follow the same pattern and were increasing from 2009 and reached their peak in 2012. So, the previously discussed gas price of Lithuania was highest in 2012 and European gas prices were highest in 2012 and 2013 as well due to the high oil prices. Moreover, as the interviewees underlined and the Picture No. 6 shows Lithuanian gas prices were highest in Europe for almost all the period between 2009 – 2015.

**FIGURE 21 – COMPARISON OF EU WHOLESALE GAS PRICE ESTIMATIONS**



Picture No. 6 Comparison of EU Wholesale Gas Price Estimations (EC Quarterly Report on European gas Markets, 2015)

### Russian wholesale gas price to Lithuania

It is worthwhile to consider Lithuanian gas prices in order to comprehend if they decreased during the period between 2009 – 2015. Lithuanian National Commission for Energy Control and Prices (NCC) is controlling and supervising the activities of the entities in the Lithuanian energy sector, set state regulated prices and their ceiling (NCC Objectives, 2014). Commission is also a source, where the average national gas import prices are reported. However, gas imports are usually based on the long – term confidential contracts so the representatives of the importing companies were not able to disclose this information. Therefore, the average prices from NCC will be analysed in order to see how did Lithuanian import price change during the period 2009 – 2015. Gas price change is shown in Table No.1. Gas price was 217 €/mcm. in 2009. It was rising until 2012, where it reached its peak of 380 €/mcm. Then it started falling down and was showing this trend until 2016. The average natural gas price was 226 €/mcm. in

2015. As a result, the price difference between 2009 and 2015 is 9 €/mcm. (Not adjusted to inflation), and it is 9 €/mcm. higher than the price in 2009.

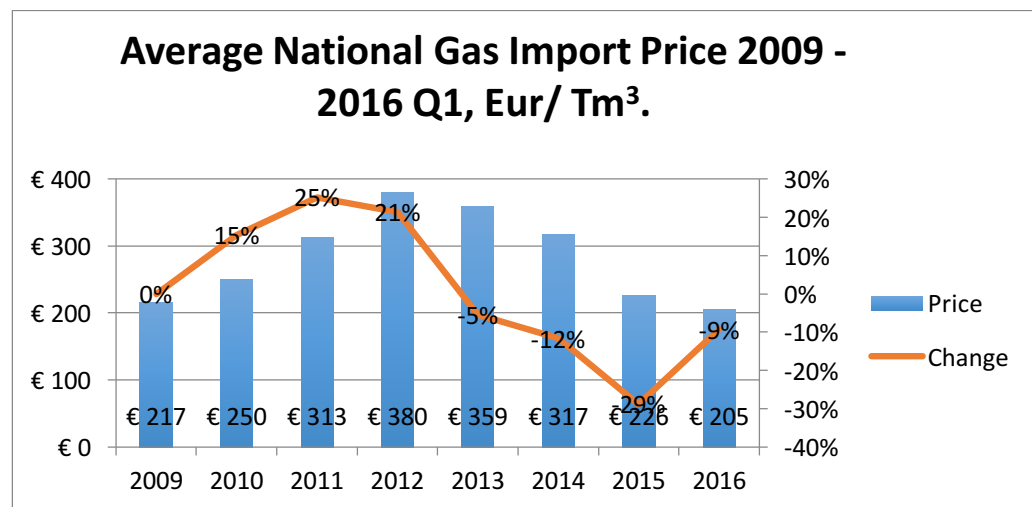


Table No. 1 Average Natural Gas Import Price 2009 – 2016 Q1, euro/ mcm (Source: NCC).

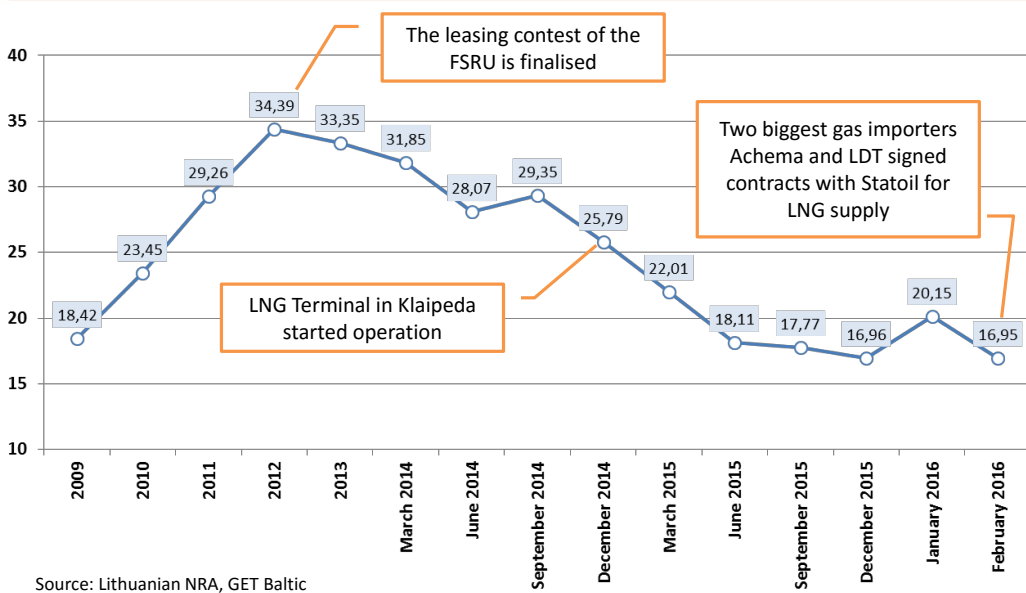
On the other hand, interviewee No.1 insisted that “Gazprom formula did not change after the terminal construction and remained the same. So the price fell only because it was following the same trend of oil – indexed gas prices”. However, Picture No. 7 shows Lithuanian gas price and the main events in the Lithuanian gas sector. The decline in gas price in 2009 – 2015 took place for those reasons:

1. Until 2016 Lithuania imported Russian gas with prices linked to oil (with a 6-month delay between the oil and gas prices). Oil prices were low in 2009 and rose in 2010 and 2011. In 2012 and 2013, oil prices were high (above 100 USD per barrel). However, from mid-2014, oil prices fell. As can be seen from the beginning of 2015, oil-linked gas prices fell.
2. Lithuania’s long-term contract with Gazprom expired at the end of 2014, although some ‘leftover’ volumes were imported in 2015. When the LNG terminal was launched and Gazprom wanted to retain its market share in Lithuania, Gazprom offered lower prices to Lithuania.
3. In 2015/16, hub prices in Europe were low. That is why the LNG imported from Statoil (with prices linked to European hubs) also remained lower than the oil-indexed prices in 2011-2014.

Lithuanian gas prices altered positively both by favourable market conditions and falling oil prices and by sound Lithuanian government policies and projects implemented in the gas sector. Even if the price had been higher in 2015 compared with 2015 it would have resulted in the lower gap between the European and Lithuanian prices.



## Average gas price in Lithuania (EUR/MWh)



Source: Lithuanian NRA, GET Baltic



1

Picture No. 7 Average Gas Price in Lithuania (euro/ MWh) (Source: Amber Grid)

### Norwegian wholesale gas price to Lithuania

Lithuania is getting Norwegian gas as a trial cargo from 2014 and as the operational cargo from 2015. The gas bought through “Independence” terminal is shifting Lithuanian gas market from the historical usage of the long – term oil – indexed gas pricing models to the SPOT pricing based on the gas – to gas competition and connected with the European gas pricing models. The price is attached to the UK NBP price index, so the price will be calculated based on the previous year factual index values on the future contracts traded in this market (Litgas, 2015). For that reason, it is also essential to discuss the prices of LNG in Lithuania and compare them with the European LNG prices and mainly UK NBP price. According to UAB Litgas average LNG price was 29,04 Eur/ MWh (302,02 €/mcm) in 2015 and it should be between 16 and 21 Eur/MWh (166,4 €/mcm – 218,4 €/mcm) in 2016. This is the price charged for the minimum required LNG amount bought from UAB Litgas by the energy producers that are determined by NCC (Litgas, 2015). (Unfortunately, the information about the gas price bought by AB Achema and UAB Lietuvos Dujų Tiekimas is confidential). According to the respondents, the gas price from the terminal is lower because more importers decided to choose Statoil over Gazprom as a wholesale gas supplier. The reasoning behind that is the price. No. 1: “The gas from the terminal is lower at the moment than the one from Gazprom.” No.3: “I think that AB Achema decision is based on the economic reasons because it is cheaper for them and other

importers to buy gas from the terminal.” Therefore, it only confirms that Norwegian gas from LNG terminal is highly competitive with the Gazprom gas from Russia.

*Cost of the projects implemented*

The alternatives implemented and especially LNG terminal construction was not accomplished without any expenses. Moreover, the cost of the projects implemented (especially implementation of the LNG project) was the most escalated argument to support their critique. All the questioned respondents also conceded that they were needed only if they were affordable. So, it is important to consider the capital expenditure and maintenance cost of the projects implemented in order to figure out if there is an increase in affordability during the period between 2009 – 2015.

Current minister of Lithuanian Energy Ministry R. Masiulis that was the CEO of AB Klaipėdos Nafta told to the News Portal Respublika that exact number about the cost and operational expenditure of the LNG terminal could not be disclosed because the main purpose of the wholesale energy importers is to figure out all the components of this cost because it could give a bargaining power to them (Respublika, 2012). As a result, the cost estimations of Independence terminal will be taken from the Independence terminal business plan and AB Klaipėdos Nafta financial statements.

The total cost of the project was 176,31 million euro (613 mln. Lt), of which the investment by the Port of Klaipėda was 46,02 million euro (160 mln. Lt.), and the investment by AB Klaipėdos Nafta was 130,29 million euro. (453 mln. Lt). All the parts invested in the terminal construction are shown in the Table No.2. Lithuanian and European gas price gas decreased during the period between 2009 – 2015, but the overall gas price increased by 9 Eur/mcm. The overall cost invested in order to increase Lithuanian energy affordability was 176,31 million euro.

<b>Investment in the Klaipėda LNG terminal by AB Klaipėdos Nafta, million euro.</b>				
	<i>2012</i>	<i>2013</i>	<i>2014</i>	<i>Total</i>
Project organizational expenses, the obtainment of the licenses, release works	8,63	22,43	33,36	64,42
LNG pipeline engineering and construction works		15,24	25,31	40,55
LNG terminal port engineering and construction works		8,34	16,97	25,32

Total	8,63	46,01	75,64	130,29
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Table No. 2 Investment in the Klaipeda LNG terminal by AB Klaipedos Nafta, million euro (Source: AB Klaipedos Nafta)

### *LNG terminal security tax*

All the cost incurred for the terminal construction was covered by the public sector and according to interviewee No.1: “Terminal construction and other infrastructural projects are paid by all the final consumer.” This security tax is calculated by applying Entry – Exit Pricing Model for the gas transmission system (NCC, 2015). According to Amber Grid, the tax collected should cover infrastructure, maintenance and administration cost for the operation of FSRU floating LNG terminal. Interviewee No. 4 underlined that “customers usually wants to use the benefits of the terminal but when you ask them to pay they say that government that built it should do that.” However, the cost of the terminal construction was included in the gas transmission price and the price structure of Lithuanian gas will be discussed later in this chapter.

### *Natural gas price structure for the households*

It is also important to analyse the effect of the construction of LNG terminal for the end users. The maintenance cost is included in the price of gas for the end users.

The main distributor of natural gas for the households is AB Lietuvos dujos so the price analysis will be based on the prices charged by AB Lietuvos dujos.

There are 3 main groups of customers:

- I group, which uses less than 500m<sup>3</sup> a year (i.e. Households);
- II group, which uses between 500m<sup>3</sup> and 20 000 m<sup>3</sup> (i.e. Small businesses);
- III group, which uses more than 20 000 m<sup>3</sup> (i.e. Industrial consumers).

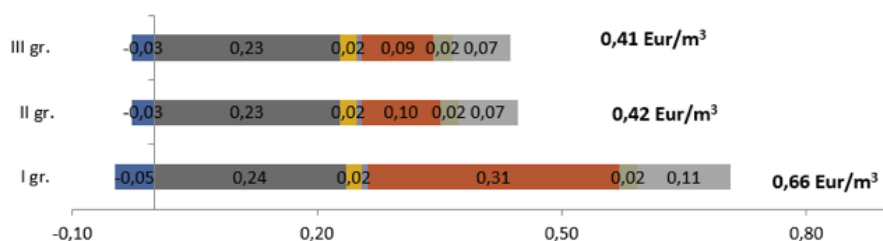
The price for the households is usually charged including the price of imported natural gas, delivery costs (transmission and distribution), charge for the energy security and taxes. The charged price consists of 2 parts:

- Fixed Part paid monthly independently of the quantity used;
- Variable Part dependent on the quantity used.

### *Variable Part*

Variable prices for the households are different for the 3 previously mentioned consumer types. The lowest price is charged for the Group III, which uses more than 20 000m<sup>3</sup> p/year (0,41

€/m<sup>3</sup>). The highest price is charged for the users consuming less than 500 m<sup>3</sup> (0,66 €/m<sup>3</sup>) (Picture No.8).



Picture No. 8 Variable Part Price Structure for 1m<sup>3</sup> of Natural Gas (Source: NCC, 2014)

The highest price share comes from the 3 main sources as shown in Table No. 3:

- Natural gas import price (Varying from 56% and 55% for the Groups III and II and 36% for the Group I);
- Distribution price (22%, 24%, 47% for the Groups III, II and I accordingly);
- VAT tax (17% of VAT for all the groups).

It is visible that the most beneficiaries of the price charged for the customers are suppliers of the imported gas getting more than half of the price charged for the customers, distributors of the natural gas and the government collecting taxes for the gas used. Moreover, the newly built LNG terminal construction and maintenance costs are also charged for the end customers, but it is visible in Table No. 3 that this price is only 0.05% and 0.03% of the total gas price for the end users. Generally, this price is not so high when the purchased amount is not big, but it can become a burden for the gas consuming industries. For some companies, such as AB Achema, which uses almost half of the overall Lithuanian gas consumption, this 5 % would result in a very high expenses.

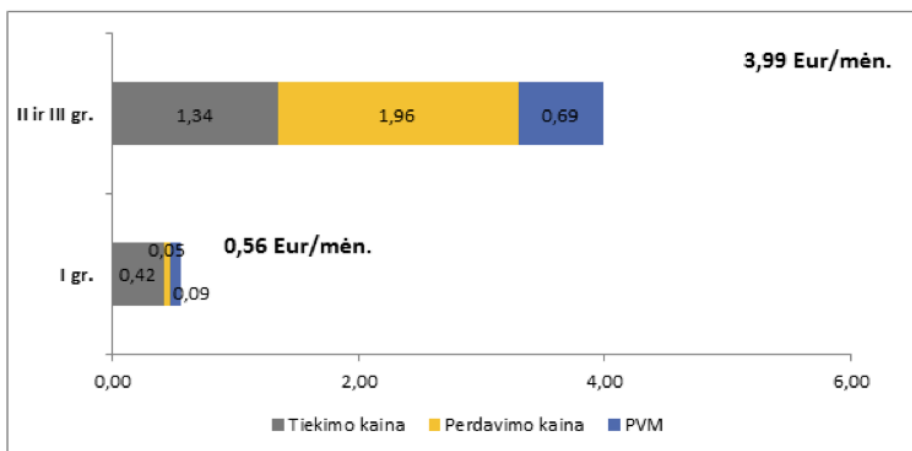
	Difference driven by the change in the contract	Natural gas import price	Difference between the forecasted and actual gas price	Transmission price variable part	Distribution price	Energy security price	VAT
III gr.	-7%	56%	5%	2%	22%	5%	17%

II gr.	-7%	55%	5%	2%	24%	5%	17%
I gr.	-8%	36%	3%	2%	47%	3%	17%

Table No. 3 Percentage share of each component in the variable part of natural gas price (Source: author of the thesis)

### Fixed part

The fixed part is paid mainly to cover the maintenances expenses and the power assurance in the main pipelines. This part also includes the operational and contractual costs as well as the taxes for the government. This price also depends on the amount of customers in the region.



Picture No. 9 Fixed Part of Natural Gas Price (Source: NCC, 2014)

The price consists of 3 parts – provision, transmission and VAT. For the customer groups that use more than 500m<sup>3</sup> (Group II and III) this charge is 3,99 Eur/month and for the Group I that uses less than 500m<sup>3</sup> p/month is lower – 0,56 Eur/month. For the Groups II and III 33% of the price go for provision, 48% goes for transmission and 17% goes for the tax payments. Group I pays 75% of the price for provision of the natural gas and the resting 25% covers transmission and taxes. In fact, in the fixed part paid by the customer the main share is for the covering of importation and transmission costs.

### Conclusions: Affordability of gas supplies

Affordability is a highly important dimension for energy security, and, according to the Energy Independence Strategy 2012, the medium – term objectives is to increase the affordability of gas supplies. The interviewees also confirmed that affordability goes after availability or might even be considered together when we talk about Lithuanian energy security. Lithuania was charged one of the highest prices among the European countries for the period 2009 – 2015.

These prices were following the same trend as the European gas prices and felt significantly after 2012. However, the prices charged for Lithuania increased but the overall gap between Lithuanian and European gas prices lowered during the period between 2009 – 2015. All the costs for the efforts to increase affordability of gas supplies were covered by all the gas consumers.

### ***Lithuanian Energy Security: Reliability of Gas Supplies***

Reliability is a significant element of energy security that means that gas system is reliable, and short – term or long – term interruptions would not have a long – term negative impact on the country. Reliability was mentioned a number of times in both Lithuanian Energy Strategies. However, it was mentioned about 5 times more in the National Energy Strategy 2007 than in the Energy Independence Strategy 2012. Reliable and predictable supply for customers is the vital element of the National Energy Strategy 2007. According to it, Lithuania was experiencing long – term reliability problems because Lithuanian – Poland pipeline was not constructed at that time (LRS, 2007). There were also plans to analyse the possibility to build LNG terminal that will ensure secure and reliable supply. Moreover, Energy Independence Strategy 2012 also analyses GIPL pipeline project and the need to build LNG terminal in order to ensure reliable supply (LRS, 2012). So, long – term reliability is firstly comprehended as the opportunity to have uninterrupted and diversified supply in the long – run.

Moreover, both strategies mention the construction of the gas storage facility in order to have access to natural gas resources in case of emergency. National Energy Strategy 2007 was considering building gas storage facility of 1 bcm in order to provide more reliable supply of gas while Energy Independence Strategy 2012 was suggesting bigger storage facility that “is a good alternative because the entire emergency volume would be physically stored in Lithuania” (LRS, 2012). So, the construction of the gas storage facility could improve short – term reliability of the gas supplies.

Another objective that would help increasing availability is an improvement in gas transmission and distribution pipelines that are “physically and morally worn” and should be modernized or replaced (LRS, 2007). Therefore, the maintenance and good quality of the infrastructure is vital to avoid gas supply interruptions in Lithuania.

Furthermore, reliability of the gas supplies also depends on the suppliers and their trustworthiness. National Energy Strategy 2007 mentions that increased capacity of the transit pipeline to Kaliningrad serves as the safeguard for the reliable and stable supply for Lithuania

(LRS, 2007). This means that without it Russia could not be considered as a reliable supplier. Moreover, Energy Independence Strategy 2012 also underlines that the main threat is Lithuanian dependency on the sole gas supplier and the main objective is to diversify the sources of supply (LRS 2012). That means that reliability of gas supplies also depends on the provider itself.

The following chapter will not only analyse Lithuanian position in all the previously mentioned parts of reliability, but also will investigate to what extent has Lithuanian reliability in the gas sector increased in the period between 2009 – 2015.

#### *Reliability of the Lithuanian gas system*

Reliability is firstly understood as an opportunity to possess gas provisions in case one of the sources of supply is interrupted. Lithuanian energy dependency ratio in the gas sector was 100,4% in 2009 and 103,8% in 2014 (EC Energy Datasheet, 2016). Lithuania became even more dependent on imported gas supplies. That means that interruption or halt in gas supplies would leave the country without the energy source that accounts for 32,4% of the total energy mix (EU Commission, 2015). It is mainly used for heat and power generation and is a source of raw material for the biggest Lithuanian fertilizers producer AB Achema.

Lithuanian gas pipeline system was only connected with the Russian East – European pipeline that was providing gas from Russia through Belarus. Russia was the only gas supplier for the period from independence until 2014, and there was no way to get any alternative gas amounts.

There would have been various negative consequences if gas supplies had been interrupted until 2014. First, there would not have been any alternative to gain the gas that is used for heating in harsh winter and power generation. It would have also caused the biggest Lithuanian fertilizers company that is making 1,5 % share of Lithuanian GDP to terminate their operations (Stat.Gov.lt, 2015)

However, as both Lithuanian Energy Strategies were focusing strongly on the problem and indicated that the main purpose is to increase energy security and diversify gas supplies the situation changed in 2014 when LNG terminal has been constructed in the port of Klaipeda. In the case of interruption of gas supplies from Russia Lithuania would be able to get 4 bcm that is more than the annual Lithuanian consumption) of gas supplies from Norway. It has also signed memorandum agreements with the American companies that are planning to build liquefaction plants and could deliver LNG to Lithuania as well. Therefore, Lithuania is now able to receive

gas supplies from other sources for the long – term provision, and that makes Lithuanian gas supplies more reliable than they were before.

### *Storage opportunities for Lithuania*

However, gas contracts that Lithuania currently has are long– term gas contracts with both Russia and Norway, so in the case of unexpected gas halt the country should be able to receive its gas supplies for the emergency needs. In addition, there should be an opportunity to store the gas for the emergency needs.

There is only one gas storage facility available for Lithuania – Incukalns Underground Gas Storage Facility that is serving Latvian, Estonian, northwest Russian and Lithuanian needs. The gas is stored during the summer months when the demand is lower and supplies the customers during the heating season. Total volume of the UGS is 4,4 bcm of which active capacity accounts for 2,32 bcm but it could be increased to 3,2 bcm if needed (Latvijas Gaze, no date). Incukalns UGS supplies Latvia, Estonia and NW Russia, but it can cover Lithuanian need only in case of emergency or in case of construction works. However, there are various threats related with the Incukalns UGS that will be discussed further.

Firstly, the ability to supply the needed gas for Lithuania. Estonian gas consumption was 0,5 bcm, while Latvian gas consumption was 1,2 bcm, and Lithuanian used 2,6 bcm in 2014. So, both Latvia and Estonia use 2.6 bcm annually, and that is more than the active capacity of the Incukalns UGS. As a result, in the case of emergency Lithuania, which annual amount is the same as both other Baltic countries, would not be able to get enough gas from Incukalns UGS to satisfy its needs (EU Commission, Energy Datasheets, 2016). However, there are some plans to expand the capacity to 2.8 bcm (Cost 135 million Eur.) in order to enhance energy security of the Baltic region but this would not be done until 2020. Furthermore, there is a project under consideration to enhance Latvia – Lithuania interconnector to 12 mcm/ day that “would increase the opportunity for a cross – border trade, for higher usage of Latvian Incukalns UGS and would increase security of supply and flexibility of the gas transmission systems in Latvia and Lithuania.” This project, if approved, should be implemented until 2018 (Amber Grid, GRIP Report, 2014 ;70). There is an opportunity for Lithuania to get its gas supplies from Incukalns Storage facility. However, this opportunity would be increased if the capacity was expanded.

Secondly, there were various discussions about the ownership of the gas storage facility. Incukalns UGS is owned by JSC Latvijas Gaze, which shares belonged to German company E.



ON Ruhrgas International (47%), OAO Gazprom (34%) and Latvian company LLC ITERA Latvija (16%). (Latvijas Gaze Annual Report, 2015). Russian company Rosneft was owning 51% of ITERA Group and has acquired the remaining 49% of it in 2013 (Rosneft Annual Report, 2014). Indeed, the owner of ITERA Latvia was Rosneft. So, 51% of the Latvian National Gas Company was owned by the Russian companies, same as Incukalns UGS. If Russia would have decided to cut gas supplies for Lithuania due to other than technical reasons there was no protection that it would allow gas flows from the Latvia UGS until 2016. The reliability of the Latvia UGS could be considered as a decreased one during the period 2009 – 2015. However, the situation is altering because Latvia has decided to implement the 3<sup>rd</sup> Energy Package until 2017 so there should be some changes made in the ownership of JSC Latvijas Gaze (EC Country Report - Latvia, 2014). One of those changes has already happened when E.ON Ruhrgas International GmbH sold 28,97% of its shares to Marguerite Gas I S.a.r.l (2020 European Fund for Energy, Climate Change & Infrastructure). The same changes should be accomplished in order to decrease the share of Russian companies in Latvia (Latvijas Gaze Annual Report, 2015).

Therefore, Incukalns UGS had less capacity than Lithuanian annual consumption, and it was partly owned by Russian companies and the situation did not improve during the period 2009 – 2015. The storage reliability did not increase. For that reason, Lithuanian government was considering the construction of its own UGS in Syderiai.

The aim of the UGS facility in Syderiai would be to use gas price fluctuations in the international LNG market, to balance gas consumption and ensure the required amount of gas for Lithuania (EnMin, 2014). The geological analysis has started in 2009 and Syderiai has been chosen as the best geological location. The planned storage capacity should be about 0,5 bcm. This capacity should ensure uninterrupted gas supply for 52 days in extremely harsh winter conditions. Syderiai UGS could serve for Poland needs that consumption would reach 5,5 times more gas than Lithuania. Planned capital expenditure is 313 million euro that is expected to be covered by Lithuania with the EU funding (LE Gamyba, no date). However, this project is not confirmed yet and is only on the planning stage.

There was a gas storage facility that Lithuanian could access in case of emergency, but it did not possess enough capacity to ensure the whole needs for Lithuania. The other problem was that the storage facility was partly owned and controlled by Russian company Gazprom and might not serve in case Russian gas supplies were halted. The project to build Lithuanian UGS

was still on the planning stage during the period investigated. As a result, short – term Lithuanian gas storage reliability did not increase during the period 2009 – 2015.

#### *Reliability of the Lithuanian gas suppliers*

It was earlier considered that reliability of gas supplies was lower due to undiversified supply. But it is also important to discuss Lithuanian relationship with its suppliers and their reliability. A trustful partner in wholesale supplies is vital in order to avoid disruptions and to protect from a threat that supplies would be cut or halted. It is even more essential when the country does not have any other options like it was the case in Lithuania until 2014. For that reason, further discussions will focus on the Lithuanian relationship with its supply countries and their reputation.

Lithuania was the part of the Soviet Union until 1990, so its gas infrastructure was remaining as a part of Russian supply system. Every decision made by Moscow in regards with energy policies had a great effect on the Baltic countries. The tension in the energy field has started from the very beginning of 1990s. Russia cut energy supplies in 1990 in order to weaken their efforts to gain independence. Then it repeated again in 1992 when Baltic countries were demanding to remove military forces from their territory (Baran, 2006: 16). Russia was using this weapon even more times in order to reach their objectives. Russian company Lukoil wanted to buy the shares of AB Mazeikiu Nafta. It was sold to American company William International Russia reacted by cutting supplies again in 1999. It repeated again in 2006 when PKN Orlen bought Mazeikiu Nafta instead of the Russian company. This time oil supply was halted and newer renewed. Moscow explained that it happened due to the technical accident (Baran, 2006: 16) But some of the respondents claim that the reasons were more political (No.2; No.4; No.5).

However, Lithuania was not the only one encountering energy cuts from Russian suppliers. Ukraine is the best instance explaining why there are doubts about trustworthiness of Russia as the gas supplies. There were a few occasions when gas supplies were cut for Ukraine – once in 2006 and again in 2009. Moreover, the annexation of Crimea increased the worries in 2014. By the way Russia was seeing the situation from its perspectives and claiming that Ukraine is the country that increase transit risk (Henderson & Mitrova, 2015). On the other hand, the circumstances under which gas was cut is not important in this case. The most important argument is that if Russia was able to cut gas supplies for one of its export partners there are no guarantee that it would not be able to do the same with another country as Lithuania.

According to the respondent No.3 said that “he would not be surprised if one day Russians would come and say that there will be no more gas for Lithuania.” The reasons might not be uncovered but they could base their decision on the technical problems as they always do.” And this threat has increased with the current political tension between Russia and Lithuania. However, some of the interviewees like No.2 underlined that those events increased the speed for the projects implemented “The gas cut for Ukraine in 2009 made Lithuania think again the new projects like the construction of the nuclear power plant, pipeline connection plans and the construction of the LNG terminal.” Therefore, there was an opportunity for the gas supplies to be halted for the period 2009 – 2015 but it resulted in the needed Lithuanian Government decision in order to increase gas reliability.

On the other hand, some of respondents indicated that “Russia is also dependent on Europe” (No.3). Indeed, Europe and Russia are interdependent because 30% of European gas is coming from Russia. And about 90% of Russian natural gas exports came to Europe (201 bcm) in 2014 (EIA, 2015). In fact, Russia is even more dependent on European consumption than Europe on Russian supplies.

Furthermore, when it comes to Lithuania, it has a safeguard in regards with gas provisions because it is a transit country to Kaliningrad and about 2,1 bcm of gas is transmitted through Lithuania each year (EnMin, 2015). All of the interviewees also agreed that Kaliningrad serves as the safeguard to prevent from gas cut off in Lithuania:

No.1 : “The gas might have already been cut for Lithuania if there had been no transit to Kaliningrad.”

No.2: “Let’s not forget that we are the transit country to Kaliningrad and this helped Lithuanian government to be more determent about the decisions made. The best example could be Lithuanian investigation in AB Lietuvos Dujos or Stockholm arbitration case. We were brave because of Kaliningrad.”

No.3: “Well if there had been some big conflicts between Lithuania and Russia they (Russians) could not have cut gas supplies because gas gets to Kaliningrad through the same pipeline”

No.4: “To be a transit country is quite good...Until there is a gas pipeline to Kaliningrad there is no technical possibility to cut off gas for Lithuania without cutting it to Kaliningrad. Kaliningrad is one big military base. And there is no opportunity to have a military base without energy. Until Kaliningrad will not have other sources of supply, the gas will still keep going.”

No.5: “Well, Kaliningrad was that small thing that kept Russian from cutting off gas supplies for Lithuania. But we cannot trust only that.”

Therefore, even if all the respondents were considering the opportunity that the gas supplies could be halted they were doubting if it had been done when there are gas supplies going to the Russian region of Kaliningrad.

#### *Conclusions: Reliability of gas supplies*

Reliability is a highly important element of energy security in Lithuania. LNG terminal construction increased long – term reliability of gas supplies because the whole needed amount for Lithuania could be provided by the alternative sources of supply if the gas supplies from Russia were halted, but that was not possible prior to 2014. However, Lithuanian ability to get gas supplies in case of emergency did not increase because the ability to access Latvian UGS did not increase during the period investigated. In addition, Lithuanian gas supplies were provided by the Russian company that were not considered reliable, and the only safeguard in this situation was the transit to Kaliningrad. Moreover, the situation changed because there is a new Norwegian supplier that provides gas to LNG terminal. Therefore, Lithuanian gas system is more reliable now compared to the way it was in 2009.

#### ***Lithuanian Energy Security: Sustainability of Gas Supplies***

Sustainability has been considered as quite a new dimension in the energy security analysis. However, it still seems as a key element mentioned various times in both National Energy Strategy 2007 and Energy Independence Strategy 2012. National Energy Strategy 2007 underlines that the main aim of energy policy is “ensuring reliability, competitiveness and sustainable development of energy supply”, while Energy Independence Strategy 2012 emphasizes sustainability and the increase of the share of renewable energy resources in all the 3 stages of the strategy and even underlines it as the main long – term goal for the period 2030 – 2050. Both strategies signify the most important elements of energy security that are sustainable development of energy sector taking into account global trends and EU environmental directives, lower emission of greenhouse gases and other harmful gases, increased efficiency and more renewables in the final energy mix and more project related to research and development of environmentally – friendly technologies (LRS, 2007; 2012). Sustainability is highly significant for Lithuania and includes various elements that will be discussed later in this chapter. Therefore, it is essential to look at what was accomplished in order to increase energy security in the dimension of sustainability during the period 2009 –

2015 and figure out if natural gas could be part of sustainable energy mix in the long – medium run.

### *Decrease in CO<sub>2</sub> emissions*

The first element of sustainability described in the Lithuanian strategies was the need to decrease greenhouse gas emissions. According to the National Energy Strategy 2007, sustainability should be reached by the reduced emission of CO<sub>2</sub> by 8% in 2010 compared to 2004, raised environmental taxes and increased share in renewables by 12% by 2012 and 20% (1/4 biofuels) by 2025 (LRS 2007). Energy Independence Strategy 2012 is aiming at 23% of renewables in the final consumption, 30% - 40% decrease in house and public heat consumption and 1,5% in efficiency saving by 2020 (LRS 2012). The most pollutant sectors in Lithuania were energy producers, transport, agriculture and industry. However, some of the users mentioned before decreased their CO<sub>2</sub> consumption, but others increased. The total GHG emission decreased from 20,7 million tons CO<sub>2</sub> in 2009 to 20,4 million tons in 2013. So, Lithuania became a less pollutant country. However, the only energy producers and agriculture decreased their emissions (energy industries from 4,8 to 3,9 tons of CO<sub>2</sub>; agriculture from 4,5 to 4,4 tons of CO<sub>2</sub>), while transport industry pollutes more from 4,5 to 4,6 tons CO<sub>2</sub> and industry from 2,3 to 2,9 tons of CO<sub>2</sub> from 2009 to 2013 (EC Energy Datasheets, 2016). Lithuanian CO<sub>2</sub> emissions decreased during the period 2009 – 2013, but some consumers are showing the upward trend to their pollution patterns. However, energy industry decreased the amount of those greenhouse gases due the increased use of biofuels that will be discussed later in the next paragraph.

### *The use of biofuels*

Lithuanian government maintains very ambitious plans to shift from the usage of gas to biofuels in the heating plants. It is also planning to use it for the electricity generation in the cogeneration power plants. It is estimated that 75% of the central heating sector will use biofuels for the period from 2020 – 2025. Moreover, the electricity generation plants will produce at least 2TWh from the biofuels by the same period. Biofuel would then amount for 90% of the total energy mix in Lithuania. However, biofuel prices were lower than gas prices in 2013, but the capital investment needed is bigger than that of gas. Moreover, biofuel power plant should work the whole year in order to pay off the investment. As heating needs are higher in the winter period this might not be possible to do that (Litbioma, 2013). As a result,

Lithuanian government has decided to subsidize some parts of the capital investment in order to prepare the power plant to use biofuels.

However, respondent number No.4 was the most sceptical one about this decision to switch from gas to biofuels. He claimed that “biofuel is only clean in theory...all the preparation of the biofuels requires a lot of energy that is using other fuels as well.” He was also considering the process of the biofuels and said that “If there won’t be any subsidies then biofuel does not have any exclusive value because if you are taking only pure price of the biofuel as a raw material than its price per KWh is much lower, but as the other components as the process are very expensive.” So, the respondent No.5 was not so excited about the usage of biofuels and indicated agreed that it requires expensive equipment and government subsidies for those projects to pay off. Nevertheless, Lithuanian government is following their plan and the share of renewables was 12,4% in 2009 and it increased to 19,1% in 2014 (EC Energy Datasheets, 2016). That is why Lithuania increased the sustainability because of the increased share of renewables in the total energy mix during the period 2009 – 2015, but it resulted in the decreased usage of gas.

#### *Gas as part of the sustainable mix*

Some of the interviewed respondents expressed some doubts about the future of the gas sector. No.1 said that “Well, I see that a lot customers went to the biofuels and I don’t see a potential where to get the consumers from of the gas.” No.4 agreed that it would be quite hard to switch back to biofuels and highlighted that “I think it will be quite hard to shift from biofuels back to natural gas because the investments have already been made.” Moreover, there are some differences in the Energy Strategies in regards with the usage of gas in the energy mix. National Energy Strategy 2007 points out that “Technologically and ecologically, natural gas is the most effective fossil fuel and it is increasingly widely used, especially in the EU states. Therefore, taking into consideration more stringent environmental requirements, natural gas would be one of the most promising types of fossil fuel in Lithuania over the reporting period, but, due to the increasing gas prices, the comparative economic efficiency of their use is decreasing and will be further decreasing in the future” (LRS, 2007). Nevertheless, Energy Independence Strategy 2012 claims that biofuel and waste potential should be used and “in the gas sector, Lithuania will strive for the decreased gas consumption by replacing it to renewable energy sources...” and “...by 2050 Lithuania will be independent from imports of fossil fuel and produce its energy only from nuclear energy and renewable energy sources” (LRS 2012). Therefore, the future of the gas sector was more promising in the National Energy Strategy 2007 than in

Energy Independence Strategy 2012. Also, the interviewees agreed that it is not clear what will happen in the gas market.

However, sustainability does not only mean environmentally friendly resources, but also the resources that will not be depleted in the medium – long run but there is no pressure to cease using them due to the environmental regulations. Gas has been considered as quite a sustainable material by the interviewees and they all agreed that it could be considered as part of the sustainable mix:

No.1: “When it comes to gas it is considered to be quite environmental friendly so it depends of the attitude.”

No.2: “I think that the usage of gas has a promising future as it is more environment friendly.”

No.3: “I believe that gas is one of the cleanest energy resources compared with oil and coal. You should only work carefully with it.”

No.4: “Natural gas is less pollutant than oil and coal and it technologically is easier to switch from oil and coal to gas. I think that the future of gas is quite promising then.”

No.5: “The purpose is to get rid of the fuel that increases substantially the emissions of CO<sub>2</sub>. This kind of gas is primary oil and coal.”

In fact, there is no common opinion about the usage of gas in the energy strategy. However, the questioned respondents do not consider the gas as a very harmful commodity for the environment. They were also claiming that gas is the most promising fuel in terms of sustainability, so it could be used as part of the sustainable energy mix.

#### *Future consumption of gas*

As it was considered in the previous chapter, the usage of gas is decreasing due to the bigger amounts of biofuels used in heating sector and electricity generation. But the second most polluting sector is transportation that mainly uses oil that is more pollutant than gas. As a result, respondent No.5 indicated that gas could be handled in the retail markets as an alternative to the oil. He also underlined that the most promising niche for the usage of LNG gas from the terminal is ship bunkering. As the growing global concern over air pollution and greenhouse gas emissions from ships has driven regulatory alteration at the international level. The International Maritime Organization (IMO) has adopted regulations that (a) limit the sulphur content in marine fuels to reduce SO<sub>x</sub> emissions; (b) specify standards for new marine diesel engines to reduce NO<sub>x</sub> emissions; and (c) require new ships to meet an Energy Efficiency

Design Index to reduce GHG emissions. These three changes, along with the price advantage of LNG over marine fuels, have driven a strong interest in LNG fuelled vessels as a viable alternative to meet these new standards.

However, LNG gas could be used as the fuel. It is mainly considered as a good alternative for the heavy – duty vehicle market like trucks, transit buses, locomotives and others. “A typical LNG – fuelled truck will have 90% lower NO<sub>x</sub> and PM emissions than a diesel – fuelled truck, 100% lower SO<sub>x</sub> emissions and 30% lower CO<sub>2</sub> emissions.”

To conclude, even though some of the respondent expressed doubts about the future of gas, all of them mutually agreed that gas is less polluting than any other fossil fuel, and there are some opportunities to use it as an alternative for oil especially in the transportation sectors.

#### *Conclusions: Sustainability of gas supplies*

Sustainability dimension in the energy security literature is quite a new aspect, but Lithuanian energy strategies were focusing on it both in 2007 and in 2012. The main focus was to diminish CO<sub>2</sub> emissions, and Lithuania was able to reach this goal during the period 2009 – 2013 by 0,3 million tones and increase the share of the renewables in the total energy mix. Yet, it was reached by the decreased consumption of gas. Energy Independence Strategy highlighted the need to switch from gas to renewables for the period between 2030 – 2015, that means that the future of the gas sector does not seem highly promising. However, some of the respondents claimed that coal and oil, that are more greenhouse gas emitting, could be switched to gas in the sector, such as transportation. They saw some opportunities for gas that could be a part of the sustainable energy mix. Therefore, even though Lithuania developed into a more sustainable country during the period between 2009 –2015, gas still should be considered as part of the sustainable mix.



## **Conclusion**

Energy security was very important and the Lithuanian government has reformed its gas market to a significant extent since 2009. However, the problem was if these reforms resulted in a significant improvement in Lithuania's energy security? In order to solve this problem key concepts of energy security were analysed and they are availability, affordability, reliability and sustainability. In order to draw conclusions about the development of Lithuania's energy security, it was necessary to examine concrete developments in Lithuania's gas sector, and then analyse the impact of those development on the availability, affordability, reliability, and sustainability of Lithuania's gas supplies. This helped to answer the research question of "to what extent has Lithuanian energy policies in the gas sector resulted in an increase in energy security during the period 2009 – 2015."

The 2007 and 2012 energy strategies published by the Lithuanian government suggest a stagewise development of the country's energy security, which correlates with the four elements of energy security identified above.

Lithuania is currently on the availability stage of energy security and availability is described as the most important stagewise element of energy security. In order to increase availability one should diversify sources of supply and this can be done by creating infrastructure itself. So Lithuania had Russian gas available and the pipeline infrastructure needed to provide it. It also increased the availability by building new infrastructural object – LNG terminal that made LNG gas from Norway available. It also created opportunities to get gas from all over the world. So there are more sources of supply in 2015 compared with 2009 - 2 instead of one and there is also infrastructure needed to provide gas from other countries if this gas will not be available anymore. So gas is more available for Lithuania than it was before. Moreover, there are further development plans that will make European gas from other countries available for Lithuania due to the planned pipeline infrastructure. So current Lithuanian policies are creating preconditions for the further increase in the availability of the gas supplies for Lithuania.

Second element of energy security is affordability that is also an important element. Energy Independence Strategy 2012 described it as the priority in the medium – run from the period 2020 – 2030. However, respondents were questioning this stagewise prioritizing by indicating that any project can be considered without taking into account the cost of it. Lithuanian wholesale gas prices were the highest in Europe between the period 2009 – 2015. Yet the price gap between the European wholesale gas prices and Lithuanian gas prices decreased during the

same period. Moreover, after the projects implemented the prices of gas started following so it had a positive effect. However, the price increased by 9 euro in 2015 compared with 2009. The cost LNG project was highly escalated topic but it constituted only from 2% to 5% of the overall gas prices and the prices for the final consumers decreased during the period between 2009 – 2015. So in general wholesale gas prices increased but the projects implemented resulted in lower gap between European and Lithuanian wholesale prices and the final consumers of gas are currently paying the lower price. So affordability in the gas sector decreased for the final customers but it did not decrease for the importing companies.

Reliability of gas supplies means that those supplies will not be interrupted neither in the short – term nor in the long – term. Lithuanian gas sector reliability increased due to the construction of the LNG terminal. The terminal provided opportunity to have access to gas supplies in case if Russian supplies were halted. LNG terminal capacity is bigger than Lithuanian consumption so it would be possible to get whole needed amount only from the terminal. So in long – term reliability increased due to the access to new LNG supplies. When it comes to short – term reliability, Lithuania had access to Incukalns UGS but it could be used only in case of emergency and it does not have enough capacity to satisfy the needs of Lithuania. Moreover, there were various threats related with the ownership of the Incukalns storage facility that might impede the provision if Russian gas would be cut. There were some plans to build new UGS in Lithuania but those plans are not confirmed yet and did not influence Lithuanian energy reliability during the period 2009 – 2015. Furthermore, Lithuania is a transit country for the gas going to Kaliningrad and there are no possibilities for the gas to be cut for Lithuania without cutting it for Kaliningrad. It was serving as the bargaining power from independence till now. However, the gas was cut few times for the neighbouring countries like Ukraine causing some effect on the Western countries. That increases the possibility that gas could be cut for Lithuania anyways. So in fact Lithuania had some leverage in negotiation with Russia in 2009 but reliability increased due to the opportunity to get gas supplies from somewhere else. But there was no increase in the storage capacity that would help the country to deal with the emergency gas needs.

Sustainability is the newest and the most questioned dimension of energy security and some doubt if it is having to be included in the energy security matter. Sustainability is understood as the use of resources that will not be depleted in the medium – long run and that are environmentally friendly. Lithuanian energy policies are aiming at decreasing fossil fuels in the energy mix to the minimum. This means decreased usage of gas. So more sustainable than

means less consumption of gas and makes prior project in gas infrastructure not economically viable. However, gas is more environmentally friendly than oil so it could replace some part of it in the transportation sector. Moreover, the increased share of biofuels in the energy mix was triggered by the Government subsidies and it might not have increased so much if they were not subsidized. So in fact Lithuanian energy policies resulted in more sustainable use of energy but gas should be considered as part of the “sustainable mix” because it is the most environmentally friendly among all the fossil fuels.

This thesis began by asking the question, “To what extent has Lithuanian energy policy in the gas sector resulted in an increase in Lithuanian energy security during the period 2009 – 2015?” As summarized above, the analyses conducted during this thesis have demonstrated that policies pursued by the Lithuanian government resulted in increases in the availability, affordability, and reliability of Lithuania’s natural gas supplies. Furthermore, the increased use of biofuels has reduced Lithuania’s dependence on natural gas, which has increased the sustainability of Lithuania’s energy mix. Given that these four elements constitute the key measurements of energy security; it is possible to state clearly that the policies pursued by the government in Lithuanian gas sector have led to a substantial increase in the country’s energy security.

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## ***Pictures***

Picture No. 1

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Picture No. 3

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Picture No. 7

Amber Grid. *Average Gas Price in Lithuania (euro/ MWh)*

Received on the 27 of February 2016 from one of the interviewees

Picture No. 8

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## Appendices

### *Interview Guide*

- What do you think energy security means for Lithuania?
- Did energy security was always important for Lithuania? Why?
- What projects and events prove that?
- When there were real actions taken and project started to be implemented in order to increase this energy security?
- In what stage of energy security Lithuania is at the moment? (availability, affordability, reliability, sustainability)
- What are factors influencing most energy security of Lithuania?
- What were the events that have influenced most energy security of Lithuania?
- How did you evaluate the construction of LNG terminal?
- What are the pluses, minuses?
- Why LNG was not regional?
- How did you evaluate the size of the terminal?
- What do you think about the Lithuanian plans to build the terminal?
- What do you think about the 3<sup>rd</sup> Energy Package implementation in Lithuania?
- Is it really possible to create a well-functioning gas market? Is it possible to create it in Lithuania?
- What do you think is the main purpose of the 3<sup>rd</sup> Energy Package?
- What do you think about the gas market before LNG terminal and 3<sup>rd</sup> Energy Package implementation and after?
- What do you think about the company ownership after the implementation of the 3<sup>rd</sup> Energy Package?
- What do you think about the construction of GIPL project?
- Does Lithuania need this connection?
- What is the main purpose of the project?
- What do you think about Lithuanian possibility to become a transit country (not considering Kaliningrad)?
- What do you think about Stockholm arbitrage case against Gazprom?
- What do you think about the discount for AB Lietuvos dujos? Is it a discount or compensations?

- What is the importance of the gas price in Lithuania?
- What you think about the cost of the projects implemented?
- What do you think about the security tax paid by gas users?
- Is it better to have Russian gas because they are cheaper? Or is it better to have LNG gas because they increase energy security of the country?
- How would you describe the reliability of gas supplies for Lithuania?
- Did Lithuanian energy reliability increased during the period investigated?
- How would you evaluate Lithuanian possibilities to have access to gas in case of emergency?
- Do you believe that gas storage facility is necessary for Lithuania?
- How would you describe Lithuanian gas suppliers?
- Is it only the price that makes the country to switch from one supplier to another?
- How would you describe sustainability of gas supplies?
- Is it important for Lithuania?
- What do you think about the subsidies to biofuels?
- What could be the future of the Lithuanian gas sector?
- Can gas be part of the sustainable energy mix?
- What are the threats to Lithuanian energy security?