LITHUANIA'S LNG TERMINAL AND ENERGY SECURITY IN THE EU

Cherelle Chin, 11095504, ES4-4B

JANUARY 4, 2016

SUPERVISOR: MRS. TROMBLE
Academy of European Studies & Communication Management
The Hague University of Applied Sciences

Image title page: (''Baltic, Nordic, Visegrad countries unite in support of EU Energy Union'', 2015)

Executive Summary

The aim of this dissertation is to research if and how Lithuania's LNG terminal could be a method to ensure energy security within the European Union. Lithuania's energy position has been a very vulnerable one, and used to import 100% of its gas supply from Russia's state monopoly Gazprom. In order to become independent from Gazprom and to diversify the gas supply in the country, Lithuania has established the Klaipeda LNG terminal in 2014.

Not only Lithuania, but also other member states in the EU rely heavily on Russian gas, and this paper explains how LNG contributes to a higher energy security. LNG is a great way to diversify energy, mainly because countries do not need to be connected to the pipelines of the supplier, because it can be transported to them. Therefore, vulnerable countries with insufficient pipeline connections are able to transport LNG to their pipeline. Nevertheless, LNG technologies are costlier than natural gas, but advanced technologies are able to contribute to lower prices.

The European Union has several strategies and communications on energy security, and the basis of this lies with the Lisbon Treaty. For the EU: energy security should ensure the functioning of the energy market, secure supply (SOS), and advance new and renewable energy, as well as advance interconnected networks within the MS. The EU does recognise that LNG ensures better market competition as well as help secure supply better through diversification.

Nevertheless, looking at long-term solutions, LNG is not a sufficient means to ensure energy within the EU. Even though it has great advantages and helped secure energy in Lithuania, it is still enhancing greenhouse emissions. To combat climate change, the EU wants to move away from fossil fuels and establish an economy build upon RES and energy efficiency by 2050. This is not easily to obtain, and therefore, at least on the short and medium term, LNG can be used by European member states as a diversifying method.

Table of Contents

Abbreviations

BCM	Billion Cubic Metres
BEMIP	Baltic Energy Market Interconnection Plan
EC	European Commission
EU	European Union
FSRU	Floating Storage and Regasification Unit
IEA	International Energy Agency
IPCC	The Intergovernmental Panel on Climate Change
LNG	Liquefied Natural Gas
MS	Member States
NBP	National Balancing Point
NOC	National Oil and Gas Companies
RES	Renewable Energy Sources
SOS	Security of Supply

Introduction

In the next twenty years, it is predicted that the European Union will have serious issues regarding energy supply, because there are no large-scale substitutes for fossil fuels other than nuclear energy (Paillard, 2010, p. 65). In addition, the need for policies regarding energy security keeps growing, and it will continue to be an important factor in military and political relations (Paillard, 2010, p. 65). It is likely that 22 to 29% of all the energy supplies in the world will consist out of natural gas in 2030 (Paillard, 2010, p. 65). Gas will be the most important energy source in Europe, followed by oil (Paillard, 2010, p. 65). The gas reserves are overflowing in some parts of the world, and most of it is located in countries such as Iran, Qatar and Russia (Paillard, 2010, p. 69). Russia is rich with gas reserves, and knows how to exploit these reserves to their benefit (Paillard, 2010, p. 69).

It is estimated that the gas production in Russia will increase, making them the leading country in the gas market (Paillard, 2010, p. 69). On the contrary, the gas supply in the North Sea in Europe is decreasing, and in 2015, the European gas industry will only be able to answer to two thirds of the gas demand, and this will decrease further to a quarter in 2025 (Paillard, 2010, p. 69). In 2015, Norway became the biggest gas supplier to Western Europe (''Norway outstrips Russia as western Europe's largest gas supplier'', 2015, par. 1). However, Russia remains a big gas supplier to many MS, and over the next 10-15 years, this is likely not going to change (Siddi, 2015, par. 3). Russia and the European Union are interdependent on each other, because the Union needs Russia's supplies, and at the same time, Russia needs the EU to maintain its monopoly position, because the Union is their biggest gas importer (Godzimirski, 2014, p. 1). This dependency is not without consequences, and during the previous Ukraine crises in 2006 and 2009; it has become evident for the European Union that tensions between Ukraine and Russia have consequences for the energy security within the EU (Godzimirski, 2014, p. 1). The main reason for this is the fact that 50% of EU's gas supply is being shipped through Ukraine (Godzimirski, 2014, p. 1). The latest crisis between Ukraine and Russia had a huge influence on the gas supply of the EU, and once again, the EU was confronted with the sensitive position of their energy sources (Godzimirski, 2014, p. 1).

In the past, there has not been cohesion regarding policies to secure energy between the Member States (Baran, 2007, p. 131). Russia has taken advantage of this, and made energy deals in their own favour to strengthen Europe's dependency on their supplies (Baran, 2007, p. 131). The European Union imports 50% of all its gas supply from Russia (Baran, 2007, p. 132). Furthermore, 7 countries in Eastern Europe import

90% of Russian gas, and 6 EU Member States rely completely on the gas supply from Russia (Baran, 2007, p. 132). In 2005, Gazprom, the company with the state monopoly position in Russia, announced that they would implement certain market rules for the former Soviet countries (Bahgat, 2006, p. 961). Because of these new rules, the Eastern European countries would lose their hugely subsidized prices, and would have to pay prices similar to the countries in Western Europe (Bahgat, 2006, p. 961). Bahgat argues that ''this new policy was largely seen as a punishment for the Ukrainian President Viktor Yushchenko, who had led the so-called Orange Revolution, defeated the Kremlin's favoured candidate in Ukraine's presidential election and pursued a pro-western foreign policy'' (Bahgat, 2006, p. 961). Furthermore, Ukraine refrained from paying the new higher prices for Russian energy, which led to a dispute between the two countries (Bahgat, 2006, p. 961). Even though the gas in the EU had not been disrupted, this matter did raise questions on the liability of energy supplies from Russia (Bahgat, 2006, p. 962). The most recent Ukraine crisis has made the matter of energy security an important priority on the EU's agenda, and it also damaged the relationship between Russia and Europe (Godzimirski, 2014, p. 2). Additionally, another fact that has had a negative impact on the relationship between the EU and Russia are the restrictive sanctions by the European Unions and the United States (Godzimirski, 2014, p. 3). These sanctions were established due to the annexation of Crimea and to assist Ukraine and de-escalate the whole situation during the crises in 2014 (''EU sanctions against Russia over Ukraine crisis'', n.d., par. 1).

Despite the vulnerable position of the Baltics and the Eastern European countries regarding energy security, Lithuania has found a way to diversify its supply. In 2014, Lithuania build an LNG terminal in the port of Klaipeda, which is a special pier connected to the pipelines in the Baltic region (Smailys, 2014, p. 3). This terminal has the capacity to store 170,000 m3 of gas, and the vessel can receive as much as 70.000 tonnes of natural gas (Smailiys, 2014, p. 3). Furthermore, this terminal is able to supply almost all the gas needs in Lithuania, and when needed, is also able to supply gas to Estonia and Latvia (Smailiys, 2014, p. 3). Pavilionis writes that ''Lithuanian President Dalia Grybauskaite summed up the importance of the LNG terminal by noting that no one ever will blackmail us over gas prices or influence, through energy, our political or economic life'' (Pavilionis, 2015, p. 68).

The purpose of this research report is to analyse if and how Lithuania's liquefied natural gas terminal could contribute to ensuring energy security within the European Union. This is important due to the fact that the European Union does not

have sufficient energy sources, and therefore many Member States rely on Russia's state monopoly Gazprom for gas. Nevertheless, it is important to diversify energy supply, and Lithuania has been successful in transforming their energy sector from one that relied heavily on Russia, to becoming an independent gas supplier. In order to find out to what extent Lithuania's liquefied natural gas terminal could contribute to the energy security in the European Union, it is important to analyse current policies made by the EU regarding energy supplies and also to analyse whether LNG can be considered a means to ensure energy.

The latest Ukraine crisis has underlined once again the dependency of EU Member States on energy supply from Russia, and therefore, it is important to explore possibilities to diversify energy sources. Since the establishment of the liquefied natural gas terminal in Klaipeda, Lithuania has shown that it is possible to become independent from Russian gas, and this may also be possible for the EU and the MS. This is important to the European Union, since it is estimated that in 2020, ¾ of all the gas supply needs to be imported to the MS (Tarvydas & Gatautis, 2006, p. 94). The technology of liquefied natural gas has advanced, and because of this, the costs of LNG have dropped greatly (Tarvydas & Gatautis, 2006, p. 94). Furthermore, the prices of natural gas are increasing, which makes LNG an economically interesting option (Tarvydas & Gatautis, 2006, p. 94). Another reason why LNG is a good option is because the percentage of the final LNG price is low due to the bonuses compensated for the liquefaction, transportation and re-gasification, and this makes it also easy to import LNG to far-off places (Tarvydas & Gatautis, 2006, p. 94).

With the establishment of this LNG terminal, Lithuania is the first Baltic country to become independent from Gazprom, and is able to buy gas from markets all over the globe (Grigas, 2014, par. 3). The terminal is expected to have a capacity of 1,5 BCM in the first year of being in use (''Klaipeda LNG terminal: Competition adds energy security'', 2014, par. 6). Additionally, the full capacity of the terminal is 4 BCM, and this will be accomplished when the building of pipelines to Latvia and Estonia will get an upgrade in the future (''Klaipeda LNG terminal: Competition adds energy security'', 2014, par. 6). Therefore the research question is specified as ''to what extent is Lithuania's liquefied natural gas (LNG) terminal a method to ensure energy security in the European Union?''

In order to answer the central question, this research is divided into four sections:

1. How can energy security be defined?
2. What are the EU's current strategies on energy security?

3. To what extent is the LNG terminal in Lithuania successful?
4. To what extent can liquefied natural gas (LNG) be considered a means to secure energy?

In this dissertation, the research methods used will be explained first. Secondly, the results of the research findings will be presented, followed with the discussion section and a conclusion will be drawn. Lastly, recommendations will be made based upon the findings.

1. Methodology

1.1 Case study: Lithuania

For every state economy, it is important to have competent energy sources, since almost all sectors related to economic fields need energy for production, importation and exportation (Augutis, Krikštolaitis & Ušpuras, 2013, p. 4). Economic sectors such as industry, transport and agriculture need to depend on good energy sources, and these sources are also needed for the military, in order to secure the state (Augutis, Krikštolaitis & Ušpuras, 2013, p. 4). In Lithuania, the matter of energy security is more complicated compared to other countries in the European Union, because Lithuania does not have primary energy sources (Augutis, Krikštolaitis & Ušpuras, 2013, p. 4). In the Country Factsheet of Lithuania, written by the Commission, Lithuania's import dependency has also been mentioned (Country Factsheet Lithuania, 2015, p. 2). The Commission writes ''import dependency in Lithuania is higher than for the EU as a whole'' (Country Factsheet Lithuania, 2015, p. 2). They continue by writing that ''import dependency was in 2013 100% for gas and at very high levels for petroleum products'' (Country Factsheet Lithuania, 2015, p.2).

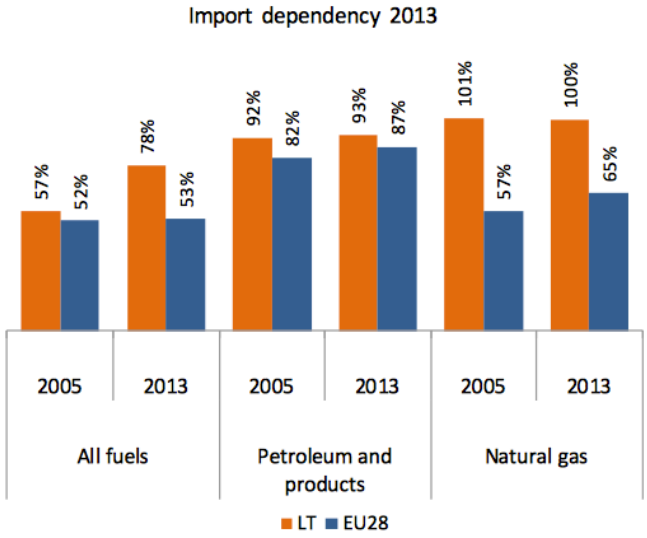

Figure 1 (Country Factsheet Lithuania, 2015).

Additionally, there are no gas or oil networks from EU Member States to Lithuania, and the electricity grid needs modernisation (Augutis, Krikštolaitis & Ušpuras, 2013, p. 4). Lithuania's energy security problems started with them gaining independence in 1990, and as a response, got blocked from energy sources by the Soviet Union in the hope that Lithuania would re-join the Soviets (Janeliūnas, 2009, p. 190). This energy blockade lasted from April 20th until July 11th, and it had damaging consequences for the economy, since energy is needed for almost everything (Janeliūnas, 2009, p. 190). Furthermore, Lithuania used to also depend on nuclear

energy, but in order to become a EU member state, had to close both their nuclear power plants in 2004 and 2009 (Augutis, Krikštolaitis & Ušpuras, 2013, p. 4). Furthermore, Augutis, Krikštolaitis and Ušpuras write that ''since the beginning of 2010, Lithuania's energy system became highly dependent on import of electricity and fossil fuels (Augutis, Krikštolaitis & Ušpuras, 2013, p. 4). As mentioned before, Lithuania is secluded from the EU's energy system; they are not part of the electricity connections, and also have to rely on one single gas supplier that is outside the country (Augutis, Krikštolaitis & Ušpuras, 2013, p. 5). Furthermore, the import of electricity comes from the neighbouring countries, and Lithuania imports more than half of all its electricity (Augutis, Krikštolaitis & Ušpuras, 2013, p. 5). Before the LNG terminal in Klaipeda, Lithuania used to import all its natural gas from Gazprom, and paid one of the highest gas prices within the European Union (''Klaipeda LNG terminal: Competition adds energy security'', 2014, par. 2).

Lithuania has set an example on how to become independent and secure energy supply with help of the LNG Terminal in Klaipeda. Grigas writes that ''Lithuania's Klaipeda LNG Terminal, unlike traditional stationary terminals, relies on floating storage and regasification technology'' (Grigas, 2014, par. 3). Lithuania's terminal is floating, and the boat is the length of three football fields (Grigas, 2014, par. 3). In addition, the boat will unload its LNG carriers and turn the liquid into gas, pumped at the shore (Grigas, 2014, par. 3). According to Tarvydas and Gatautis, ''liquefied natural gas (LNG) is odourless, colourless, nontoxic, noncorrosive natural gas consisting almost entirely of methane (CH4)'' (Tarvydas & Gatautis, 2006, p. 94). They continue by explaining that ''LNG is kept at –161 °C at a pressure similar to atmospheric'' (Tarvydas & Gatautis, 2006, p. 94). LNG did not used to be a popular choice of gas, and it was mainly used in situations when the building of gas pipes was not necessary, or when the gas source was too far away from the consumers (Tarvydas & Gatautis, 2006, p. 94). In addition, because LNG is not physically bound to its gas source, it is a great way to diversify energy sources, and it is a way to secure gas supplies (Tarvydas & Gatautis, 2006, p. 94).

The reason why Lithuania's terminal is chosen as the case study for this research is due to the fact that, as mentioned above, Lithuania used to depend 100% on energy imports and managed to transform their dependent position into a strong and independent one. The European Union is less vulnerable than Lithuania was, but still imports most of its gas from outside the Union and these imports will most likely continue to increase in the future. This strengthens the energy insecurity of the EU, while in the meantime; Lithuania has been able to secure their supply, since they are

able to transport LNG from anywhere in the world to their pipelines. This leads to the question, could this terminal contribute to not only Lithuanian, but also European energy security? Lithuania has set a valuable example on how to secure energy in a country, and therefore makes this case research worthy, in order to find out whether this LNG terminal is a method to ensure energy security within the EU.

1.2 The research methods

During this research, policies and academic materials have been analysed. The reason for this is that there has been a lot written about the subject, and this information can be transformed into data that fits this research. In addition, this paper will be basic analytical, as it will analyse the effect of LNG on energy security. Furthermore, to gain in-depth information on energy security in the European Union and LNG, semi-structured interviews have been conducted. Clifford et al. explain semi-structured interviews as interviews that ''are about talking with people but in ways that are self-conscious, orderly and partially structured'' (Clifford et al., 2010, p. 103). Clifford et al., continues by saying ''allowing the discussion to unfold in a conversational manner offers participants the chance to explore issues they feel are important'' (Clifford et al., 2010, p. 107). Furthermore, Mathers et al. describes the advantages of semi-structured interviews by saying that ''if the interviewee has difficulty answering a question or provides only a brief response, the interviewer can use cues or prompts to encourage the interviewee to consider the question further'' (Mathers et al., 1998, p. 1). The semi-structured interviews have provided an in-depth perspective about both energy security in the EU and the LNG terminal in Lithuania. Furthermore, these interviews gave the research specific data by experts that is, in general, only usable for this paper.

1.3 The secondary data

In order to find out what the different energy security definitions are, several energy related journals have been reviewed. Several experts and their conceptualisation of energy security have been consulted, in order to define energy security in a way that fits this research best. Furthermore, in order to understand what measures the EU should take to ensure the security of energy; several strategies set up by the European Commission have been researched. One of the most important EU document for this paper was the EU Energy Security Strategy 2014, where the Commission addresses the vulnerable position of the MS regarding energy. The Commission has set up several strategies to help the MS secure their energy better. Another document that was crucial in order to understand the EU's view on how to make energy more secure is the Energy Roadmap 2050. In this document, the Commission lays out a roadmap for the Union how to move away from fossil fuels to

renewable energy sources, in order to combat greenhouse emissions, and also links RES to energy security. In order to understand the success of the terminal in Lithuania, several articles in the journals of Energy Policy and Applied Energy has been consulted. Lithuanian experts, who have a lot of knowledge on the topic, mainly wrote these journals. Lastly, to find data on whether LNG could be seen as a means to secure energy, journal articles on LNG have been reviewed. Nevertheless, in order to find out whether LNG is indeed secure, it is important to investigate LNG alternatives, such as nuclear energy and RES.

1.4 The interviews

In order to gain in-depth knowledge on this subject, three semi-structured interviews with experts have been conducted. During the semi-structured interviews, as stated by Whiting, it is not necessary to be in total control of the situation, but rather let personal reflection be a part of it, since this will enhance the understanding of issues that are fundamental (Whiting, 2008, p. 36). During the interviews, all the interviewee's were asked the same questions, but did get the opportunity to have their own input. Therefore, other questions regarding this input have also been asked.

2. Literary review

2.1 The complexity of energy security

Even though the matter of energy security has a high importance, the term is not clearly defined (Winzer, 2012, p. 36). Energy security has many different meanings to everyone, which makes it even harder to conceptualise (Kruyt, van Vuuren, de Vries & Groenenberg, 2009, 2167). Energy is the key factor in every modern economy and in modern lives of people, and therefore, securing energy is also about securing people (Sovacool & Mukherjee, 2011, p. 5343). Sovacool and Mukherjee point out that ''coal, oil, natural gas, and uranium are currently needed to energize our vehicles, light schools and workplaces, produce food, manufacture goods, and cool and warm our residences'' (Sovacool & Mukherjee, 2011, p. 5343). It could be said that energy is a basic need, such as water, food and air (Sovacool & Mukherjee, 2011, p. 5343). Nevertheless, energy security is not valued accordingly to this, which may lead to failure of security systems (Sovacool & Mukherjee, 2011, p. 5343).

After the second world war, many countries relied heavily on oil from the Middle East, and it was an important energy source for the growing economy, and in particular, the transport sector (Chester, 2010, p. 888). Oil supply was cheap, until it got much more expensive in 1970, triggered by the restriction on production by the Organisation of Petroleum Exporting Countries (Chester, 2010, p. 888). Chester explains that ''the shortfall in global energy supplies led to the formation of the International Energy Agency (IEA) with member countries required to hold oil stocks for sharing in an oil supply emergency'' (Chester, 2010, p. 888). Furthermore, this has led to the acknowledgement of countries that it is important to not depend so heavily on oil (Chester, 2010, p. 888). Another important energy source was nuclear energy, and by 1970, countries such as the U.S., U.K., France, Germany and Russia were using it (Chester, 2010, p. 888). Nevertheless, the accidents of Three Mile Island in the United States and Chernobyl in the former Soviet Union, and of course the latest nuclear accident of Fukushima have caused a negative image of nuclear energy among the public (Chester, 2010, p. 888). Additionally, in 2006, the use of nuclear energy for electricity was reduced to a total of 15% in the world, and coal and gas are being used more to generate electricity (Chester, 2010, p. 888). In the twentieth century, China and India emerged as huge consumers and importers of energy (Chester, 2010, p. 888). In 1980, those two countries together consumed less than 8% of the world energy consumption, and by 2005, this has grown to 18% (Chester, 2010, p. 888). It is estimated that their combined use will double in the next 25 years (Chester, 2010, p. 888). In addition, China is using a lot of coal, increasing the coal use in the world (Chester, 2010, p. 888).

The dependency of countries around the globe on energy imports is high, and the possibility of problems regarding energy is also high, because of political situations that might occur, such as the several energy disruptions from Russia to Europe play a role. (Chester, 2010, p. 888). But other factors such as natural disasters can disrupt the import and export of energy as well, which enhances the energy dependency in the world (Chester, 2010, p. 888). Furthermore, since the 20th century, energy supply depends upon import and exports at the world market, and involves a complicated infrastructure of cross-border pipelines, tankers and offshore platforms (Chester, 2010, p. 889). There is a growing dependence on small groups of energy suppliers, because these groups are interdependent on industrial countries, and also the financial sector is closely connected with the energy market (Chester, 2010, p. 889). Chester explains that ''this complexity brings heightened risks of major supply disruption through political conflict or war, technical system failures, accidents, sabotage, extreme weather events or financial market turmoil'' (Chester, 2010, p. 889).

2.2 Conceptualizing energy security

As believed by Cherp and Jewell, even though energy security has several different meanings, the concept remains the same (Cherp & Jewell, 2014, p. 416). Cherp and Jewell write that ''a good starting point in conceptualizing energy security is the idea that economic security, environmental security, identity security, social security, and military security are different forms of security, not fundamentally different concepts'' (Cherp & Jewell, 2014, p. 416). They argue that energy security should define ''the low vulnerability of vital energy systems'' (Cherp & Jewell, 2014, p. 418). They divide this between 3 parts, namely: ''(a) delineating vital energy systems; (b) exploring their vulnerabilities; and (c) Referent objects and securitization'' (Cherp & Jewell, 2014, p. 418). Vital energy systems translate into: what to protect? (Cherp & Jewell, 2014, p. 418). Vital energy systems are energy sources and technologies that support energy imports and exports (Cherp & Jewell, 2014, p. 418). Furthermore, examples of this are systems such as: RES, infrastructure, sufficient supply, etc. (Cherp & Jewell, 2014, p. 418). Cherp and Jewell argue that identifying these vital systems will help target what is necessary to protect (Cherp & Jewell, 2014, p. 419). The second factor is vulnerability, and Cherp and Jewell point out that ''vulnerabilities of vital energy systems are combinations of their exposure to risks and their resilience'' (Cherp & Jewell, 2014, p. 419). Mostly, experts distinguish these vulnerabilities between short and long term, and between physical and economical risks (Cherp & Jewell, 2014, p. 419). Looking at economical risks, ''a good starting point is the argument that in the context of energy security: prices are affordable if

they stop short of causing severe disruption of normal social and economic activity" (Cherp & Jewell, 2014, p. 419). The origins of energy security risks could lie with factors such as natural forces, but also deliberate actions by certain (sovereign) actors (Cherp & Jewell, 2014, p. 419). Cherp and Jewell argue ''one, the 'sovereignty perspective', sees the origin of risks in deliberate actions of foreign actors. It has its roots in political science and focuses on interests, power, intentions, and the space for manoeuver'' (Cherp & Jewell, 2014, p. 419). Natural risks are risks such as: supply scarcity, old infrastructure and natural situations and/or disasters that may occur (Cherp & Jewell, 2014, p. 419). Furthermore, the last factor is identified as ''referent objects and securitization'', and here, both authors stress the importance of security for whom, and also add that there has not been much attention paid to this (Cherp & Jewell, 2014, p. 419).

Ang, Chong and Ng write that energy security depends upon seven factors, namely: energy availability, infrastructure, energy prices, societal effects, environment, governance, and energy efficiency (Ang, Chong & Ng, 2014, p. 1081). The two main things that affect energy availability are geopolitical factors and diversification (Ang, Chong & Ng, 2014, p. 1081). According to Ang, Chong and Ng, diversification helps to reduce and better deal with any sort of disruption of the energy supply (Ang, Chong & Ng, 2014, p. 1081). Any sort of geopolitical issues relates to wars, regional tensions or unstable regimes (Ang, Chong & Ng, 2014, p. 1081). Furthermore, Ang, Chong and Ng write that ''energy supply diversity can take several forms'' (Ang, Chong & Ng, 2014, p. 1081). They continue by saying that ''a country which imports energy from many different countries has high source diversity, whereas a country with large land area has higher potential for spatial diversity as it can distribute energy facilities across different sites and reduce the impact of critical incidents in a specific location'' (Ang, Chong & Ng, 2014, p. 181). Countries can also diversify their supply when using a mix of several energy sources, and countries that mainly use renewable sources, can invest in energy efficiency technology (Ang, Chong & Ng, 2014, p. 1081).

Additionally, the second factor is infrastructure. Ang, Chong and Ng write that ''infrastructure is integral in providing stable and uninterrupted energy supply'' (Ang, Chong & Ngm 2014, p. 1082). Infrastructure involves energy transformation facilities, power plants, distribution and transformation facilities such as pipelines, etc. (Ang, Chong & Ng, 2014, p. 1082). Investment in good infrastructure means that you are securing your supply by making sure that there is sufficient energy for the short and long term (Ang, Chong & Ng, 2014, p. 1081). The third factor is energy

prices, because it is important that energy supply is affordable (Ang, Chong & Ng, 2014, p. 1082). Ang, Chong and Ng point out that ''since crude oil is traded in US dollars internationally, exchange rates and purchasing power of different currencies play a role in determining how much a country and its people pay for energy imports'' (Ang, Chong & Ng, 2014, p. 1082). Societal effects are also an important factor in securing energy, because everyone in a society needs and uses energy (Ang, Chong & Ng, 2014, p. 1082). Ang, Chong and Ng write that ''societal concerns include energy poverty, where certain segments of the population could be denied the basic energy services'' (Ang, Chong & Ng, 2014, p. 1082). It could also be the case that some communities have energy projects that are harmful for their own environment (Ang, Chong & Ng, 2014, p. 1082).

Moreover, the environment is also a factor mentioned by these scholars, because carbon and other emissions that come with energy are one of the causes for global warming and air pollution (Ang, Chong & Ng, 2014, p. 1082). The sixth factor mentioned is the importance of governance to avoid and reduce disruptions (Ang, Chong & Ng, 2014, p. 1082). It is important for governments to support infrastructure to ensure long-term security, and countries are increasingly working together with exporting regions because of this (Ang, Chong & Ng, 2014, p. 1082). Lastly, energy efficiency is also a relevant factor, and Ang, Chong and Ng write that ''energy improving technologies, systems, and practices help to reduce energy needs and improve energy security'' (Ang, Chong & Ng, 2014, p. 1082). Furthermore, closely related to energy efficiency is energy intensity (Ang, Chong & Ng, 2014, p. 1082). Reducing the energy intensity also contributes to energy security, because it reduces the amount of energy a country needs to be able to function (Ang, Chong & Ng, 2014, p. 1082).

Johansson argues that energy security involves two main aspects, namely: security of demand and security of supply (SOS) (Johansson, 2013, p. 200). SOS is the most important for most countries, because, as mentioned before; energy is crucial for a modern society (Johansson, 2013, p. 201). To define SOS, factors such as availability and price point are mostly taken into account (Johansson, 2013, p. 201). SOS depends upon good working infrastructures and networks that transport, transform and distribute energy chains to the importers and consumers (Johansson, 2013, p. 201). Threats to these infrastructures may occur at any time, either by (state) actors or natural phenomena, and therefore, energy dependency is a huge part of energy security (Johansson, 2013, p. 201). Furthermore, Johansson argues that ''the threats to security of supply can be of differing characters in terms of type of negative

effects, time-frames and cause of the threats'' (Johansson, 2013, p. 201). He goes on by saying ''the main negative effects that threaten the interests and values of nations and individual consumers are energy interruptions and price increases resulting from long or short term imbalances between supply and demand'' (Johansson, 2013, p. 201). Two time frames are important to help deal with threats, namely level of performance of the disruption, and the warning time prior to these disruptions (Johansson, 2013, p. 201).

Firstly, performance of disruptions means the time that it actually lasts, and of course, the longer the disruptions takes, the greater the consequences will be (Johansson, 2013, p. 201). Johansson points out that ''the acceptance for short-term effects and the strategies to deal with these are significantly different to those attached to longer interruptions and imbalances'' (Johansson, 2013, p. 201). He gives an example, namely: ''for shorter fuel supply interruptions, energy reserves could be released to reduce price hikes but this method would be less feasible for long-term imbalances'' (Johansson, 2013, p. 201). Furthermore, the second factor is the warning time prior to disturbances, and when there is a sufficient warning time, changes can be made accordingly, in order to reduce the consequences (Johansson, 2013, p. 201).

Security of demand is crucial for energy exporting countries, and these countries rely economically heavily on these exports (Johansson, 2013, p. 202). Johansson writes that ''the role of the energy sector in this case is comparable to that of other important industrial sectors, with the difference that the energy sector in a few countries totally dominates the economy'' (Johansson, 2013, p. 202). He continues by saying that ''the oil industry contributes 45% of GDP in Saudi Arabia, 80% of budget revenues and 90% of exports'' (Johansson, 2015, p. 202). Because of this, it remains in the exporting countries interest to have stable prices and sufficient infrastructures, and in the meantime, this is also important for the importing countries (Johansson, 2015, p. 202). However, there may be a conflict of interest between importers and exporters about price levels, etc. (Johansson, 2015, p. 202). Another conflict between these two is climate policies, since they can harm the economy of exporting countries (Johansson, 2015, p. 202). Nevertheless, Johansson argues that ''this reasoning could be too simplistic as climate policy would lead to even greater cost increases for unconventional oil and synthetic diesel from coal which, in a world of dwindling oil resources, might set the long-term price for liquid fuels'' (Johansson, 2013, p. 202).

As the previous mentioned scholars also have discussed, Stringer writes that energy security ''now extends to the entire infrastructure of energy supply that supports the

global economy'' (Stringer, 2008, p. 122). Stringer believes that the view on energy security depends upon your place in the energy supply chain, and energy consumers and companies that are energy intensive, would need good prices and no disruptions (Stringer, 2008, p. 122). On the other hand, Stringer points out that ''oil and gas companies consider access to new reserves, ability to develop new infrastructure, and stable investment regimes to be critical to ensuring energy security'' (Stringer, 2008, p. 122). While developing countries are concerned with how to pay for the energy needed to support their economy, and policymakers engage in the risks of disruptions in order to secure infrastructures (Stringer, 2008, p. 122). Furthermore, Stringer indicates that ''energy security does not stand by itself but is lodged in the larger relations among nations and how they interact with one another'' (Stringer, 2008, p. 123). He continues by saying ''for states, energy security contains three essential goals: the availability of energy needed for a stable economic and social development; freedom from interruption of the energy supply; and the affordability of energy prices'' (Stringer, 2008, p 123). In addition, looking at energy security from a political perspective, involves three main aspects: energy availability, the amount of energy needed for a stable economy and social development, no disruptions of supply and lastly, affordable energy prices (Strigner, 2008, p. 123).

Looking at all these definitions of energy security, the scholars do agree with each other that energy availability, prices and infrastructures all have to be taken into account. This all connects to the case study of Lithuania, since the terminal was established due to a lack of sufficient infrastructures and in order to achieve sufficient availability of gas for good prices. Besides, this paper aims to research energy security on a political level, because it aims to research energy security from a European perspective. So in order to conceptualize energy security in a way that is fitting for this research, **availability**, **affordability** and **infrastructure** are all factors that have to be taken into account.

Therefore, this paper will refer to energy security as the availability and affordability of supply with support of good infrastructures, perceived from a European perspective.

3. EU energy strategies and policies

3.1 The European Union's energy position

The main basis for the EU as an energy union has been laid out in the Lisbon Treaty (2007), and according to this treaty, four factors should be taken into account, namely: ensuring the functioning of the energy market, security of supply, new and renewable energy and interconnected networks (Lisbon Treaty, 2007, p. 133).

Two of the most recent strategies regarding energy security in the European Union are the Energy Roadmap 2050 and the Energy Strategy established in 2014. These strategies are important, mainly because energy is a vital aspect of every economy and lifestyle in modern states, and energy is also something that citizens expect for an appropriate price (''In-depth study of European Energy Security'', 2014, p. 3). Since the 70's, most Member States have not experienced any disruptions regarding energy (''European Energy Security Strategy'', 2014, p. 2). Despite this, in 2006 and 2007, the energy supply was temporarily disrupted, which affected some countries in the east of the EU, mainly because six countries in Eastern Europe import 100% of their gas from Russia (''European Energy Security Strategy'', 2014, p. 2). This has led to the strengthening of collective strategies and policies regarding energy security, but the EU's position remains vulnerable (''European Energy Security Strategy'', 2014, p. 2). The European Union imports 51% of all its energy supply, and the energy that is imported the most are oil (almost 90%), and gas (66%) (''European Energy Security Strategy'', 2014, p. 2). The European Commission writes that ''the most pressing energy security issue is the strong dependence from a single external supplier, and this is particularly true for gas, but also applies to electricity'' (''European Energy Security Strategy'', 2014, p. 2). Energy security issues are often dealt with on a national level, but the Member States are interconnected with each other (''European Energy Security Strategy'', 2014, p. 3). The European Commission writes that ''the key to improved energy security lies first in a more collective approach through a functioning internal market and greater cooperation at regional and European levels, in particular for coordinating network developments and opening up markets, and second, in a more coherent external action'' (''European Energy Security Strategy'', 2014, p. 3).

3.2 Energy Roadmap 2050 (2011)

This Roadmap provides a follow up for the 2020 strategy and tries to examine different routes towards reducing greenhouse emission, and heading to an economy that is supported by RES and using this energy efficiently (Energy Roadmap 2050, 2011, p. 2). The 2020 Energy Strategy describes EU's strategy for diversifying energy,

sufficient affordable availability of energy and combating climate change, while following the Lisbon Treaty (Energy 2020, 2010, p. 2).

The 2050 strategy consist out of 5 sections, namely:

1. Transforming the energy system;
2. Rethinking energy markets;
3. Mobilising investors - a unified and effective approach to energy sector incentives;
4. Engaging the public is crucial;
5. Driving change at the international level.

3.2.1 Transforming the energy system

The main focus should lie with improving energy efficiency (Energy Roadmap 2050, 2011, p. 9). Furthermore, energy efficiency should become higher in both existing and new buildings, and these buildings (and homes) should be able to produce more energy than that they use (Energy Roadmap 2050, 2011, p. 9). The Commission argues that ''products and appliances will have to fulfil the highest energy efficiency standards'' (Energy Roadmap 2050, 2011, p. 9). They continue by writing that ''in transport, efficient vehicles and incentives for behavioural change are required'' (Energy Roadmap 2050, 2011, p. 9). Household investments play a crucial role in this, and a bigger capital for innovative businesses and consumers are needed (Energy Roadmap 2050, 2011, p. 9). Furthermore, renewable energy plays a crucial part in transforming the current energy system (Energy Roadmap 2050, 2011, p. 9). The Commission writes that ''renewables will move to the centre of the energy mix in Europe, from technology development to mass production and deployment, from small-scale to larger-scale, integrating local and more remote sources, from subsidised to competitive'' (Energy Roadmap 2050, 2011, p. 10). Nevertheless, gas plays a crucial part in the transition period, and using gas as a substitute for oil and gas will help reduce emissions (Energy Roadmap 2050, 2011, p. 11).

3.2.2 Rethinking energy markets

In order to decarbonise the EU in 2050, the joint responsibility needs to be strengthened to avoid spill over with a negative effect (Energy Roadmap 2050, 2011, p. 14). Therefore, the European Commission writes that ''the cross-border impact on the internal market deserves renewed attention'' (Energy Roadmap 2050, 2011, p. 14). One of the main challenges is flexible energy generation, storage and demand management during the transition to renewable energy (Energy Roadmap 2050, 2011, p. 14). Furthermore, the prices of energy could be decreased; because wind and solar energy have very low marginal costs, and this means that these lower prices could remain for a longer period of time (Energy Roadmap 2050, 2011, p. 14).

Nevertheless, if the price for these plants are high, it may not be interesting for investors, because it is unsure whether they are able to make some profit (Energy Roadmap 2050, 2011, p. 14). Therefore, the European Commission writes that ''ensuring that market arrangements offer cost-effective solutions to these challenges will become increasingly important'' (Energy Roadmap 2050, 2011, p. 14). To make this possible, it is important that Member States do no establish policies that could be a barrier to integrating the internal energy market (Energy Roadmap 2050, 2011, p. 14).

3.2.3 Mobilising investors

Up to 2050, there needs to be high investment in infrastructure, and there are also investments needed in homes in order to make them use energy more efficiently, and to transform these houses so that they are able to generate energy (Energy Roadmap 2050, 2011, p. 16). The European Commission writes that ''these are very substantial upfront investments, often with returns over a long period'' (Energy Roadmap 2050, 2011, p. 16). Furthermore, the prices of carbon should increase, because that will support investments regarding low-carbon alternatives (Energy Roadmap 2050, 2011, p. 16). Nevertheless, these efforts may cause carbon leaking, and these policies mentioned above, should prevent that from happening (Energy Roadmap 2050, 2011, p. 16). Additionally, Member States should keep supporting energy incentives and new technology, with the help of subsidies (Energy Roadmap 2050, 2011, p. 17).

3.2.4 Engaging the public is crucial

There is a very important social dimension involved in this Roadmap, while these measures affect jobs, and there is also education and training needed (Energy Roadmap 2050, 2011, p. 17). The European commission writes that ''in order to efficiently manage change, involvement of social partners at all levels will be necessary in line with just transition and decent work principles'' (Energy Roadmap 2050, 2011, p. 17). Improving energy efficiency comes with higher costs, and vulnerable consumers need support to be able to invest in energy efficiency (Energy Roadmap 2050, 2011, p. 17).

3.2.5 Driving the change at the international level

While the European Union is working towards decarbonisation, it is also important to strengthen the international cooperation (Energy Roadmap 2050, 2011, p. 18). The European Commission writes that ''as Europe's demand develops away from fossil fuels, and energy producers develop more diversified economies, integrated strategies with current suppliers need to address benefits of cooperation in other areas such as renewable energies, energy efficiency and other low-carbon technologies'' (Energy Roadmap 2050, 2011, p. 18). The EU needs to strengthen the

international relationship with several countries, such as North Africa, mainly because the Sahara is seen as a way to expand the solar energy potential (Energy Roadmap 2050, 2011, p. 18).

3.3 European Energy Security Strategy (2014)

The most current communication from the Commission to the European Parliament and the Council, European energy security strategy, is divided into 8 pillars:

1. Immediate actions aimed at increasing the EU's capacity to overcome a major disruption during the winter 2014/2015;
2. Strengthening emergency/solidarity mechanisms including coordination of risk assessments and contingency plans; and protecting strategic infrastructure;
3. Moderating energy demand;
4. Building a well-functioning and fully integrated internal market;
5. Increasing energy production in the European Union;
6. Further developing energy technologies;
7. Diversifying external supplies and related infrastructure;
8. Improving coordination of national energy policies and speaking with one voice in external energy policy (''European Energy Security Strategy'', 2014, p. 3).

3.3.1 Immediate actions aimed at increasing the EU's capacity to overcome a major disruption during the winter 2014/2015

In the wake of the Ukraine crisis, it has become clear that there is a big possibility of disruption of the energy supply, and therefore, this pillar focuses on countries that depend on one gas supplier (''European Energy Security Strategy'', 2014, p. 4). In order to prepare for possible disruptions, the Commission and the EU Member States will cooperate closely together, and also with regulators and Transmission Systems Operators (''European Energy Security Strategy'', 2014, p. 4). Furthermore, there will be a particular consideration for the Baltic Region, because of their vulnerable position, and for the increase of storage capacity, (''European Energy Security Strategy'', 2014, p. 4). There will also be special attention paid to the development in supply security at a regional level, and to invest more in Liquefied Natural Gas (''European Energy Security Strategy'', 2014, p. 4).

3.3.2 Strengthening emergency/solidarity mechanisms including coordination of risk assessments and contingency plans; and protecting strategic infrastructure

One of the most important aims of this energy security strategy is to have a good preparation against any possible energy disruption, and to collectively protect the Member States with a vulnerable position (''European Energy Security Strategy'', 2014, p. 4). The current energy security strategy of the EU explains that the Union is

better prepared for possible gas disruptions, and the Member States are obliged to make Emergency Preparedness and Response Plans, in order to have a collective respond (''European Energy Security Strategy'', 2014, p. 5). Regarding solidarity, the European Commission points out that ''solidarity is the hallmark of the EU, and requires practical assistance for those Member States most vulnerable to severe energy supply disruptions'' (''European Energy Security Strategy'', 2014, p. 6).

3.3.3 Moderating energy demand

Another way to protect supply is, according to the European Commission, to use energy more efficiently, in order to reduce the demand (''European Energy Security Strategy'', 2014, p. 7). In order to achieve this, the Energy Efficiency Directive (EED), and the Energy Performance of Buildings Directive (EPBD) have been established (''European Energy Security Strategy'', 2014, p. 7). It is important to identify the priority sectors when it comes to energy saving, and investment capital should also be mobilised and easily accessible (''European Energy Security Strategy'', 2014, p. 7). In order to trigger the private sector into reducing its energy use, the European Structural and Innovation (ESI) Funds has made 27 billion euros available for low carbon and energy efficiency economic plans (''European Energy Security Strategy'', 2014, p. 7).

3.3.4 Building a well-functioning and fully integrated internal market

In order to secure energy and to make the use more efficient, an internal EU energy market is crucial (''European Energy Security Strategy'', 2014, p. 8). Decisions made by the Member States regarding energy efficiency, renewable energy, and decisions to invest or decommission nuclear energy, or decisions to support new infrastructure that may affect the framework, should be discussed on a European Level (''European Energy Security Strategy'', 2014, p. 8). Good trading mechanisms are an effective short-term solution when disruptions occur, and this has already provides security for oil and coal, and is also applicable to gas and electricity (''European Energy Security Strategy'', 2014, p. 8). A regional approach to the integration of energy markets in the EU remains one of the most important strategies, and this also benefits the security of supply (''European Energy Security Strategy'', 2014, p. 8). Also, the EU's dependency on Russian oils needs to be addressed, and the energy policies refined, even though there is no immediate threat to the EU's oil supply at this moment in time (''European Energy Security Strategy'', 2014, p. 10).

3.3.5 Increasing energy production in the European Union

Since the past two decades, energy production in the European Union has decreased, but it is possible to slow this down with the help of renewable, nuclear, and sustainable energy (''European Energy Security Strategy'', 2014, p. 12). The European Commission discusses that ''there is a significant cost-effective potential for

renewable electricity and renewable heating to further reduce natural gas use in a number of sectors by the end of this decade'' (''European Energy Security Strategy'', 2014, p. 12). Because of the fact that the technology prices of renewable energy are getting lower, these sources are competitive and ready to be brought to the market (''European Energy Security Strategy'', 2014, p. 12). The winning of oil and gas in Europe in areas such as the North Sea, and in the newly discovered areas of the Eastern Mediterranean Sea and the Black Sea, should be further developed (''European Energy Security Strategy'', 2014, p. 12).

3.3.6 Further developing energy technologies

It is extremely important to develop energy technologies, in order to reduce the energy dependency of the Member States (''European Energy Security Strategy'', 2014, p. 14). The Commission points out that ''new technologies can deliver efficient and cost-effective solutions to improve the efficiency of buildings and local heating systems, to provide new energy storage solutions and optimise the management of grids'' (''European Energy Security Strategy'', 2014, p. 14). To accomplish this, there is significant investments needed by the Member States, for energy research and innovation (''European Energy Security Strategy'', 2014, p. 14). These investments must be made in technology of the whole chain of supply, such as materials and manufacturing (''European Energy Security Strategy'', 2014, p. 15). To achieve the best results, there is more coordination needed between the Member States, and also between the European Commission and the Member States (''European Energy Security Strategy'', 2014, p. 15).

3.3.7 Diversifying external supplies and related infrastructure

It is a priority for the EU to diversify its gas supply, and also to maintain the gas imports from reliable suppliers (''European Energy Security Strategy'', 2014, p. 15). Furthermore, liquefied natural gas will continue to grow, and be a potential source for diversification (''European Energy Security Strategy'', 2014, p. 15). As mentioned above, one of the priorities is to maintain the relationship with reliable suppliers, but it is also important to find new energy sources (''European Energy Security Strategy'', 2014, p. 16). Regarding electricity, nuclear power plants are reliable sources, and are therefore an important factor in securing energy (''European Energy Security Strategy'', 2014, p. 16). Furthermore, the Commission writes that ''the relative value of the nuclear fuel is marginal in relation to the total production cost of electricity compared to gas or coal fired plants, and uranium is only a small part of the total cost of the nuclear fuel'' (''European Energy Security Strategy'', 2014, p. 16). Nevertheless, safety regarding nuclear energy is the most important priority, and the European Union should be the pioneer in making nuclear energy safe on an international level (''European Energy Security Strategy'', 2014, p. 16).

3.3.8 Improving coordination of national energy policies and speaking with one voice in external energy policy

This strategy involves one key aspect, namely closer cooperation and coordination between the Member States (''European Energy Security Strategy'', 2014, p. 17). Decisions about energy should be made collectively, and that there is also a need for solidarity (''European Energy Security Strategy'', 2014, p. 17). Furthermore, the Commission goes on by writing that ''within our closer neighbourhood our goal must remain to engage all partners at all levels in order to enable their close integration into the EU energy market'' (''European Energy Security Strategy'', 2014, p. 17). Therefore, Member States should inform each other, when making policies regarding energy (''European Energy Security Strategy'', 2014, p. 18).

3.4 Other opinions

The Lisbon Treaty in 2007 established the first legal basis for energy policies in the EU, and this treaty also involves solidarity regarding energy policies within the Member States (Amineh, 2014, p. 759). Nevertheless, Amineh writes that ''Member States remain in control over external supply security and the domestic energy mix'' (Amineh, 2014, p. 759). For the Commission, internal supply dependence is an import point on the agenda, because at this moment, there is no limit set on how much a country may depend on energy imports (Amineh, 2014, p. 759). Nevertheless, even though there is no common SOS policy, energy security supply is part of several policies to combat climate change, such as the Climate and Energy Package of 2008 (Amineh, 2014, p. 759). This package promotes energy efficiency and a higher share (20%) of renewable energy (Amineh, 2014, p. 759). Amineh explains that ''an increase in renewable energy would reduce greenhouse gas emissions and reliance on imported fossil fuels, but the question is are these policies sufficient to ensure energy supply security?'' (Amineh, 2014, p. 759).

Furthermore, interviewee Ries Kamphof agrees with the fact that the EU wants to move towards RES, and mentioned that LNG is a fossil fuel, and therefore not climate friendly (Kamphof, 2015, Personal Communication). Energy efficiency and renewable energy are the best ways to diversify energy in the context of decarbonising the economy. He also mentioned, just like the EU, that nuclear energy is a climate friendly source, and explained that this an important source in a MS such as France (Kmphof, 2015, Personal Communication). During another interview, Sijbren de Jong pointed out that the best way to diversify energy is to use renewable energy sources and to invest in energy efficiency (De Jong, 2015, Personal Communication). He believes that you do not have to secure the energy that is not consumed, but does argue that energy efficiency costs a lot of money, and countries

that most need this security, e.g. eastern and Baltic countries, do not yet consider it therefore (De Jong, 2015, Personal Communication).

In the Energy Roadmap 2050, the EU provides a mapped out plan to decarbonise the economy. Nevertheless, the European Union's energy demand is only a small fraction from the world demand, and it is actually decreasing (Jonssona, et al., 2015, p. 51). Jonssona, et al. explains that ''for 2035 in its new policy initiatives scenario, the IEA expects the EU to account for 9% of global primary energy demand compared to 13% in 2011'' (Jonssona, et al., 2015, p. 51). That means that the availability of energy sources would depend upon the rest of the world (Jossona, et al., 2015, p. 51). If fossil fuel remains the most used, there could be not enough availability for Europe, mainly because of competition (Jossona, et al., 2015, p. 51). On the other hand, if there is going to be a global strategy to decarbonise, there is a chance that there will be heavy competition for renewable energy (Jossona, et al., 2015, p. 51). Jossona, et al. argues that ''energy efficiency as a unilateral EU strategy can entail improved energy security in reducing vulnerability, but will probably only bring marginal positive effects on total global resource availability since EU accounts for a limited share of demand'' (Jossona, et al., 2015, p. 51). This is mainly the case, because energy efficiency does not have any relation to accessibility and the risk of supply (Jossona, et al., 2015, p. 51). According to Kaare, Koppel and Leppiman, security of supply (SOS) is the most important factor for the European Union's energy security strategy (Kaare, Koppel & Leppiman, 2013, p. 159). Furthermore, they write that ''from a European perspective, energy security is most often discussed in terms of SOS, in other words with reference to the avoidance of sudden changes in the physical availability of energy relative to demand'' (Kaare, Koppel & Leppiman, 2013, p. 159).

3.5 Critical assessment

After several gas disruptions and both the Ukraine crises, it has become clear that the EU has taken several measures in order to make the supply more secure. The energy security strategy explains the importance of overcoming disruptions, and also mentions energy efficiency and diversification. All these measures proposed by the EC comply with what was laid out in the Lisbon Treaty: ensuring the functioning of the energy market, security of supply, new and renewable energy and interconnected networks. In order to secure energy supply, it needs to be diversified. A sufficient approach to diversifying the gas supply is importing LNG from several suppliers. The EU is tackling important issues that need to be addressed by the Member States in order to secure energy. However, energy security is not for every Member State a big issue. Eastern and Baltic countries have more concerns than countries in the west. Moreover, the EU is not a country, and cannot oblige the

Member States to implement all these measures. Therefore, the European Union wants to strengthen the solidarity between the MS, in order to support the countries that need energy security the most. Nevertheless, this strategy is not a regulation, and it depends on the MS how much of it is going to be implemented within national energy policies.

Another way to secure energy is to move away from fossil fuels, and to only use renewable sources, and also to use energy more efficiently. The EU wants to decarbonise the economy by 2050, and has provided the MS with a Roadmap. Using RES as the main energy source is of course a great way to secure energy, because wind and solar energy could be extracted on a domestic level. However, making such drastic changes are quite costly, and also energy companies have to either transform their business, or they will not be able to do business anymore, besides being able to provide fossil fuel back-up. Furthermore, de Jong argues that a very effective way to secure supply is energy efficiency, mainly because of the fact that you do not have to secure any amount of energy that you do not use (de Jong, 2015, Personal Communication). However, it is questionable how much energy efficiency contributes to the reduction of greenhouse emissions and global-warming, while this really is a global issue, and Europe only consists of a small amount of the greenhouse emissions out there, especially compared to China and India.

4. Lithuania's LNG terminal

4.1 Lithuania before LNG

Lithuania's dependency on Russian energy sources has always been an important topic on the political agenda, because of Lithuania's vulnerable position in the past (Janeliūnas & Molis, 2005, p. 200). As mentioned, before the LNG terminal, Lithuania imported 100% of their energy supply, and the country felt that this dependency could be subject to negative effects to the economy (Janeliūnas & Molis, 2005, p. 200). In 2005, securing energy became even more important for Lithuania, because Russia and Germany had an agreement to build a pipeline, which would go through the Baltic sea, but it would dismiss the Baltic countries and Poland (Janeliūnas & Molis, 2005, p. 200). This agreement raised questions in Lithuania, regarding the fact that their region was being deprived of energy routes (Janeliūnas & Molis, 2005, p. 200). Janeliūnas and Molis argue that ''such perspectives may diminish Lithuanian energy security in the way that Lithuania remains only a consumer of energy resources, with no possibilities to influence energy suppliers'' (Janeliūnas & Molis, 2005, p. 200). Janeliūnas and Molis write that Lithuania's priorities in securing energy before the establishment of the LNG terminal in 2014 were:

1. Ensuring reliable energy supply and functionality of energy infrastructure;
2. Diversification of energy supply sources;
3. Reduction of dependence on energy resource import (by reducing energy intensity and switching to alternative or renewable energy resources) (Janeliūnas & Molis, 2005, p. 204).

Up to 2005, Lithuania depended greatly on Russia, mainly because Lithuania's main energy source was the Ignalina Power Plant, and the fuel of this power plant came from Russia (Janeliūnas & Molis, 2005, p. 204). It should also be noted that Lithuania used to have no sufficient domestic and renewable energy sources, and the ones that they did have, were only able to provide 10% of the country's energy demands (Janeliūnas & Molis, 2005, p. 205). Because of this, the real threat to Lithuania's economic stability was the fact that Russia was able to disturb energy supplies (Janeliūnas & Molis, 2005, p. 204). Additionally, Lithuania's greatest weakness used to be the gas sector, because before the terminal, Lithuania only imported gas from Gazprom, and did not play a role in the transit of gas (Janeliūnas & Molis, 2005, p. 208). Since Gazprom was the only company able to supply gas to Lithuania, and therefore were able to demand high prices from Lithuania (Janeliūnas & Molis, 2005, p. 209). In 2013, Gazprom's gas prices for Lithuania were ''one of the highest, if not

the highest in the EU'' (''Lithuania looks for alternatives to counter Russia's high gas price'', 2013, par. 2). In fact, Lithuania had to pay 500 euros per 1000 BCM, while Germany had to pay 400 euros for the same amount (''Lithuania looks for alternatives to counter Russia's high gas price'', 2013, par. 2). Furthermore, what also strengthened the dependence on Russia before the terminal was the fact that there is only one pipeline going through Lithuania, namely the Minsk-Vilnius-Kalinigrad pipeline, which is controlled by Gazprom (Janeliūnas & Molis, 2005, p. 209). Lithuania is not connected to the European energy network, or any other alternative network (Janeliūnas & Molis, 2005, p. 209). The main gas operator in Lithuania, ''Lietuvos dujos'', is one of the biggest stockholders, but this gas operator is also a part of Gazprom (Janeliūnas & Molis, 2005, p. 209). Therefore, Janeliūnas and Molis write that ''this means that Lithuania does not have any chances to implement any policy that would contradict the interests of Gazprom'' (Janeliūnas & Molis, 2005, p. 209). Another factor that made the energy security of Lithuania vulnerable was the fact that there were no storage capacities available in Lithuania, and if it would have been build, Janeliūnas and Molis believe that ''the main shareholders would be Gazprom and its partner E.O.N. Ruhrgas International'' (Janeliūnas & Molis, 2005, p. 209).

Regional cooperation is important, and the Baltic countries, as well as Poland realised that they were not able to secure energy on their own (Janeliūnas & Molis, 2005, p. 212). As a result, the relationship between the Baltic and Nordic countries was strengthened, and the governments and energy companies decided to coordinate better to help secure energy (Janeliūnas & Molis, 2005, p. 212). Regarding gas supply, Lithuania only cooperated with Latvia in 2005, because in case of a disruption form Russia, Latvia was the only country able to provide gas to Lithuania (Janeliūnas & Molis, 2005, p. 214). The EU played a big role with the coordination between the Baltic States, and is able to provide these states with investors to help facilitate better energy infrastructures (Maigre, 2010, p. 6). The EU has helped establish the Baltic Energy Market Interconnection Plan (BEMIP), which was one of the main energy infrastructure projects set up by the EU's energy strategy (Maigre, 2010, p. 7). The main aim of the BEMIP was to connect the infrastructure of the Baltic ''energy islands'' to the infrastructure of other MS (Maigre, 2010, p. 7). Furthermore, the BEMIP focused first on connecting electricity grids together, and later on connecting gas infrastructures (Maigre, 2010, p. 7). The cooperation between Lithuania and Poland has also been strengthened, and there were some talks about building an LNG terminal in Poland and also building a connected pipeline between these two countries (Janeliūnas & Molis, 2005, p. 214). In October 2015, Poland and

Lithuania have signed the deal to build the connected pipeline (''Polish-Lithuanian gas pipe to end Baltic energy isolation'', 2015, par. 1). Because of this pipeline, the Baltic States and Poland will officially not be isolated anymore from the gas infrastructure of western MS, and this will increase the energy security in the EU (''Polish-Lithuanian gas pipe to end Baltic energy isolation'', 2015, par. 2). The total costs of this pipeline will be 558 million euros, and the EU will invest 295 million euros (''Polish-Lithuanian gas pipe to end Baltic energy isolation'', 2015, par. 7). It is estimated that the build will start in 2016, and will be finished somewhere in 2019 (''Polish-Lithuanian gas pipe to end Baltic energy isolation'', 2015, par. 8).

As mentioned above, before the establishment of the LNG terminal in Klaipeda, Lithuania did not have any gas, oil or electricity connection with Western Europe (Augutis, et al., 2012, p. 144). Nevertheless, the gas connection with Russia has been sufficient on a technical level, but because it is transported through one pipeline, there were no reserves (Augutis, et al., 2012, p. 144). Furthermore, before the LNG terminal in Klaipeda, the only pipeline that went through Lithuania was the same pipeline that went through Kaliningrad (Jankauskas, 2015, p. 181). Just like Lithuania, Kaliningrad was also connected to only one pipeline (Jankauskas, 2015, p. 181). This provided Lithuania with some kind of assurance, because if Gazprom would disrupt gas to Lithuania, it would also disrupt the gas supply to Kaliningrad in Russia (Jankauskas, 2015, p. 181). Nevertheless, because Kaliningrad's vulnerable position, some small storage has been build, and there are also plans for an LNG terminal, build by Gazprom (Jankauskas, 2015, p. 181). So as the Kaliningrad region starts to become less vulnerable, Lithuania will lose its assurance of no gas disruption, because of these new developments (Jankauskas, 2015, p. 181). In order to increase independency, the Lithuanian National Energy Independency Strategy (2012) had as main goal to strengthen Lithuania's energy position (Jankauskas, 2015, p. 181). In the strategy, Lithuania wanted to strive to have gas alternatives, and it also stated the plans for the LNG terminal (Jankauskas, 2015, p. 181).

4.2 Lithuania after LNG

Lithuania's attitude has always been cautious in regards to Russia (Mitrova, 2015, Personal Communication). This fact has also had an influence on the relationship with Gazprom (Jankauskas, 2015, p. 182). Due to the limited gas consumption, there is only one terminal needed in the region, and it would also be more economically effective if the Baltic States cooperate together in establishing a regional terminal, rather than all three countries building their own (Jankauskas, 2015, p. 182). Nevertheless, Lithuania's position remained vulnerable, while the two other Baltic States did not show any particular interest into a common energy approach

(Jankauskas, 2015, p. 183). Especially Latvia feels quite secure, because this country has big underground gas storages in Incukalns (Jankauyskas, 2015, p. 183). Therefore, Lithuania decided to build the LNG terminal on its own (Jankauskas, 2015, p. 183). This LNG terminal lies in Klaipeda, and is based upon Floating Storage and Regasification Unit techniques (FRSU) (Jankauskas, 2015, p. 183). FSRU involves an LNG ship that transports gas in liquefied form, and with help of FSRU techniques, the liquefied gas will immediately be transformed back into gaseous form on shore and pumped into the pipeline (''The Floating Storage and Regasification Unit (FSRU)'', 2010, par. 2).

Jankauskas explains that ''during the first year of operation it may give about 1 BCM gas to the market'' (Jankauskas, 2015, p. 183). He goes on by saying that ''it may increase its regasification capacity to 4 BCM and that could be a key game changer in the completely monopolistic gas market of three Baltic States, which in total consumes 5.5 BCM of natural gas per year'' (Jankauskas, 2015, p. 183). This means that if the terminal is capable of providing 4 BCM of gas to the market, Latvia and Estonia could also buy this gas. Furthermore, this gives the Baltic States the chance of only having to import 1,5 BCM from other exporting companies, such as Gazprom. The main purpose of this terminal is to be able to supply all of Lithuania of gas, but when needed, other countries in the region can use the storage too (Jankauskas, 2015, p. 183). Instruction for this FRSU started in 2012, and this unit is being leased for 10 years with the option of purchase from the Norwegian company Höegh (Jankauskas, 2015, p. 183). In addition, the costs of this lease are 689 million dollars, and this type of unit was chosen, because it is more competitive in comparison to onshore LNG terminals (Jankauskas, 2015, p. 183). Furthermore another reason why FSRU is an attractive option, is because of the fact that the investment is 50% lower than that of an onshore terminal, the implementation is 2 years shorter, and it is more flexible, since you are able to move the ship from location to another location (Jankauskas, 2015, p. 183).

Because of the fact that the gas prices by Gazprom kept going up, the Lithuanian government mostly decided to establish this LNG terminal to make the prices of gas lower (Jankauskas, 2015, p. 183). LNG was at that point a cheaper option, since the prices of Gazprom kept increasing (Jankauskas, 2015, p. 183). After the decisions were made and the LNG terminal build, Lithuania was able to re-negotiate with Gazprom, got a price that was 20% lower than before, and got a compensation for the high gas prices they had to pay in 2013 (Jankauskas, 2015, p. 183). Because of this, the price for gas imported from Gazprom is now lower than the gas that comes from the

terminal in Klaipeda (Jankauskas, 2015, p. 183). Experts believe that willingness from Gazprom to lower the prices is a direct cause of the LNG terminal, and this helped strengthen the position of Lithuania (Jankauskas, 2015, p. 183). Jankauskas writes that ''in order to support effective operation of the Klaipeda LNG terminal, Lithuania has already adopted main legislative acts which will allow to effectively ensure diversification of gas supply, including regulation which ensures that not less than 0.54 BCM of natural gas must be supplied annually via LNG terminal for a period of 5 years'' (Jankauskas, 2015, p. 184). This 0.54 BCM is approximately 20% of the annual gas consumption in Lithuania, and electricity and heat producers are supposed to purchase these volumes of gas (Jankauskas, 2015, p. 184).

4.3 Other opinions

The LNG terminal in Klaipeda has offered the Baltic region leverage against Gazprom's high gas prices, especially since Gazprom lowered the price after the establishment of the terminal (''Lithuania Considers New Tax to Support Its Loss-Making LNG Facility'', 2015, par. 4). Nevertheless, since the price cuts of Gazprom, it is a challenge for Lithuania to handle the more costly LNG prices from Norway and the terminal costs in general (''Lithuania Considers New Tax to Support Its Loss-Making LNG Facility'', 2015, par. 4). The constitutional court in Lithuania has made it obligatory to purchase gas from the terminal, even though Gazprom is cheaper at this moment (''Lithuania Considers New Tax to Support Its Loss-Making LNG Facility'', 2015, par. 7). Because of this rule, the heat company Vilniaus Energija has to buy 65% of its demand form this terminal, and in order to secure the Klaipeda terminal, there needs to be 22,30 euros per 1,000 cubic meters paid (''Lithuania Considers New Tax to Support Its Loss-Making LNG Facility'', 2015, par. 10). Furthermore, other operational costs are included in the power bill of Lithuanian citizens (''Lithuania Considers New Tax to Support Its Loss-Making LNG Facility'', 2015, par. 11).

The biggest gas consumer in the Baltics is the chemical and fertilizer company Achema, and is forced to pay approximately €25 million because of this rule, for gas they are not using, since the company gets its gas from Gazprom, while it is less costly (''Lithuania Considers New Tax to Support Its Loss-Making LNG Facility'', 2015, par. 16). In order to fight this rule, Achema is planning to import nitrogen, which can also be used to produce fertilizers, without using gas (''Lithuania Considers New Tax to Support Its Loss-Making LNG Facility'', 2015, par. 16). Another danger for the LNG terminal is the fact that more heating companies are using biofuels (''Lithuania Considers New Tax to Support Its Loss-Making LNG Facility'', 2015, par. 17). It is expected that in a couple of years, the majority of the

heating companies are using this kind of fuel, and therefore, it is necessary to have a national tax paid for the costs of the terminal (''Lithuania Considers New Tax to Support Its Loss-Making LNG Facility'', 2015, par. 17). Nevertheless, such a tax to ensure energy security may not be supported by the European Commission, especially because most of the citizens in Lithuania do not use natural gas, and because of the fact that 30% of Lithuania's energy budget comes from the EU (''Lithuania Considers New Tax to Support Its Loss-Making LNG Facility'', 2015, par. 21). It should also be noted before the terminal was build; Lithuania wanted to make investments in this terminal mandatory for major gas consuming companies, and the Commission also ruled against this, so this was never implemented (''Lithuania Considers New Tax to Support Its Loss-Making LNG Facility'', 2015, par. 23). Therefore, it is likely that the Commission would not support these new taxes.

A year after the establishment of the terminal, critics argue that it may not be viable (Karmazinaitė, 2015, par. 1). Karmazinaitė writes that ''at the moment the gas price from the LNG terminal (32,82 EUR/MWh) is much higher than Lithuania pays to Gazprom (around 17-18 EUR/MWh)'' (Karmazinaitė, 2015, par. 5). On another note, the price of the LNG gas is established according to the UK's National Balancing Point (UK NBP), rather than by Russian's state monopoly Gazprom (Karmazinaitė, 2015, par. 5). Furthermore, if gas demands rise, the gas prices will get lower according to the UK NBP, and it is expected that Europe and the United States will import more LNG over the years (Karmazinaitė, 2015, par. 5). To make the terminal as attractive as possible, low prices are needed (Karmazinaitė, 2015, par. 7). This is not only necessary to attract Lithuanian consumers, but also to be able to export gas to other countries (Karmazinaitė, 2015, par. 7). In order to export gas from Klaipeda, the establishment of infrastructure is needed, as well as agreements within the region, and also expertise in exporting gas (Karmazinaitė, 2015, par. 7). In 2014, a new pipeline between Klaipeda and Kuršėnai was established, which enables Lithuania to export gas to Latvia and Estonia (Karmazinaitė, 2015, par. 8). However, if Lithuania wants to transform the terminal in a regional hub, there needs to be multilateral agreements in order to make the gas markets in all the Baltic States less different Karmazinaitė, 2015, par. 9).

4.4 Critical assessment

Even though the fact that the LNG terminal comes with high costs due to the expensive lease, and because of the fact that LNG is generally more expensive than gas, it has brought Lithuania great advantages. It is quite notable that Gazprom had immediately dropped their high gas prices, and that could be seen as the most

important proof of the fact that the LNG terminal is a success. In 2014, the Lithuanian energy security strategy aimed at:

1. Ensuring reliable energy supply and functionality of energy infrastructure;
2. Diversification of energy supply sources;
3. Reduction of dependence on energy resource import (by reducing energy intensity and switching to alternative or renewable energy resources) (Janeliūnas & Molis, 2005, p. 204).

Looking at these three aims, Lithuania has successfully secured their energy supply. The LNG terminal has ensured a reliable supply from countries in Northern Europe, but also the Middle East, instead of only relying on Russia. At the same time, the energy supply has also been diversified with LNG, and Lithuania is not dependent on one country, but is able to import from a competitive market. Nevertheless, because of the fact that LNG is more expensive than gas, and also since the prices from Gazprom have decreased, using the terminal is not the most financially attractive option. However, it has become an important asset for Lithuania, who would fully depend on imports via the pipeline from Russia without the terminal. Therefore, the terminal provides Lithuania with security of gas disruptions, and that is the real price Lithuania is paying for. Furthermore, this terminal offers the chance to not only diversify the energy supply, but the country is now in the position to become a gas exporter. The obvious countries to export gas to are Latvia and Estonia, but in order to do so, infrastructure and multilateral polices need to be formed.

5. LNG and energy security

5.1 The benefits of LNG

LNG has a great potential to liberalise gas markets, and at the same time, diversify energy supply of countries (Dorigoni, et al., 2010, p. 7653). Importing LNG with the help of tankers and to transport gas has advantages, because it does not need to be physically bound to pipelines (Dorigoni, et al., 2010, p. 7653). Furthermore, the prices for building LNG infrastructure are decreasing, and the importer gets the opportunity to import gas from an exporter that is beneficial on an economic level (Dorigoni, et al., 2010, p. 7653). Additionally, there is a lack of internationally connected pipelines, and LNG, at this point, is the only possible way to get gas from non-connected competitors to compete at the gas market (Dorigoni, et al., 2010, p. 7653). Furthermore, because the EU's reliance on energy imports is increasing, so is the importance of LNG (Dorigoni, et al., 2010, p. 7653). Existing gas fields in Europe will decrease, and the EU will have to depend on imports even more by 2025 (Dorigoni, et al., 2010, p. 7654). Therefore, it is crucial for the European Union to explore ways to have new supplies, from both existing importers and new ones (Dorigoni, et al., p. 7654). Therefore, for these purposes, LNG is a great alternative (Dorigoni, et al., 2010, p. 7654).

LNG has been growing in availability, and this is a very important development for Europe (Belkin, et al., 2013, p. 26). LNG is the source of 25% of all natural gas in Europe, and the United Kingdom has the leading terminal in the EU (Belkin, et al., 2013, p. 26). The main LNG suppliers are Qatar, Egypt and Algeria, with Qatar as the largest supplier (Belkin, et al., 2013, p. 26). The amount of LNG imports is the highest in the Baltic States (Liuhto, 2014, p. 39). Countries such as Germany, Denmark, Norway and Russia import LNG from the Baltic Sea region (Liuhto, 2014, p. 39). Furthermore, because of the energy crises between Russia and the EU, LNG offers the gas importing countries a chance to have multi-suppliers, instead of relying on one main supplier (Gritsenko & Serry, 2015, p. 3). LNG is the fossil fuel that is least polluting, and the increasing use of LNG can be seen as a diversifying tool as well as a way to combat climate change (Snijder, 2008, p. 3). Snijder writes that ''natural gas is particularly identified as a prominent future source to meet market needs'' (Snijder, 2008, p. 3). Molnar et al. writes that ''in order to be effective and to avoid any further serious mismatches between investments and market reality, the LNG and gas storage strategy should be part of a broader natural gas strategy'' (Molnar et al., 2015, p. 2). Furthermore, the European Commission says that LNG imports depend upon two things: how much the EU depends upon imports from the global market and it depends upon how accessible LNG supplies are to the Union (Molnar

et al., 2015, p. 2). Nevertheless, Molnar et al. believes that the LNG imports really depends upon the market price (Molnar et al., 2015, p. 2). When LNG is relatively cheaper than natural gas, it is more likely that the EU will import more LNG, rather than when it is more costly.

5.2 Downsides of LNG

Using natural gas in order to reduce the dependency on coal and gas also has downsides (Snijder, 2008, p. 3). Mainly because there are high costs involved with natural gas reserves (Snijder, 2008, p. 3). Furthermore, natural gas is also uneven distributed, and it can be mostly found in regions far away from consumers, in countries such as Russia, Iran and Qatar (Snijder, 2008, p. 3). These countries have the freedom to choose to which countries they want to export gas to, and also to pick the best markets, as well as pick countries where their geopolitical interests lies (Snijder, 2008, p. 3). Snijder argues that ''consumer countries might not have any guarantee that producing countries and their NOCs are able (or willing) to make all the necessary investments in time to supply the markets'' (Snijder, 2008, p. 4). This could lead to exporters to have power over the market, since they are the ones to either invest in it or not (Snijder, 2008, p. 4). In addition, the NOCs in Russia, Iran Qatar, Venezuela, Saudi Arabia, Norway and other countries with natural gas are mostly members of the Gas Exporting Countries Forum, where they discuss policies regarding energy exports (Snijder, 2008, p. 4). Also, international law has decided that natural resources are part of the sovereignty of a country, and Snijder believes that this is most likely not going to change (Snijder, 2008, p. 4). Because of this, consuming regions in Europe, the United States and Asia have no supply guarantee, and Snijder argues that ''investment approval might not only depend on (geo) political considerations; project economics are also often directly influenced by the policies of the host government to guarantee or maximise their portion of the project rent'' (Snijder, 2008, p. 4).

While the world is growing more dependent on gas supplies, the chance for conflicts also grows stronger (Snijder, 2008, p. 4). Liquefied natural gas is a new sufficient mean to diversify gas sources, and in 2008, LNG consisted out of 7% of all the gas trade, but was growing rapidly (Snijder, 2008, p. 4). There has been a lot of investment in terminals and pipelines over the years, and the regasification capability of the EU increased to 58%. Nevertheless, while the regasification capabilities in the EU are increasing, the volumes of imported LNG decreased in 2013 to 45 BCM, which is an import decrease of 24% (Molnar et al., 2015, p. 2). Molnar et al. writes that ''it is important to note, however, that a low utilisation rate does not necessarily mean that an asset is stranded'' (Molnar et al., 2015, p. 2). It

should be noted that these terminals have been used to export LNG to Japan and South Korea, who wanted to move away from nuclear energy after the Fukushima accident (Molnar et al., 2015, p. 3). Furthermore, these countries were willing to pay twice as much as the European hub price, but since august 2014, this has caused oversupply of LNG in the Asia-Pacific region, and lower prices for Asian consumers (Molnar et al., 2015, p. 3). Because Japan and South Korea stopped paying double the price, the LNG market in Europe collapsed (Molnar et al., 2015, p. 3).

5.3 LNG alternatives

5.3.1 Renewable energy sources

Renewable energy sources are a great way to diversify the energy mix, and if energy vulnerability is considered, it should be noted that RES is not vulnerable on a geopolitical level, if it is generated and consumed on a domestic level (Escribano Francés, et al., 2013, p. 551). Furthermore, a countries' energy supply is also being diversified when using RES, because it is an alternative to fossil fuels (Escribano Francés, et al., 2013, p. 551). Nevertheless, solar, wind and hydropower are not able to make sure that there are no disruptions, since these sources depend upon the weather, so there is a need for fossil fuel back up (Escribano Francés, et al., 2013, p. 551). However, Escribano Francés, et al. point out that ''RES enhances the technical resilience of the system due to energy mix and spatial diversification'' (Escribano Francés, et al., 2013, p. 551). Even though technological facilities of RES are less vulnerable, they cannot be considered entirely safe, mainly because these facilities could be hacked by people who have excellent IT skills (Escribano Francés, et al., 2013, p. 551). Nevertheless, RES does not need any form of fuel to produce power, and is therefore not subjective to international price markets (Escribano Francés, et al., 2013, p. 551). Moreover, Escribano Francés, et al. point out that ''because RES are fixed-cost technologies, they could be used to balance price volatility inherent to fossil fuels'' (Escribano Francés, et al., 2013, p. 551). Furthermore, the energy markets do not set RES prices, and it should also be noted that these sources are safer for society, properties and for the environment in case of an accident (Escribano Francés, et al., 2013, p. 551).

5.3.2 Nuclear energy

The Fukushima nuclear accident in 2011 had a negative impact on the public opinion regarding nuclear energy (Wolf, 2015, p. 287). It is widely questioned whether the economic benefits of nuclear energy could weigh out radioactive contamination in case of an accident (Wolf, 2015, p. 287). Nevertheless, greenhouse emissions keep on rising at a dangerous rate, and therefore, many experts argue that in order to combat climate change, nuclear energy is needed (Wolf, 2015, p. 287). Wolf explains that ''the

Intergovernmental Panel on Climate Change (IPCC) and the International Energy Agency (IEA) have emphasized the advantages of nuclear fission as a climate-friendly alternative to carbon-fuelled power plants'' (Wolf, 2015, p. 287). Climate-change is causing serious problems in some parts of the world, which are experiencing rising temperatures, and this is a direct cause of greenhouse emissions (Wolf, 2015, p. 289). This is causing desertification, water shortages and failing harvests (Wolf, 2015, p. 290). Furthermore, this has also caused water disasters, including increasing floods (Wolf, 2015, p. 290). This affects millions of people, while on the other hand, the numbers of people that are harmed because of nuclear energy are way less, and these numbers can barely be compared (Wolf, 2015, p. 290). Wolf points out that ''as long as commercial nuclear reactors operate as planned, they scarcely endanger the local population at all'' (Wolf, 2015, p. 294). In addition, epidemics specialists fail to find precise evidence that nuclear power plants affect the communities surrounding them (Wolf, 2015, p. 294). Nevertheless, a problem with nuclear energy is the waste it comes with, which also causes health risks, and there has not yet been a sufficient manner found to dispose of this (Wolf, 2015, p. 296). Furthermore, Wolf argues that ''most importantly of course, there is the risk of catastrophic meltdown resulting from grave malfunctions or deliberate attacks on reactors'' (Wolf, 2015, p. 296). However, as claimed by Wolf, in case of a nuclear accident, thousands of people will become victims, whereas due to climate change, there are millions of people victimised (Wolf, 2015, p. 296).

5.4 Critical assessment

The biggest asset of LNG is the fact that it is not bound to a physical place, and this is ideal for countries that are only connected to one main gas pipeline, and mainly because of this, LNG could be considered secure. Furthermore, these vulnerable countries used to be dependent on only one main gas supplier. Giving that much power to one gas importer is dangerous, since gas supply is crucial to the economy of almost all countries, and to the lives of citizens in every society. Because of the fact that LNG can be imported from anywhere in the world where there is supply, it is possible to transport LNG to a pipeline even when it is not connected to the place that the supply came from. Critics towards LNG mostly mention the fact that it is costlier than gas, due to the technology that comes with it, e.g. liquefying the gas, and then later the regasification process. However, due to technological improvements, the price is decreasing, and if that will remain, the price of LNG could possibly come close to that of gas.

At this point in time, there is an oversupply of LNG. Therefore, it is easy to obtain from importing LNG countries. However, there will come a moment when the

oversupply of LNG is gone. When that happens, LNG would become costlier again, making it less attractive to import and to use as a diversification tool of the energy mix. Even though LNG can be considered a sufficient means to secure and diversify energy, it is important to note that it is still a fossil fuel, and the fossil supply in the world is decreasing. Therefore, when considering LNG as a sufficient method to ensure energy security, it is important to also consider alternatives, such as nuclear and renewable energy. Even though nuclear energy is considered a ''environmentally friendly'' form of energy, disasters such as Chernobyl and Fukushima have made it less acceptable in the public eye. Of course, as mentioned by Wolf, global warming affects millions of people in the world, but nuclear energy can still be dangerous, and it is therefore not an ideal diversification tool nor is it the best solution to climate change. Besides energy security, climate change is an important issue that is extremely highlighted by the European Union, and in order to combat this, RES would be the most interesting option.

6. Discussion

To what extent is Lithuania's LNG terminal a method to ensure energy security in the EU?

6.1 The EU's view on LNG

LNG does secure energy in the European Union, while one of the most important securing means is diversification. For the European Union, energy security mainly entails diversifying supply; strengthen solidarity; coordinating energy policies of the MS better; developing energy technologies and to strengthen the infrastructure. The EU agrees about the fact that LNG helps diversify the Union's energy mix, and states that it provides an expanding market. The growing LNG market ensures competition, and that is a great benefit for countries such as Lithuania, Latvia and Estonia, since they are able to transport natural gas to their own pipelines. This is especially important, while not all countries have the benefit of a good and diverse energy network, and this is where LNG plays a crucial role. Countries are able to import LNG to their pipelines, and are able to pick suppliers that are economically beneficial.

Nevertheless, securing energy involves many factors, and diversification is just a part of it. Therefore, the European Union does not consider LNG the only way to diversify and secure energy, mainly because in order to secure supply, multiple factors have to be addressed. Lithuania is a great example of how dangerous it could be to rely on one main supplier and one main network. LNG could help diversify suppliers, but results have shown that the Union also emphasizes on good and advanced infrastructure. Besides this, the MS needs to cooperate together in an effective matter, even though not all the MS have the same energy related issues. Countries that do not have sufficient access to energy networks need to build strong relationships with MS that do have those networks, so they are able to connect infrastructures. Furthermore, the EU wants to keep investing in RES and energy efficiency, which is a climate friendly method to secure energy, with the aim to decarbonise the economy.

It should be noted this transformation is expensive, since new kinds of infrastructures needs to be build, as well as the fact that energy companies have to transform from one form of energy to another. Furthermore, transforming a whole economy that runs mostly on fossil fuels into one supported by RES takes quite a long time. In the meantime, there are still energy security threats, and companies such as Gazprom that put pressure on countries who have no supply of their own. In these situations, LNG is an extremely important diversifying method, in order for

vulnerable MS to break free from one main supplier. Therefore, from a European perspective, LNG is able to secure supply, at least on a short term.

6.2 The terminal's success in Lithuania

Lithuania's LNG terminal is a sufficient method to ensure energy security within the EU, since it provides leverage against companies such as Gazprom. Lithuania's vulnerable position has been mentioned several times, and in order to become independent from Gazprom, the terminal was established. After Lithuania had to close their nuclear power plant, the country was forced to important 100% of its gas supply from Russia, since they have only one pipeline, which is connected to Russia. Energy supply is needed in every working economy, and Gazprom used their monopoly position to raise Lithuania's gas prices continuously higher. Beside the high-energy costs the country had to pay, Russia had also big influences on Lithuania's foreign policy, because they could not afford to oppose against them. Nevertheless, Gazprom kept raising the gas prices, while the north of Europe had to pay considerably less.

The Klaipeda terminal has influenced three factors, the first, diversifying gas supplies in the country. Lithuania was able to transform their vulnerable supply into a strong one, and is now able to import from countries such as Norway and Qatar. Furthermore, it helped transform Lithuania from a gas importing country to a country that is also able to store and export LNG. Thirdly, and most importantly, the terminal provided the country with leverage against Gazprom. This became abundantly clear when, soon after the establishment of the terminal, Gazprom dropped their high gas prices, and even offered compensation for the high prices Lithuania had to pay the years before. The Klaipeda terminal is also beneficial for other MS, because it is able to transport gas to other vulnerable countries such as Latvia, Estonia and Poland, which also gives them some leverage against Gazprom. It could also be transported to other countries within the EU, to help diversify their supply.

Nonetheless, the Klaipeda terminal has not only experienced successes. The technology that comes with LNG is quite expensive, and this influences the gas prices that citizens and companies have to pay. Besides that, the lease for the FRSU has to be accounted for, and Lithuania has set up a national policy, forcing companies to buy gas imported from the LNG terminal. However, buying gas from Gazprom is cheaper, due to the fact that natural gas does not have to be transported and liquefied. Because of this, companies are looking for means to work against this rule, for example, using fuels other than gas to meet their energy needs. This rule

does encourage companies and private investors to invest in RES, but this would have a negative effect for the terminal, because then there is a possibility that Lithuania is not able to meet the costs, and would again be dependent on one big supplier.

Looking at both sides, the pros outweigh the cons. Lithuania would not have this independent position without the terminal, and it is a great example for the other ''energy islands'' (e.g., Latvia and Estonia). Lithuania has set an example on how to transform a vulnerable position into a strong one. Furthermore, due to the enhancement of technology, LNG could also become less costly, which would make it more interesting for the countries in Eastern Europe. Mainly because diversification of supply is crucial for securing energy, several MS are now able to diversify to gas from the Klaipeda terminal, which enhances the security of the whole Union.

6.3 Securing energy with LNG

LNG may not be secure enough to ensure security in the EU, mainly because only small parts of the world contain gas. Even though countries are able to build a terminal to import and storage gas, it still needs to be imported from other countries. The main gas fields lie in Russia and in countries in the Middle East. The gas exporting companies in those countries have the benefit of choosing markets where the most profit lie, and therefore, importing countries are still subject to this. Additionally, these countries could also choose to export gas where their geopolitical interest lies, and may not always act in the interests of the gas markets. At this point, it is rather easy to import LNG, since there is an oversupply of it in the world. This oversupply will not remain and that will make it more difficult to import it in the future. When that happens, geopolitical and economic interests of the exporting countries will play a bigger role. Countries such as Lithuania, who already have a tense relationship with Russia, will probably have to pay high prices for their gas imports.

Nevertheless, LNG is a great method to diversify supply, but it still causes climate change, which also affects the security of people within the EU and all over the world. Therefore, a more sufficient method to ensure energy is to keep investing in energy efficiency methods and RES. As mentioned, RES is less vulnerable on a geopolitical level, because it gives countries the chance to consume and generate it on a domestic level. Especially since there is no infinite supply of gas in the world, it is important to invest in RES. Furthermore, greenhouse gas emissions are increasing, and this could lead to fatal disasters all over the world. LNG is still a fossil fuel, and

in the future, fossil fuels will probably not be used anymore. All in all, to ensure security in the EU, there needs to be more investment made into environment friendly supply such as RES.

So to answer the main question, to what extent is Lithuania's LNG terminal a method to ensure energy within the EU, it should be noted that on the short and medium term, this terminal could indeed contribute to securing energy, mainly within the region. It has helped Lithuania to diversify their supply, and to become a strong player on the international energy arena, and could supply also to other MS. Nevertheless, LNG is a fossil fuel, and for to EU to reach their 2050 goal, and to secure supply, RES is probably the best method to ensure energy security.

7. Conclusion

The goal of this report was to research whether Lithuania's LNG terminal could be a method to ensure energy security in the European Union. Through policy and academic journal analysis it became clear that LNG is a great way to diversify energy in a country. Lithuania used to import 100% of its gas from Russia, but was forced to pay high prices decided by the Russian monopoly company Gazprom. This terminal has firstly provided Lithuania with leverage against Gazprom and its high prices. Secondly, the terminal helps the country to diversify gas supplies and lastly, using this terminal for storage gives Lithuania the chance to export gas to other countries in the region, but only if infrastructure allows it. The terminal has advanced Lithuania's energy position greatly and secured the country's gas supply. However, LNG is not cheap, and the terminal brings high costs to the country and major gas consuming companies mostly have to account for this. Nonetheless, this is the price Lithuania pays for enhancing energy security.

On a European level, MS all have different energy security interests, and not all countries have the same level of vulnerability. Nevertheless, vulnerable countries such as the Latvia, Estonia and Poland are able to use the terminal when needed, which ensures the energy security in the region. The conducted research has shown that the EU recognises the fact that LNG can be a great tool for energy diversification, certainly on the short and medium term. To make LNG more interesting, more investment should be made in technologies and infrastructures, and the EU mentions this in their energy security strategies. Nevertheless, diversification is not the only factor that ensures secure energy, and the EU also emphasises the importance of good infrastructures and successful cooperation between the MS.

However, looking at the long-term security situation, the EU wants to move away from fossil fuels and start using RES and energy efficiency only. Energy efficiency enhances energy security, because it reduces the amount of energy that needs to be secured. Furthermore, RES is less subject to disruptions and to insecurity on a geopolitical level, since it can be produced and consumed domestically. The EU wants to invest in these climate friendly energy sources, and in order to reach the goal of a decarbonised economy in 2050 has set up a strategy, which explains how the MS can achieve this. The conducted research has made it clear that RES and energy efficiency have fewer risks than any other fossil fuel on the long term, so besides the benefits it has on the climate, it could also contribute to more energy security in the European Union.

8. Recommendations

After extensive research, it has become clear that even though LNG cannot completely secure energy within the EU, it can and should be used as a diversification tool. As diversification is only a part of energy security, there is a need for attention to infrastructure, geopolitical relationships that may lead to energy insecurity, and to energy security on the long-term and short/medium term.

Therefore, it should be recommended that the EU should encourage the use of LNG as a diversifying method in the MS. Mainly because LNG is a great diversification method on the short and medium term, especially since there is an oversupply of it at this point in time.

The EU should also encourage the use of the LNG terminal in Klaipeda, with building infrastructures to the neighbouring Baltic States and Poland, to improve the energy security in the region.

In order to maintain and promote the use of LNG, it should become a more interesting option than natural gas on an economic level. Thus, the EU should encourage LNG investors with subsidies, to improve the technologies that come with it.

On the long term, LNG is not entirely climate friendly, and therefore, the EU should encourage the MS to implement the Energy Roadmap 2050. In order to move away from fossil fuels and to establish an economy that relies on RES and energy efficiency.

9. References

Amineh, M.P. (2014). Rethinking EU Energy Security Considering Past Trends and Future Prospects. *Journal of Perspectives on Global Development and Technology,* 13, 757-825. Retrieved November 19, 2015 from http://web.a.ebscohost.com/ehost/pdfviewer/pdfviewer?vid=4&sid=e5dc3138-38bd-46df-a0c5-6f59719a7821%40sessionmgr4003&hid=4201

Ang, B.W., Chong, W.L., & Ng, T.S. (October, 2014). Energy security: Definitions, dimensions and indexes. Journal of Renewable and Sustainable Energy Reviews, 42, 1077-1093. Retrieved November 28, 2015 from doi: 10.1016/j.rser.2014.10.064

Augutis, J., Krikštolaitis, R., Martisauskas, L., & Peciulyte, S. (September, 2012). Energy security level assessment technology. *Journal of Applied Energy, 97*, 143-149. Retrieved November 9, 2015 from doi: 10.1016/j.apenergy.2011.11.032

Augutis, J., Krikštolaitis, R., & Ušpuras, E. (2013). Lithuanian Activities in Energy Security. In *Risk Analysis VIII* (pp. 3-12). UK: WIT Press

Bahgat, G. (2006). Europe's Energy Security: Challenges and opportunities. *Journal of International Affairs, 82*(5), 961-975. Retrieved October 20, 2015 from http://resolver.ebscohost.com/openurl/?id=hahog%3fsid%3dgoogle&id=doi%3a10.1111%2fj.1468-2346.2006.00580.x&auinit=G&aulast=Bahgat&atitle=Europe's+energy+security%3a+challenges+and+opportunities&title=International+Affairs+(Blackwell)&volume=82&issue=5&date=2006&spage=961&linksourcecustid=919

Baltic, Nordic, Visegrad countries unite in support of EU Energy Union. (March 13, 2015). Retrieved December 27, 2015 from http://www.baltictimes.com/baltic__nordic__visegrad_countries_unite_in_support_of_eu_energy_union/

Baran, Z. (2007). EU Energy Security: Time to End Russian Leverage. *Journal of the Washington Quarterly, 30*(7), 131-144. Retrieved October 20, 2015 from http://acc.hudson-employment.org/files/publications/07autumn_baran.pdf

Belkin, P., Nichol, J., Ratner, M., & Woehrel, S. (August, 2013). *Europe's Energy Security: Options and Challenges to Natural Gas Supply Diversification.* Report for

Congress. Retrieved November 19, 2015 from http://digital.library.unt.edu/ark:/67531/metadc227749/m1/1/high_res_d/R42405_2013Aug20.pdf

Dorigoni, S., Graziano, C., & Pontoni, F. (December, 2010). Can LNG increase competitiveness in the natural gas market? *Journal of Energy Policy,* 38(12), 7653-7664. Retrieved December 1, 2015 from doi: 10.1016/j.enpol.2010.08.004

Chester, L. (February, 2010). Conceptualising energy security and making explicit its polysemic nature. *Journal of Energy Policy,* 38, 887–895. Retrieved October 28, 2015 from http://www.academia.edu/4645811/Conceptualising_energy_security_and_making_explicit_its_polysemic_nature

Cherp, A. & Jewell, J. (December 2014). The concept of energy security: Beyond the four A's. *Journal of Energy Policy,* 75, 415–421. Retrieved October 28, 2015 from doi: 10.1016/j.enpol.2014.09.005

Clifford, N., French, S., & Valentine, G. (2010). *Key Methods in Geography*. London: SAGE Publications

Escribano Francés, G., Marín-Quemada, J.M., & González, E.S.M. (October, 2013). RES and risk: Renewable energy's contribution to energy security. A portfolio-based approach. *Journal of Renewable and Sustainable Energy Reviews,* 26, 549-559. Retrieved December 2, 2015 from doi: 10.1016/j.rser.2013.06.015

Euractiv. (July 13, 2013). *Lithuania looks for alternatives to counter Russia's high gas price*. Retrieved December 21, 2015 from the Euractiv Web site: http://www.euractiv.com/energy/lithuanian-minister-gazprom-know-news-529127

Euractiv. (October 15, 2015). *Polish-Lithuanian gas pipe to end Baltic energy isolation*. Retrieved December 21, 2015 from the Euractiv Web site: http://www.euractiv.com/sections/energy/polish-lithuanian-gas-pipe-end-baltic-energy-isolation-318552

EU sanctions against Russia over Ukraine. (n.d.). Retrieved December 20, 2015 from the European Union Newsroom Web site:

crisishttp://europa.eu/newsroom/highlights/special-coverage/eu_sanctions/index_en.htm

European Commission. (November 10, 2010). *Energy 2020: A strategy for competitive, sustainable and secure energy*. Retrieved December 15, 2015 from http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52010DC0639&from=EN

European Commission. (December 15, 2011). *Energy Roadmap 2050.* Retrieved November 5, 2015 from the European Commission Web site: http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52011DC0885&from=EN

European Commission. (May 28, 2014). *European Energy Security Strategy*. Retrieved October 29, 2015 from the European Commission Web site: http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52014DC0330&from=EN

European Commission. (November 18, 2015). *Country Factsheet Lithuania*. Retrieved December 4, 2015 from https://www.parlament.gv.at/PAKT/EU/XXV/EU/08/45/EU_84561/imfname_10590194.pdf

Godzimirski, J.M. (2014). European Energy Security in the Wake of the Russia–Ukraine Crisis. *Journal of the Polish institute of International Affairs, 27*(63), 1-5. Retrieved October 20, 2015 from https://www.pism.pl/files/?id_plik=18874

Grigas, A. (September 22, 2014). *Klaipeda's LNG terminal: a game changer*. Retrieved October 23, 2015 from the Euractiv Web site: http://www.euractiv.com/sections/energy/klaipedas-lng-terminal-game-changer-308613

Gritsenko, D., & Serry, A. (June, 2015). *A Geographical Perspective on Liquefied Natural Gas (LNG) Facilitiy Development in the Eastern Baltic Sea* (Conference Paper). Retrieved November 19, 2015 from http://www.researchgate.net/profile/Daria_Gritsenko/publication/278683573_A_Geographical_Perspective_on_Liquified_Natural_Gas_(LNG)_Facility_Development_in_the_Eastern_Baltic_Sea/links/55ddf01008ae7983897d0b5f.pdf

Janeliūnas, T., & Molis, A. (2005). Energy Security of Lithuania: Challenges and Perspectives. *International Relations and Political Science Vilnius University*, 200-223, retrieved November 9, 2015 from http://www.ceeol.com/aspx/issuedetails.aspx?issueid=6af1eb0f-2a4a-43ec-8fda-9bd6f7f79f7d&articleId=ad7ddb52-bde3-4662-b4fa-10995e4aca75

Janeliūnas, T. (2009). Lithuanian Energy Strategy and its Implications on Regional Cooperation. *Journal of Latvian Institute of International Affairs*, 31(4), 190-222, retrieved October 20, 2015 from http://liia.lv/site/attachments/17/01/2012/Energy-Baltic-region.pdf

Jankauskas, V. (2015). *The recent developments in the Lithuanian gas market.* (Policy Brief 1/2015). Retrieved November 9, 2015 from http://www.centrumbalticum.org/sites/default/files/user_uploads/bsr_policy_briefing_1_2015_small.pdf#page=175

Johansson, B. (May, 2013). A broadened typology on energy and security. *Journal of Energy*, 53, 199-205. Retrieved December 10, 2015 from doi: 10.1016/j.energy.2013.03.012

Jonssona, D.K., Johanssona, B., Månsson, A., Nilsson, L.J., Nilsson, M., Sonnsjö, H. (January 2015). Energy security matters in the EU Energy Roadmap. *Journal of Energy Strategy Reviews*, 6, 48-56. Retrieved November 16, 2015 from doi: 10.1016/j.esr.2015.03.002

Kaare, M., Koppel, O., & Leppiman, A. (2013). The Eastern Baltic LNG terminal as a prospect to improve security of regional gas supply. *International Conference on Environment, Energy, Ecosystems and Development* (pp. 158-164). Tallinn University of Technology. Retrieved August 31, 2015 from http://www.inase.org/library/2013/venice/bypaper/EEEAD/EEEAD-22.pdf

Karmazinaitė, S. (2015, November 10). *Klaipeda LNG Terminal one year on – independence or responsibility?* Retrieved November 17, 2015 from the Delfi Web site: http://en.delfi.lt/lithuania/energy/klaipeda-lng-terminal-one-year-on-independence-or-responsibility.d?id=69528746

Klaipeda LNG terminal: Competition adds energy security (2014). Retrieved October 27, 2015 from the Nordic Investment Bank Web site: http://www.nib.int/news_publications/cases_and_feature_stories/1544/klaipeda_lng_terminal_competition_adds_energy_security

Kruyt, B., van Vuuren, D.P., de Vries, H.J.M. & Groenenberg, H. (2009). Indicators for energy security. *Journal of Energy Policy*, 37(6), 2166–2181. Retrieved October 28, 2015 from doi: 10.1016/j.enpol.2009.02.006

Lithuania Considers New Tax to Support Its Loss-Making LNG Facility. (2015, May 5). Retrieved November 17, 2015 from the Russia Insider Web site: http://russia-insider.com/en/politics/lithuania-considers-new-tax-support-its-loss-making-lng-facility/6464

Liutho, K. (May, 2014). *The EU's Isolated Baltic Gas Islands and LNG Receiving Terminals in the Baltic Sea Region* (Policy Brief 1/2014). Retrieved November 19, 2015 from http://www.researchgate.net/profile/Kari_Liuhto/publication/264604097_The_Baltic_Sea_region_2014/links/53fb39840cf20a45497057c0.pdf#page=37

Maigre, M. (March, 2010). *Energy Security Concerns of the Baltic States.* Retrieved December 21, 2015 from http://www.icds.ee/fileadmin/media/icds.ee/failid/Merle_Maigre-Energy_Security_Concers_of_the_Baltic_States.pdf

Mathers, N., Fox, N., & Hunn, A. (1998). *Using Interviews in a Research Project*. Sheffield: Trent Focus Group

Molnar, G., Behrens, A., Egenhofer, C., & Genoese, F. (October, 2015). Europe's LNG Strategy in the Wider EU Gas Market (Policy Brief No. 333). Retrieved November 20, 2015 from http://aei.pitt.edu/68486/1/PB333_Europe_LNG_Strategy_0.pdf

Norway outstrips Russia as Western Europe's largest gas supplier. (May 23, 2015). Retrieved December 20, 2015 from https://www.rt.com/business/261549-norway-gas-supply-europe/

Paillard, C.A. (2010). Russia and Europe's mutual energy dependence. Journal of international affairs, 63(2), 69. Retrieved October 27, 2015 from

http://web.a.ebscohost.com/ehost/pdfviewer/pdfviewer?vid=6&sid=73b853fb-1806-4c09-84bf-6cd222ae7fa2%40sessionmgr4003&hid=4204

Pavilionis, Z. (March, 2015). Lithuanian Energy Freedom. *Journal of International Affairs*, 177(6), 67-71, retrieved November 2, 2015 from http://web.a.ebscohost.com/ehost/pdfviewer/pdfviewer?sid=a7142dff-6967-4700-9cf9-912f7ffaa92e%40sessionmgr4003&vid=7&hid=4109

Siddi, M. (October 13, 2015). *The EU-Russia Gas Trade: A Case of Mutual Dependence*. Retrieved December 20, 2015 from the European Futures Web site: http://www.europeanfutures.ed.ac.uk/article-1815

Smailys, V. (2014). 2014: A Momentous Year for Klaipeda Region and the Energy Sector of Lithuania. *Journal of Engineering and Management*, 4(70), 3-4. Retrieved November 2, 2015 from doi: 10.5755/j01.erem.70.4.9716

Snijder, R. (March, 2008). The Future of Gas and the Role of LNG: Economic and Geopolitical Implications (Working Paper 14/2008). Retrieved November 20, 2015 from http://scholar.google.nl/scholar?start=40&q=lng+eu&hl=nl&as_sdt=0,5

Sovacool, B.K. & Mukherjee, I. (August 2011). Conceptualizing and measuring energy security: A synthesized approach. *Journal of Energy*, 36(8), 5343-5355. Retrieved December 10, 2015 from doi: 10.1016/j.energy.2011.06.043

Stringer, K. (2008). Energy Security: Applying a Portfolio Approach. *Journal of Baltic Security & Defence Review*, 10, 121-142. Retrieved November 9, 2015 from http://213.184.43.214/files/files/documents/Research/6_%20Kevin%20D%20Stringer-Energy%20security-Portfolio%20approach.pdf

Tarvydas, D., & Gatautis, R. (2006). Liquefied natural gas in the world and Lithuanian Perspective. *Journal of Energetika, 3*, 94-101. Retrieved October 23 from http://www.lmaleidykla.lt/publ/0235-7208/2006/3/Ener094_101.pdf

The Floating Storage and Regasification Unit (FSRU). (April 13, 2010). Retrieved December 22, 2015 from https://www.bimco.org/en/Education/Seascapes/Ships_that_serve_us/2010_04_13_The_floating_storage_regasification_unit.aspx

Treaty of Lisbon (2009). *Consolidated Reader-Friendly Edition of the Treaty on European Unio (TEU) and the Treaty on the Functioning of the European Union (TFEU) as amended by theTreaty of Lisbon (2007).* Denmark: Foundation for EU Democracy

Whiting, L.S. (2008). Semi-structured interviews: guidance for novice researchers. *Journal of Nursing Standard,* 22(23), 35-40. Retrieved December 4 2015 from http://journals.rcni.com/doi/pdfplus/10.7748/ns2008.02.22.23.35.c6420

Winzer, C. (2012). Conceptualizing energy security. *Journal of Energy Policy,* 46, 36-48. Retrieved October 28, 2015 from doi: 10.1016/j.enpol.2012.02.067

Wolf, R. (March, 2015). Why wealthy countries must not drop nuclear energy: coal power, climate change and the fate of the global poor. *Journal of International Affairs,* 91(2), 287-301. Retrieved December 2, 2015 from doi: 10.1111/1468-2346.12235