Hydraulic Fracturing and Energy Security

The Cases of Bulgaria and Poland

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Abstract

This thesis seeks to explain how shale gas affects the approaches to energy security taken by Bulgaria and Poland. It takes a positivist approach and uses process-tracing. It claims that the decisions regarding hydraulic fracturing taken by the different member states have to be seen in the context of the international system, thus through the lens of International Relations theory. It takes a neo-classical Realist perspective. This paper argues that Bulgaria and Poland have chosen very different approaches to hydraulic fracturing. However, these approaches are ultimately just a reflection of the two country's energy policy in general, as they have taken very different approaches to their energy security in general. While Poland has developed a clear strategy of how to achieve energy security and is pursuing it, Bulgaria is subject to frequent shifts that have negatively affected the investment climate in the energy market. The cases show the complexity of how to pursue an energy strategy and the multiple factors that influence it. While the choice of sources remains subject to the particularities of the given country, there are always policy choices that can be picked. The implication of this finding is that what matters most for achieving energy security is consistency in politics, not the choice of source.

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CCS	–	Carbon Capture Storage
CNG	–	Compressed Natural Gas
EPP 2030	–	Energy Policy Poland 2030
EU	–	European Union
LNG	–	Liquefied Natural Gas
NPP	–	Nuclear Power Plant
RES	–	Renewable Energy Sources
ROSATOM	–	Russian State Atomic Energy Company
U.S.	–	United States

Introduction

Recently, several German brewers wrote a letter to the German government expressing their concerns regarding the impact the use of hydraulic fracturing could have on the quality of drinking water and thereby on the quality of beer.[1] While this case is a particular German oddity, it reflects the deepness of concerns regarding the use of the technology. Proponents of hydraulic fracturing point at the United States and argue that Europe cannot fall back behind when it comes to this new technology which appears to make the U.S. energy independent within the foreseeable future. However, opponents of hydraulic fracturing also point to the U.S. and raise concerns regarding the negative environmental impact the technology can have. European lawmakers have taken very different stands on this question.

While some promote and actively encourage hydraulic fracturing, others have banned its use until the impact of the technology can be assessed more accurately. Most member states of the European Union, however, are in a limbo between these two extremes. Europe is highly dependent on energy imports as only few countries have own resources of considerable size. When it comes to gas, these imports mainly come from Russia. Some European states, particularly in the former Communist part of the continent, are highly dependent on this one suppliers. Some even get their complete gas supply from this one source. From an energy security perspective, this is highly problematic, as disruptions would affect the country immediately. Hydraulic fracturing has been named as a solution for this problem. The debate in these countries is ongoing and will likely last for some more time. Two of the extreme cases, that will be looked at in this work, are Poland and Bulgaria. Both countries are expected to have huge shale gas reserves. However, while Poland actively supports the explorations, Bulgaria has turned its initial support into a ban of the technology, following protests in the country's capital, Sofia.

Multiple questions arise from this situation. Some of them are: How do the approaches taken

[1] "German Brewers Oppose Fracking Because of Fear over Clean Water."

by different EU member states to hydraulic fracturing differ? How can the differences between the approaches and their development be explained? In how far is hydraulic fracturing a solution to energy security in Europe? These are the types of questions this paper looks into. Concretely, the research question is: How does the discovery of shale gas affect the approaches to energy security taken by Bulgaria and Poland? In order to answer this question, a positivist approach is taken and with the technique of process-tracing, an answer is sought to the question posed. This paper claims that the decisions regarding hydraulic fracturing taken by the different member states have to be seen in the context of the international system, thus through the lens of International Relations theory. In this light, the perspective taken toward the issues will be a Realist one, concretely a neo-classical Realist perspective. Independent variables that are being looked at are the degree of dependence on one supplier, concretely Russia; the availability of alternative sources; and the perception of the main supplier in the countries. The dependent variable examined is the use of hydraulic fracturing in the given country.

This paper argues that Bulgaria and Poland have chosen very different approaches to hydraulic fracturing. However, these approaches are ultimately just a reflection of the two country's energy policy in general, as they have taken very different approaches to their energy security in general. While Poland has developed a clear strategy of how to achieve energy security and is pursuing it, Bulgaria is subject to frequent shifts that have negatively affected the investment climate in the energy market. The cases will show the complexity of how to pursue an energy strategy and the multiple factors that can influence it. While the choice of sources remains subject to the particularities of the given country, there are always policy choices that can be picked. The implication of this finding is that what matters most for achieving energy security is consistency in politics, not the choice of source.

The paper I divided in two major chapters. The first section of the first chapter takes a look at the status quo of the existing debate on energy security in general and on shale gas in particular, acknowledging the conceptual problems of energy security and the lack of academic debate about

hydraulic fracturing; The second section of the first chapter takes a look at the theoretical framework used. As this paper takes a neo-classical Realist perspective, this theory is introduced and the choice justified. The second chapter deals with the concrete implications of hydraulic fracturing. It is divided in three sections. The first section introduces the status quo of European energy security and the general questions regarding hydraulic fracturing, while sections two and three look at the cases discussed. First, Poland will be looked at, as it is the case where hydraulic fracturing actually is being supported, before the second section looks at the situation in Bulgaria. Both cases do not only look at hydraulic fracturing but also draw from the general state of the two countries' energy markets and policies. This is necessary, as the decision for hydraulic fracturing is not a separate decision but stands in the context of a country's general energy policy.

The importance and contribution of this paper is threefold: First, it adds to the debate on energy security by dealing with a subject, hydraulic fracturing, that has barely been touched by academia. Second, by taking an International Relations perspective on energy security, the bridge between the two areas. Finally, the issue is current and urgent. An understanding of what is going on with regards to hydraulic fracturing helps academics and policy makers in the whole of Europe to consider their options adqequately.

Chapter 1 – Neo-classical Realism and Energy Security: The Framework

Chapter 1.1 – The Discourse on Energy Security and Hydraulic Fracturing

At the core of the debate about hydraulic fracturing lies the question of energy security. This notion has been discussed widely, especially following crises that negatively affected the flow of energy resources to the West, such as the Arab oil embargo of 1973 or the Ukrainian gas crises of 2006 and 2009 in the case of Europe. However, the ongoing debate shows that there are very different perceptions of what energy security actually means.[2] Hereby, both the term in a conceptual way and the scope of the concept are not clearly defined. Furthermore, a big share of the literature dealing with the issue is not academic but policy oriented, drafted by think thanks and government bodies.[3] This particularly is the case with regard to hydraulic fracturing, as the spread of the technology occurred rather recently and comes with a series of unknowns. While there are various government reports dealing with the environmental, economic, and political impacts of the technology, the academic debate is still at an early stage. This section provides an overview of the academic debate on energy security and how it relates to hydraulic fracturing in Europe.

Traditionally, the concept of energy security simply referred to the "availability of energy sources at an affordable price"[4], a definition the IEA still uses. Beyond this, the IEA differentiates between long-term and short-term energy security, thus investments and *ad hoc* reactions to sudden

[2] Ciută, "Conceptual Notes on Energy Security"; Blank, *Russia's Energy Weapon and European Security*; O'Sullivan, "The Entanglement of Energy, Grand Strategy, and International Security"; Yergin, "Ensuring Energy Security"; Deese and Nye, *Energy and Security*; Nye, "The Changing Face of Energy Security"; Kalicki and Goldwyn, *Energy and Security.*

[3] European Commission, *Support to the Identification of Potential Risks for the Environment and Human Health Arising from Hydrocarbons Operations Involving Hydraulic Fracturing in Europe*; ExxonMobil, "Hydraulic Fracturing"; Fulbright Energy, "Germany Drafts Hydraulic Fracturing Regulations"; Umwelt Bundesamt, *Environmental Impacts of Hydraulic Fracturing*; Bundesministeriums für Umwelt, Naturschutz und Reaktorsicherheit, *Umweltauswirkungen von Fracking Bei Der Aufsuchung Und Gewinnung von Erdgas Aus Unkonventionellen Lagerstätten*; Ernst & Young, *Shale Gas Report - Poland*.

[4] IEA, "Topic: Energy Security."

changes. However, this definition has been criticized as not meeting the complexity of the issue[5]. Therefore, many have called for an update of the definition of the term.[6] In the current academic debate, the definition has been modified as it no longer only focuses on the concerns of the consumer-side but also takes the producers into account. Today, *security of supply*, *security of demand*, and *security of transit* have become the three dimensions of energy security. In an even more sophisticated sense "being energy secure means having access to affordable energy *without* having to contort one's political, security, diplomatic, or military arrangements unduly."[7]

Joseph S. Nye discussed the changing concept of energy security on the basis of the policy implications the changing nature has.[8] While in the past, the four components of energy security policy were (1) liberalization of energy prices; (2) (modest) subsidies and regulations; (3) reserves; and (4) co-ordination on an international level, the changing international system has made it necessary to think beyond these notions.[9] While they would still make sense, they would not help when dealing with long-lasting disruptions. Therefore, Nye introduced two additional dimensions, namely growing economies – and the power shift that comes with these, especially towards big state-owned companies that serve as foreign policy tools – and climate change. He argues that "measures that deal with energy security must address the demand side even more than the supply side." For him, "energy security can no longer be summed up as greater energy independence. Instead, we must find better ways to cope with energy interdependence."[10]

Another scholar that is highly critical with the use of the term energy security is Felix Ciută.[11] He defines energy security by looking at the opposite – energy insecurity. For him this is

> the product of the contradiction between a general trend of increasing energy consumption and a contradictory trend of energy reserves, and it acquires policy salience at the interaction of three dimensions connected by multiple and

5 O'Sullivan, "The Entanglement of Energy, Grand Strategy, and International Security"; Nye, "The Changing Face of Energy Security"; Kalicki and Goldwyn, *Energy and Security*.
6 O'Sullivan, "The Entanglement of Energy, Grand Strategy, and International Security"; Nye, "The Changing Face of Energy Security."
7 O'Sullivan, "The Entanglement of Energy, Grand Strategy, and International Security."
8 Nye, "The Changing Face of Energy Security."
9 Ibid.
10 Ibid.
11 Ciută, "Conceptual Notes on Energy Security."

multidirectional links: growth, sustenance and the environment.[12]

Ciută's criticism of the term is very distinct and different from the usual debate. He criticizes that even though there is a legitimate link between energy and security, there is no appropriate conceptual and normative attention to energy security in the debate. For him, three factors shape the relationship between energy and security: (1) the *totality* of energy – energy is not just a resource but in the discourse it is often dealt with as such; (2) the *liminality* of energy; and (3) the *banality* of energy security – everything can be linked to energy and thereby the term security becomes everything and nothing.[13] While energy would become securitisized, it became "an 'umbrella' term" covering different concerns and "linking energy, economic growth and political power."[14] Ultimately, the actors would take all security roles. However, Ciută does not say that there is no such thing as energy security, he just criticizes the inaccuracy of the conceptual discourse.[15]

An important aspect of the conceptualization of energy security is its scope. Some discuss it globally, while others narrow it down to a particular region[16]. Originally, many dealt with the issue from a U.S. perspective. Yergin, for example, discusses the changing circumstances for the U.S. when dealing with the security of oil supply.[17] He argues that the current energy system does not meet the challenges of our time. However, his article was written before the recent developments with regard to unconventional oil and gas that has changed the situation not only for the U.S. but on the entire global market. For the case of hydraulic fracturing in Europe, the ongoing debate about energy security is most interesting. However, the debate is limited to policy recommendations, as mentioned above and does not serve a larger analytical purpose.

The European dependence on Russian gas and the crises of 2006 and 2009 have led to a wide range of publications dealing with Russia and the question, whether the country uses energy as

12 Ibid.
13 Ibid.
14 Ibid.
15 Ibid.
16 Blank, *Russia's Energy Weapon and European Security*; Baran, "EU Energy Security"; Bay, "Poland's Natural Gas Revolution: Energy, Security and Geopolitics."
17 Yergin, "Ensuring Energy Security."

a weapon.[18] In this debate, two camps have been established. One camp considers Russian policy as imperialist and energy as a tool for it, while the other camp emphasises the mutual interdependence between the European Union and Russia. Richard Youngs, in his book 'Energy Security: Europe's New Foreign Policy Challenge', for example, focuses on the foreign policy aspects of European energy security and consciously leaves out the internal (market) aspects of the issue. He focuses on three major aspects: The situation of the European Union and its policy response; the producer states and regions; and the role of European energy companies. By this, he delivers "a thorough analysis of current EU strategies towards energy security, assessing the EU as an international actor."[19] Youngs puts "a key focus on the governance structures of producer states"[20] and contributes to the "debates surrounding markets and geopolitics, informing both international relations and international political economy."[21] Works like this are important in understanding the situation Europe is currently facing but they do not solve the problem that while both the supply-side and the demand-side are being dealt with, there are few works that try to rationalize the actions of individual member states or regions within Europe. For example, Anita Orbán[22] discusses the Russian policy towards Poland, Slovakia, and Hungary but does not look at their responses. An exception in this context is the work by Nowak and Grzejszczak[23], who deal with the specific case of Poland. While they acknowledge the need for diversification as the common denominator, they emphasise on the different circumstances in the different member states of the European Union. They argue that various factors, such as historical relationships with suppliers, divergent standards of energy consumption, the different energy mixes, access to natural resources, dependence on imports, or political pursuits have created a complex situation that explains the different practices of the member states and their lack of co-ordination.[24]

[18] Blank, *Russia's Energy Weapon and European Security*; Larsson, *Russia's Energy Policy: Security Dimensions and Russia's Reliablity as an Energy Supplier*; Bugajski, *Cold Peace*; Smith, *Russian Energy Politics In The Baltics, Poland, And Ukraine*.

[19] Youngs, *Energy Security.*

[20] Ibid.

[21] Ibid.

[22] Orban, *Power, Energy, and the New Russian Imperialism*.

[23] Nowak and Grzejszczak, *Poland's Energy Security in the Context of the EU's Common Energy Policy. The Case of the Gas Sector.*

[24] Ibid.

While there is at least a limited number of scholars dealing with the energy security of Poland and the Visegrád countries[25], there is practically no academic discourse taking place with regard to Bulgaria. The only exception in this regard is a paper by Gareth Winrow, discussing geopolitics and energy security in the wider black sea region.[26] However, even this paper does not deal with the particular situation in Bulgaria in great detail or with regard to the particularities of the Bulgarian reactions to their energy security. One of the few authors dealing with the policies of the demand-side is Balmaceda[27] who looks at how Ukraine manages its energy relations to Russia. He found that Ukrainian dependency can be traced back to a lack of transparency in the energy policy.

With regard to the analysis of responses in Central Europe, Ryan Miller's work is a positive exception. Miller analyses the variety of responses and finds four reasons for "Central Europe's energy schism": (1) Russian policies; (2) EU policies; (3) regional unity; and (4) understanding of the term energy security.[28] These four points are crucial when one tries to understand the energy policies of the receiver states, especially small ones who are the focus of this paper, when dealing with the cases of Bulgaria and Poland. Especially the fourth point also connects to what Larsson writes about in the context of Russian energy policy: "Security does not only relate to the actual threats, but also to how they are perceived by the various actors (as actions are taken upon both perceptions and realities)."[29]

The ongoing debate shows how complex the issue of energy security is. One last approach that stands a bit away from the general debate but can also be linked to the question of how to define the limits of energy security was taken by O'Sullivan, who argues that energy security should not only be seen as a separate concept but be looked at in the context of Grand Strategies. Even though Grand Strategies are usually not linked to small powers, the notion of seeing energy as an aspect of the bigger strategical organization of a state is something that is being taken into account

[25] Bay, "Poland's Natural Gas Revolution: Energy, Security and Geopolitics"; Kozlowski, "Poland's Natural Gas Revolution: Energy, Security and Geopolitics"; Orban, *Power, Energy, and the New Russian Imperialism*.
[26] Winrow, "Geopolitics and Energy Security in the Wider Black Sea Region."
[27] Balmaceda, *Explaining the Management of Energy Dependency in Ukraine: Possibilities and Limits of a Domestic-Centered Perspective*.
[28] Miller, "Central Europe's Energy Security Schism."
[29] Larsson, *Russia's Energy Policy: Security Dimensions and Russia's Reliablity as an Energy Supplier.*

with regard to the case studies. This notion, in a way, is also linked to the topic of the next section, the theoretical framework, as the idea of state interest is clearly linked to realist notions, which will be discussed in the upcoming section.

Chapter 1.2 – Theoretical Framework

The previous chapter has shown the controversy on the exact meaning of energy security within the academic community. However, it was also shown that if one wants to understand the security-related problems that are related to hydraulic fracturing, one has to look beyond simply supply-matters. There are various factors that can potentially influence the decisions that lead to the use of the technology for the satisfaction of energy demand. Before it can be shown on the basis of concrete examples what this means, the theoretical framework needs to be established. As this paper is looking at the interaction between the international system and national policy decisions, International Relations theory needs to be consulted. The concrete theoretical approach that is most suitable is neo-classical Realism. By taking this approach, the liberal framework is as well rejected as is the political economy approach to International Relations. Liberalism is unsuitable as it disregards the importance of energy resources and oversimplifies the role of statesmen, while political economy is not suitable for strategically important commodities.[30] Neo-classical Realism, in contrast, overcomes the weaknesses of other Realist approaches, while offering points of engagement to explain why actions towards energy security are taken in the particular way they are being taken.

It might be surprising that International Relations plays such an insignificant role in explaining energy security. However, this becomes more understandable if one considers that until not too long ago, IR theory had been focusing on hard power and military power. As much as with

[30] Griffiths, *International Relations Theory for the Twenty-First Century*.

any IR theory, likely even more, this is the case with Realism, a family of theories containing classical Realism, neo-Realism, offensive Realism, defensive Realism, and neo-classical Realism.[31] Realism basically has three core assumptions: First, states are the primary actors that are rational, unitary, and are set in an anarchic international system; second, state preferences are fixed; and third, material power capabilities matter, as the international structure is what matters most.[32] For Realists, hard (military) power matters and the state as the main decision maker[33] and is being emphasized above domestic actors. Even though the concept has recently been slightly widened and national resources have been included into this framework by Morgenthau,[34] the theory still is very much state centric and resources are considered mainly a tool of power. For Realists, the perspective on energy relations is a global one; That the state actually does have an outstanding role in energy relations. According to Joseph S. Nye, "state-owned oil- and gas-companies now control far more oil and gas reserves than do the traditional private energy companies once known as the seven sisters."[35] This is shown by the fact that about 85% of oil companies and 80% are state owned.[36] But even beyond this, the state takes an exceptional position in matters of energy by setting the rules, for example for exploitation, taxation, or environmental regulations. From the Realist perspective, every state acts out of self-interest and there are no strong global or regional institutions. So, while the realist perspective on the importance of the state is correct, the neglect of intra-state actors and overarching institutions disqualifies it for explaining the contemporary world, when it comes to energy.

On the basis of Realism, Neo-Realism was developed as an approach to find answers to criticism towards the original theory, while at the same time not giving up the strong points of the approach. In Neo-Realism, the international system is anarchic and every state is in a constant state of risk and uncertainty.[37] In this environment, every state only has one goal: survival. Therefore,

[31] Ibid.
[32] Ibid.
[33] Waltz, *Theory of International Politics*.
[34] Morgenthau, Thompson, and Clinton, *Politics Among Nations*.
[35] Nye, "The Changing Face of Energy Security."
[36] Shaffer, *Energy Politics*.
[37] Waltz, *Theory of International Politics*.

when it comes to energy, the goal for every state is to increase its energy security.[38] In Neo-Realism in general – and particularly in the *Balance of Power Theory* by Kenneth Waltz – state follow strategies with the goal to eliminate risks.[39] This leads to similar actions by different states, as they are mainly driven by the will to survive.[40] In this setting, states with similar circumstances were to act similarly. However, a bigger problem for the analysis of state energy policies is that the theory can only explain outcomes but not the driving forces being decision making. Therefore, a theory is needed that considers the sub-state level to a certain extent, too. Neo-classical Realism provides this, by stating how systemic factors become actual foreign policy through the medium of the state.

Neo-classical Realists consider relative power capabilities as the main driving force of foreign policy.[41] For them, systemic pressures – and thereby also domestic variables – affect the actions of the state.[42] The fact that "different state motivations"[43] are considered, means that Constructivist elements are being added to the Realist basis. This move away from the basis has been criticized as violating basic principles of Realism[44] and to blur the different theories.[45] Some even argue that "there is no single neoclassical realist theory of foreign policy, but rather a diversity of neoclassical realist theories."[46] Be it as it may, neo-classical Realism could "well be the only game in town for the current and next generation of realists."[47] It is the only Realist theory that delivers an explanation for domestic preferences.

As it is statesmen, rather than states, who act as the key decision makers, internal factors and irrationalities are much more easily explicable. It explains these "through analyses that generally use domestic politics and ideas in a very limited way. The state is still present, only overcome. Objective reality exists, but decision making is impaired by uncertainty and the complexity of the

38 Ibid.
39 Ibid.
40 Ibid.
41 Rose, "Neoclassical Realism and Theories of Foreign Policy."
42 Griffiths, *International Relations Theory for the Twenty-First Century*.
43 Ibid.
44 Ibid.
45 Onea, "Putting the 'Classical' in Neoclassical Realism."
46 Lobell, Ripsman, and Taliaferro, *Neoclassical Realism, the State, and Foreign Policy.*
47 Onea, "Putting the 'Classical' in Neoclassical Realism."

environment."[48] As Anita Orbán argues, "for neoclassical realists to explain a state's foreign policy decision, perceptions are far from enough. It is equally important to incorporate 'state power' which decision makers are able to use for their own purposes."[49] Ultimately, neo-classical Realism allows the analysis of domestic events without the need for an in-depth focus on domestic politics and society.

This shows that there are various reasons why neo-classical Realism is most suitable for the analysis of hydraulic fracturing. First, it emphasizes the state and its role, which still is exceptionally strong in matters of energy. However, the domestic structure is still considered. What is key here is that what neo-classical realism analyses is not only the objective power balance but equally the perceived one. The next section will show why this is important by analysing the two cases of Bulgaria and Poland in depth. Before doing so, however, a short introduction into the state of the energy security situation in Europe and the subject of hydraulic fracturing is given.

[48] Rathbun, "A Rose by Any Other Name."
[49] Orban, *Power, Energy, and the New Russian Imperialism*.

Chapter 2 – Energy Security & Hydraulic Fracturing in Europe

Chapter 2.1 – The General Implications of Hydraulic Fracturing

Many factors can potentially influence the different approaches taken towards the legalization of hydraulic fracturing. These factors can be internal and external. It can go from the perceived energy security, the diversification in terms of suppliers, energy sources, and supply routes, the relations to the major suppliers, the attitude of the population towards these, as well as towards the use of different technologies, or historic reasons. This chapter will discuss these questions on the basis of Bulgaria and Poland, two EU member states that have very different and very similar circumstances at the same time. Circumstances that made their leaders take a very different stand on the question of hydraulic fracturing. The first country that will be looked at is Poland, as it is the country that took the lead in promoting the technology in Europe. Following on this, the reasons will be examined for why the situation in Bulgaria is so different. However, there are some basic elements that need to be looked at before, as they do apply to both cases similarly. These are the general energy situation in Europe, the development of EU-Russia energy relations in the close past, the state of the common European energy market, and what hydraulic fracturing is, why it has become such a controversial issue.

In the past years, the question of energy security has been on top of the EU's agenda. The 2003 Security Strategy observed an increasing "European dependence – and so vulnerability – on an interconnected infrastructure in transport, energy, information and other fields."[50] Especially the question of dependence on Russian gas has been a major issue. Europe depends on gas imports and currently has two main sources where it obtains gas: Russia and Africa, particularly Algeria.[51] According to the Commission's numbers, 57% of the EU-27's gas demands are covered by imports. This number is expected to even raise to about 84% by 2030.[52] While the Western member states are

[50] European Council, *A Secure Europe in a Better World: European Security Strategy.*
[51] Götz, "European Energy Foreign Policy and the Relationship with Russia."
[52] Ibid.

relatively independent of Russian supplies, the new member states of Central and particularly Eastern Europe are by far more dependent. This does not only have effects in times of crisis but also influences the prices the different member states have to pay for Russian gas.[53] The EU has already taken steps towards diversification, such as the 2009 'Third Energy Package' but this has so far shown unsatisfying results.

The question of the extraction of shale gas by the use of hydraulic fracturing (fracking) has become a highly politicized issue. While some see it as a key technology on the way to energy security and self-sufficiency, others are worried about the ecological implications of the technology. In light of the given debate, it is necessary to be aware of what hydraulic fracturing actually means and what consequences it comes with. The United States claim to become energy independent within the nearby future[54], largely by the extraction of shale gas and oil. Many European countries strive for the same. In order to understand the implications of this, one has to understand what shale gas is, how it is being extracted. Shale gas can be found in shale deposits in sedimentary rock. These deposits varies but often cover huge areas.[55] Equally to the size, the thickness of shale deposits can vary largely, with thick deposits usually holding larger reserves. The deposits (*plays)* are categorised on the basis of their density.[56] A low density *play* has more pores and can therefore hold more gas. In order to determine the potential of a play, a number of explorations have to be made. The gas is trapped in the rock as the spaces holding the gas tend to be small and no well connected. Therefore, the original horizontal drillings in the past decades were economically very infeasible and had low production rates. Based on the observation that the productivity of multi-fractured rock was higher, horizontal drilling into the shale deposits was introduced. With one horizontal drill, large quantities of gas can be extracted from the play as most natural fractures are vertical.[57]

As the technology is only being used at a large scale in the past years, the long-term

[53] Ibid.
[54] Samuelson, "The U.S. May Become Energy-independent after All."
[55] Global Oil Insight, "What Is Shale Gas?".
[56] Umwelt Bundesamt, *Einschätzung Der Schiefergasförderung in Deutschland*.
[57] Centre for Global Energy Studies, "What Is Unconventional Gas?".

productivity of a play is hard to measure. However, in most cases production "tends to peak suddenly during the first year of production after which it declines rapidly."[58] This has lead for very high production rates in the beginning and a decline of up to 70% within two years. In order for the deposits to remain economically feasible, the play has to be 'stimulated' to increase gas flow out of the pores. The most common technology for this is hydraulic fracturing, often called hydraulic fracturing. The technology, developed in the mid-twentieth century, involves the high-pressure injection of water and sand, often mixed with a number of chemicals, into the rock. The water widens the existing gaps in the rock, while the sand remains in the the fractures and keeps them open.[59] This procedure is much more expensive than conventional gas drilling and therefore has not been widely used over decades. However, the increasing gas-prices of the last decades have changed this. In combination with horizontal drilling, the technology became established around the beginning of the new Millennium.[60]

While conventional gas dwells keep their production steady over a long period of time, this is not the case with shale-gas dwells.[61] Furthermore, ongoing capital investment is necessary to keep production up and prolong production. The advantage of the technology is that the high early output rates lead to an early return of investment. This enables producers to react much better to changes in demand, supply, and price. However, the technology requires the producer to drill new wells into the shale play to keep production up. A similar phenomenon has lead to an explosion of costs for producers of oil in the tar sands of Alberta, Canada.[62] With regard to the potential the theory has to significantly increase European energy security, there are different perspectives. While some see "huge opportunities in EU shale gas"[63] others argue that "extracting Europe's shale gas and oil will be a slow and difficult business."[64]

On the basis understanding, the case studies can now be looked at. These will show that

58 Global Oil Insight, "What Is Shale Gas?".
59 Centre for Global Energy Studies, "What Is Unconventional Gas?".
60 Global Oil Insight, "What Is Shale Gas?".
61 Ibid.
62 Ibid.
63 Petroleum Economist, "Huge Opportunities in EU Shale Gas."
64 Economist, "Frack to the Future."

Bulgaria and Poland have chosen very different approaches to hydraulic fracturing. However, these approaches are ultimately just a reflection of the two country's energy policy in general. While Poland has developed a clear strategy of how to achieve energy security and is pursuing it, Bulgaria is subject to frequent shifts that have negatively affected the investment climate in the energy market. The cases will show the complexity of how to pursue an energy strategy and the multiple factors that can influence it. While the choice of sources remains subject to the particularities of the given country, there are always policy choices that can be chosen. The implication of this finding is that what matters most for achieving energy security is consistency in politics, not the choice of source.

Chapter 3.1 – Analysis of Poland

From all European countries, Poland has taken the lead in the promotion of hydraulic fracturing. There are various potential reasons for this, however the most frequently cited one is that the country aspires to become more independent from Russian gas.[65] However, there is more to this decision, as will be shown in this section. Beyond the Polish-Russian relations, the decision has groundings in the history of the country, EU policy, the current energy mix Poland has, and other factors, such as the role of the U.S., for example. The case of Poland will show how this mixture of factors has lead Poland to take a policy decision that is equally directed to the domestic and international level. The degree of energy security a country finds itself in is the product of the history, geographic location, and political context a country finds itself in. This also is the case in Poland. That Poland is promoting fracturing is the consequence of a series of events that last back into a distant past, is connected to perceptions that developed from this and expectations towards

[65] Kozlowski, "Poland's Natural Gas Revolution: Energy, Security and Geopolitics"; LaBelle, "Fracking to Reduce Risks (1)."

the future. The example of Poland exquisitely illustrates the existence of policy choices and that for a good energy policy, the most important factor is consistency.

Today, Poland is comparably energy independent. In 2009, Poland was the ninth largest coal

Table 1: Energy Dependency of EU Member States

producer in the world.[66] Because of its huge domestic capacity, the country has largely relied on this source in the past.[67] However, the use of coal comes with some disadvantages – above all very high carbon dioxide emissions.[68] Nonetheless, the use of domestic sources has made Poland – in comparison to other European states - relatively independent from imports. In 2009, the country had the sixth lowest energy dependency rate (energy dependency rate is defined as net imports divided by gross consumption) of all EU-27 countries, with a score of 33.6% for all energy sources[69] (see Table 1). With regard to oil and gas, Polish dependency is higher. While almost the entire oil supply of Poland is covered by imports, the energy dependency rate for gas is around 70%.[70] It is interesting to note that this is the fifth lowest score in the European Union. However, this does not mean that Poland was not dependent on resource imports. While for certain industries that heavily rely on energy, such as the chemical industry, this dependency can be seen as a problem, it is tolerable for Poland as a whole. As the country largely relies on coal, the production of electricity is secured from domestic sources.

66 U.S. Energy Information Administration, "Overview Data for Poland."
67 IEA, *Energy Policies of IEA Countries*.
68 LaBelle, "Fracking to Reduce Risks (1)."
69 Eurostat, "Energy Production and Imports."
70 European Commission, *Market Observation for Energy: Key Figures*.

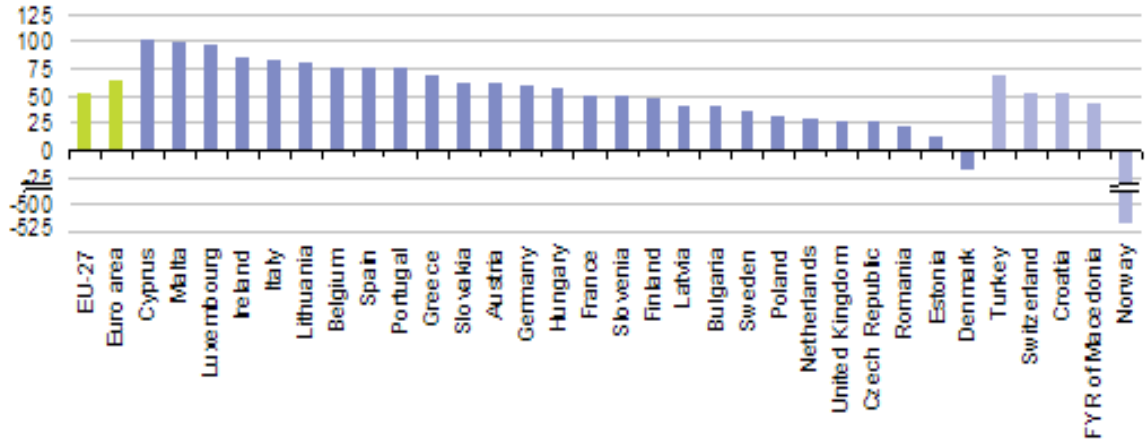

Figure 1: Energy dependency rates of European countries

While the relative energy independence has but Poland in a comfortable position in the past, this is currently changing. The problem the country is facing today is that there are at least three major factors pushing the country away from coal: First of all, the high carbon dioxide emissions are seen critically and have lead the European Union, of which Poland is a member state since 2004, to develop various legislations that favour other energy sources over coal.[71] Second, Polish power plants are old and particularly inefficient, thus building new, more efficient, power plants becomes a necessity for Poland rather soon.[72] The third aspect, which is related to the issue of the necessity for increasing efficiency, is regarding the energy density of coal. Energy density – in a nutshell – describes how much energy a given material contains.[73] While water has almost no energy density at all, nuclear fusion – in theory – would have the highest energy density possible. Coal has an energy density of 32.5 MJ/kg. To compare: While wood, for example, has a rather low energy density of 10 MJ/kg and thereby is much less efficient than coal, the energy density of crude oil (41.9) and natural gas (55.6) is much higher.[74] What does this mean? It means that with the equal amount of oil or gas, one can produce in between one-third and two-thirds more energy in comparison to coal. For policy makers, this means that with equal availability and without pre-

[71] LaBelle, "Fracking to Reduce Risks (1)."
[72] Enerdata, "Poland Energy Market Report."
[73] Dillon, "How Far Will Energy Go?".
[74] Ibid.

existing infrastructure, coal is a less attractive choice than oil or natural gas are. Traditionally, energy transitions have moved from lower quality and density to higher quality and density in energy.[75] Therefore, Poland, when modernizing its energy infrastructure, has a clear incentive to go for alternative energy sources than coal. Especially when taking all three named factors into account, it appears reasonable for Poland to consider alternative sources of energy. The question that the government needs to look at in this context are, which options the country has and what pursuing them were to mean for the energy security of the country?

Like any government, driven by the incentive to reduce risks, the Polish government needs to consider solutions to maximize energy security. But how exactly does Poland want to guarantee its energy security? To answer this question, it is helpful to have a look at the national energy strategy EPP 2030.[76] In this, the government outlined six major objective for the Polish energy sector. These objectives are (1) to improve the energy efficiency; (2) to enhance security of fuel and energy supplies; (3) to diversify the electricity generation structure by introducing nuclear energy; (4) to develop competitive fuel and energy markets; and (6) to reduce the environmental impact of the power industry.[77] In order to achieve these objectives, the energy strategy calls for three foundations of Polish energy: Nuclear power, natural gas, and coal.[78] For achieving this, the Polish government has already announced concrete measures that will be taken or are already on the way. In order to increase the share of nuclear energy, Poland will invest into three new nuclear power plants (NPP) by 2030[79]; to deal with the negative environmental impact of coal, Poland wants to become leading in carbon capture storage (CCS)[80]; and in order to increase its share of gas, an LNG terminal is being built in Świnoujściu until 2014[81], while the potential for the domestic extraction of unconventional gas through hydraulic fracturing is being explored and actively encouraged.

At this point in time it has to be said: The exploration of shale gas in Poland is at a very

75 Goldthau, "Energy Policy Session 7: Financing Energy Transition."
76 Ministry of Economy, Poland, *EPP 2030*.
77 Nyga-Łukaszewska, "Poland's Energy Security Strategy."
78 Ministry of Economy, Poland, *EPP 2030*.
79 IEA, *Energy Policies of IEA Countries*.
80 Ibid.; LaBelle, "Fracking to Reduce Risks (1)."
81 EurActiv.com, "LNG Terminal Set to Redraw Poland's Energy Map."

early stage. Currently, it is very unclear how much potential the shale gas market in Poland has.[82] In spite of this, the Polish government supports the use of hydraulic fracturing strongly. Over one hundred concessions for exploratory drillings have already been granted.[83] As Polish companies lack the know-how, the explorations are mainly executed by foreign companies.[84] At this point, 42 wells are completed and two further ones are being built. The Polish government plans to have at least 309 wells built before 2021[85]

Currently, five Polish ministries are involved into matters concerning shale gas. This large government involvement and the strong support leads to the question, why the government supports this technology so strongly? The rationale behind Polish support for the exploration of shale gas is, what Michael LaBelle described as "hydraulic fracturing to reduce risks."[86] The key drivers are economic, regarding security of supply, environmental, and about the perception of alternatives. The economic reasons concern the chemical industry and other energy intense sectors. These are concerned about a decrease in competitiveness with U.S. producers after observing the shale gas revolution and the resulting decrease in production costs.[87] By supporting hydraulic fracturing, the Polish government hopes to support its industry and create jobs, particularly in rural parts of the country. Furthermore, the government believes that a diversification and an increased production will result in lower energy prices for the consumers, too.[88]

With regard to the security of supply, Poland is following a strategy of diversification. As mention before, the EPP 2030 outlines the goal to move away from the strongly coal dominated energy sector, toward one that uses a combination of coal, nuclear energy, and natural gas.[89] A fourth alternative, to exchange electricity within the EU is not sufficiently developed. These smart grids, at this point of time, are not smart enough, yet.[90] However, on the long run, a common

82 MillwardBrown SMG / KRC Institute, *Fuel and Energy Market in Poland*.
83 Wasley, "On the Frontline of Poland's Fracking Rush."
84 MillwardBrown SMG / KRC Institute, *Fuel and Energy Market in Poland*.
85 Natural Gas Europe, "Poland Updates Shale Gas Exploratory Well Count."
86 LaBelle, "Fracking to Reduce Risks (1)."
87 EurActiv.com, "Poland Unsure About Its Energy Mix."
88 LaBelle, "Fracking to Reduce Risks (1)."
89 Nyga-Łukaszewska, "Poland's Energy Security Strategy."
90 EurActiv.com, "Poland Unsure About Its Energy Mix."

European electricity network is likely to be seen as desirable by the Polish government. While coal is domestically produced, the current supply with gas is more complicated. The only existing option Poland has is to buy gas from Russia, as the network of interconnectors in Europe is not at sufficiently developed, yet. Considering the past experiences Europe has had with Russian gas supplies, particularly the 2006 and 2009 Ukrainian gas crises, relying only on Russian gas would not improve Russian energy security in comparison with the status quo. However, Poland is pushing for the building of interconnectors. For example, in 2011 an interconnector was built between Poland and the Czech Republic.[91] Furthermore, Poland and some other European countries, are currently building LNG terminals. While Lithuania is facing troubles[92], the mentioned LNG terminal at Świnoujściu in Poland is already under construction.[93] However, at this point, LNG is much more expensive that conventional natural gas and not sufficient to cover the full needs. Therefore, utilizing the third option, shale gas, is a rational consideration for the Polish government. It is also important to emphasize that, while the Polish government has high hopes for the technology, the current stage is only exploratory, thus what is being done can be described as an evaluation of options and a reduction of risks to the energy supply. Nevertheless, the supposed reserves of shale gas in Poland are exorbitant and could provide the country with enough gas for decades – at least.

Another aspect of the Polish hydraulic fracturing bonanza might seems surprising at the first look: Environment protection. The problem Poland is currently facing is that the high carbon dioxide emissions that come with coal have a severely negative environmental impact.[94] In light of global climate change, the EU has taken various steps towards the reduction of carbon dioxide emissions, such as the Low Carbon Roadmap 2050 or the Energy Roadmap 2050. Poland, in the past, has vetoed several of these attempts.[95] This is not because Poland is inherently anti low-carbon energy but because for the past years, it has lacked alternatives to achieve lower emissions and

[91] Natural Gas Europe, "Polish-Czech Interconnector Launched."
[92] Petroleum Economist, "Lithuania LNG Project Faces Further Delay."
[93] EurActiv.com, "LNG Terminal Set to Redraw Poland's Energy Map."
[94] IEA, *Energy Policies of IEA Countries*.
[95] LaBelle, "Fracking to Reduce Risks (1)."

energy security at the same time. In this context, the climate policy has even been called "a sign of diloyalty with the new member states."[96] As the new member states have structural disadvantages towards the old member states and energy, particularly cheap energy, is needed for growth, the priorities of Poland are not always equal to those of the EU.[97] Furthermore, because of these circumstances, the German solution of a sudden and extreme shift in energy supplies with large investments into RESs is not feasible for the country for financial and structural reasons.[98] Meanwhile, hydraulic fracturing is offering a solution for the reduction of carbon dioxide emissions. As the burning natural gas comes with lower emissions than burning coal, the country can take a huge leap towards the fulfilment of the common European goals established in the Roadmap 2050 by reducing the share of coal. Currently this share is at 90% of electricity production.[99] But the local gas does not only have environmental advantages compared to coal. As a matter of fact, by using local gas, Poland can reduce emissions by two to ten percent compared to Russian gas and by seven to ten percent compared to LNG.[100] This makes Polish shale gas an interesting transit option for the country. This is why the long term goals state that the Polish energy mix in 2050 is supposed to contain 20% gas, 15% lignite (the most carbon dioxide intense coal), and below 20% RESs.[101]

The final reason behind the Polish decision is how Poland perceives its alternatives. This aspect concerns the psychological aspect of energy security, as "security does not only relate to the actual threats, but also to how they are perceived by the various actors."[102] Poland has a long history of occupations and has been split up between Germany and Russia multiple times. This, especially when there is actual grounds for it, such as the dominant role of Russia on the European gas market, affects the way the population and more importantly for the decision making process, the elite is perceiving the energy security of the country. With this background, Poland was deeply concerned

96 EurActiv.com, "Poland Unsure About Its Energy Mix."
97 Ibid.
98 LaBelle, "Fracking to Reduce Risks (1)."
99 Enerdata, "Poland Energy Market Report."
100 LaBelle, "Fracking to Reduce Risks (1)."
101 Ibid.
102 Larsson, *Russia's Energy Policy: Security Dimensions and Russia's Reliablity as an Energy Supplier.*

when Germany and Russia built the North Stream pipeline, circumventing Poland despite cheaper land-based solutions being available.[103] Then defence minister and current minister of foreign affairs, Radislaw Sikorsi, has even called the project a new Molotov-Rippentrop Pact, referring to the 1939 treaty that divided Poland between Germany and the Soviet Union.[104] While Polish perceptions of Germany have improved, though, over the last decades, Russia is increasingly being seen as a threat to Polish security. For example, a study by the Polish Institute of Public Affairs has shown that while in 1990 only two percent of the respondents named Germany as "a real ally of Poland", this number rose to 17% fifteen years later. The trend for the Soviet Union/Russia was the opposite. While in 1990 18% named it as an ally, this number fell to four percent in 2005.[105] This trend becomes even more evident, when one looks at the question of which country Poland should fear most. In 1990 88% of the respondents answered this question with Germany, while in 2005 it were only 21%. Russia was named by 25% in 1990 and by 67% in 2005.[106] Considering that 70% of Polish gas supplies are being delivered by Gazprom, a company that is often seen as a tool of Russian foreign policy, this trend shows the feelings the Polish have towards further reliance on Russia. In an interview conducted by Michael LaBelle, a Polish government official described Polish-Russian relations as follows: "It is always the younger brother that is beaten up and Poland is the younger brother."[107] Therefore, diversification of supplies satisfies the Polish need for reduced reliance on Russia and shale gas provides the country with this option. This perception is also reflected in the high public support for hydraulic fracturing in Poland.

Considering these motivations, the question arises, whether hydraulic fracturing actually can keep its promises or whether other alternatives would serve the country better? In regard to this, it must be brought back to attention that the exploration of shale gas in Poland is still at a very early stage.[108]

[103] EurActiv.com, "Nord Stream 'a Waste of Money', Says Poland."
[104] Ibid.
[105] Cwiek-Karpowicz, *Public Opinion on Fears and Hopes Related to Russia and Germany*.
[106] Ibid.
[107] LaBelle, "Fracking to Reduce Risks (1)."
[108] MillwardBrown SMG / KRC Institute, *Fuel and Energy Market in Poland*.

Various points of critique connected to the extraction of shale gas have been voiced from different sides recently.[109] Some of them deal with the dangers that come with the application of hydraulic fracturing, while others take the opposite stand and criticize that the current legislation hinders the efficient application of the technology. In the U.S., the enthusiasm about the outlook of energy independence has in many places been replaced by scepticism and concerns about the environmental impacts of hydraulic fracturing.[110] Reports about poisoning of ground water, large public campaigns and films, such as *Gasland*, have lead to a constantly decreasing support. In Europe, where the environmental legislations are stricter than in the U.S., the technology was met with different attitudes, with some countries even banning it. In Poland, however, the technology is still met in an "enthusiastic manner not seen elsewhere in Europe."[111] Still, there have been some protests and reports of land-grabbing in the context of the extraction of unconventional gas.[112] It has been criticized that there was no sufficient debate in the Parliament or dialogue with civil society organisations and that Poland is acting too carelessly in the light of the U.S. experience. In this context, the government is blamed for a policy of closed doors.[113] While these are mainly procedural matters, the one of the biggest problems is given with regard to the balance between profits and risks between the government and the local population. According to Polish law, the state owns everything that is found below 50cm under ground. It is one of the prime tasks of the government to find a solution that satisfies the needs of all parties. Representatives of the industry acknowledge various risks but consider them acceptable with appropriate legislation in place. Here, Poland can learn from approaches taken by the U.S. government.[114] For them, fracking is "not bad in itself" and "can be green."[115] However, EU recent EU reports have emphasised the dangers that come with the technology.[116] Nevertheless, at this point, there is no evidence for any contamination connected to

[109] Decock and Barzcak, "Presenting the Other Side of the Shale Gas Coin in Poland"; Wasley, "On the Frontline of Poland's Fracking Rush"; Burchett, "Shale Gas in Poland."
[110] Anderson, "Polls Divided on Fracking."
[111] Wasley, "On the Frontline of Poland's Fracking Rush."
[112] Decock and Barzcak, "Presenting the Other Side of the Shale Gas Coin in Poland."
[113] Ibid.
[114] LaBelle, "Fracking to Reduce Risks (2)."
[115] Wasley, "On the Frontline of Poland's Fracking Rush."
[116] European Commission, *Final Report on Unconventional Gas in Europe*.

hydraulic fracturing in Poland.[117]

With regard to the current state of hydraulic fracturing in Poland, it has been raised that the current legislation and regulations are hindering the full utilization of the potential of the technology.[118] Currently, hydraulic fracturing is governed by the same legislation that is dealing with the conventional extraction of gas, an act from 1994[119]. Considering the differences in dangers that potentially come with hydraulic fracturing and the differences between the methods, this appears inappropriate, both from the producer side and with regard to consumer protection. Furthermore, it is problematic that the energy market is still highly concentrated and in-transparent.[120] Currently, it can take up to nine months with more than 30 permits needed, before an exploration can be started.[121] For a quick and efficient exploration, this legal framework needs to be improved. Additionally, there is a fear of new taxes to be levied on them that damages the investment climate. These problems, in combination with some disappointing results in first explorations, have led to some disappointments. ExxonMobil, for example, has returned five out six concessions for explorations in 2012.[122] The disappointment about the results was so big that ExxonMobile representatives stated that "what we find here is nothing else than water."[123] In total, only two foreign companies are left within Poland and it has been argued that at this point, "Polands shale gas exists only in the media"[124] At this point it becomes quite evident that Poland cannot duplicate the success of the U.S. However, in spite of low flow rates and reduced estimates, the potential there and the industry is interested in investing.[125] One way in which Poland meets these challenges is by plans to form a state-run company dealing with hydraulic fracturing.[126] As a matter of fact, the reserves of the country are still huge and their extraction would have a huge impact on both the country's and the European energy situation.

117 Wasley, "On the Frontline of Poland's Fracking Rush."
118 MillwardBrown SMG / KRC Institute, *Fuel and Energy Market in Poland*.
119 Ibid.
120 Enerdata, "Poland Energy Market Report"; RWE, *RWE Energy Report 2012*.
121 Bauerova, "Poland Urged to Ease Shale-Gas Rules to Retain Energy Explorers."
122 Ibid.
123 Natural Gas Europe, "Poland Updates Shale Gas Exploratory Well Count."
124 BBC, "Two Firms Quit Fracking in Poland."
125 Burchett, "Shale Gas in Poland."
126 Bauerova, "Poland Urged to Ease Shale-Gas Rules to Retain Energy Explorers."

Poland has embraced the use of hydraulic fracturing in order to increase its energy security. While there are also critical voices, the government considers the pressures that the international environment and local elites put on the country to allow the use of the technology more important than the concerns. Despite of various problems, the outlook of achieving a higher degree of energy security makes the Polish government support shale gas extraction. As together with nuclear energy and coal, gas is to be the backbone of Polish energy supplies, it is consequent of the Polish government to follow this path. A country that has evaluated its options differently is Bulgaria, which will be discussed in the upcoming section.

Chapter 3.2 – Analysis of Bulgaria

Similar to Poland, Bulgaria is argued to have a huge potential for the extraction of shale gas. In contrast to Poland, however, Bulgaria has become one of those European countries, that has banned the use of hydraulic fracturing. It has been argued that this was the case because of protests that took place shortly before the decision was taken. However, this is only one aspect of the picture. There is a series of factors that, as this paper argues, have mattered more in the decision making process of the government.

The situation of Bulgaria with regard to energy security has parallels and differences to the situation in Poland. The current Bulgarian energy market has gone through some changes in the past decades but nevertheless still is heavily influenced by what the country has inherited from its Communist past. Additionally, EU membership, the geopolitical particularities of the region, and the political problems the country has had affect the energy market. On paper, Bulgaria has an energy market by Western model. However, there is a discrepancy between the regulations on paper and their application in reality.[127] The Bulgarian energy market is still run by few, usually state-run,

[127] Stefanov et al., *Energy and Good Governance in Bulgaria*.

monopolists, while the market is very fragmented at the same time. There are overlapping responsibilities in the governance of energy that regularly lead to conflicts of interest.[128] Furthermore, the major energy companies frequently have financial problems. Corruption has lead to the failure of multiple big projects in the past.[129] Criminal interests have regularly affected the implementation of energy policy and in procurement best-practice has frequently been violated because of the lack of sufficient control and sanction mechanisms.[130] It is in this environment that Bulgarian energy policy and the decisions have to be considered.

Bulgarian energy security is heavily influenced by the geographical location of the country. The location is on the one hand an advantage, as the Black Sea provides the country with a series of possibilities of how to achieve energy security.[131] On the other hand, however, the geographic proximity to Russia is a problem as it often made aligning with the Russians the easiest way to go. Accordingly, Bulgaria is heavily dependent on Russian supplies. During the 2009 gas dispute, this dependence became evident when Bulgaria experienced a 100%-cut off for 13 days. As the country had almost no reserves, the cut-offs had severe impacts on the country.[132] Similar to the situation in Poland, the energy dependency rate of Bulgaria for the total energy production is relatively low (36.6%). For oil and gas, yet, Bulgaria shows total energy dependency.[133] The low overall energy dependency is due to the high share nuclear energy has in the production of electricity, as Bulgaria produces more than one-third of it's electricity through nuclear energy. This energy is provided through the NPP in Kozloduy.[134] However, this NPP has been built with Soviet Technology and only two reactors are still running, which are to be shut off in 2017 and 2019, respectively.[135] The question Bulgaria therefore is facing is, how to secure energy supply for the time after the NPP Kozloduy has been shut down without reducing energy security further.

Three factors have been named to be at the core of the challenges Bulgaria is facing: (1) The

[128] Ibid.
[129] Ibid.
[130] Ibid.
[131] LaBelle, "Fracking to Reduce Risks (1)."
[132] Ibid.
[133] European Commission, *Market Observation for Energy: Key Figures*.
[134] Hang, "Bulgarian Referendum Reflects Uncertainty of Nuclear Energy Development."
[135] Kondov, "Bulgaria, Russia Go to Court over Belene Nuclear Project."

country, also through its EU membership, has agreed to cut greenhouse gas emissions, thus needs to modernize its energy production; (2) a reduction of energy costs in the light of the global economic crisis and the bad financial state of the Bulgarian state is necessary; and (3) "political pressures from foreign geopolitical and economic interests"[136] need to be overcome. In the light of these challenges, Bulgaria has released an energy strategy in 2011.[137] The document acknowledges the challenges[138] and it is declared that the energy future of the country is defined by LNG, nuclear energy, and shale gas. In this context, an increase of the use of renewable energy sources (RES) from 9% to 16%, as well as an extension of the operation for the NPP Kozloduy and the building of another NPP in Belene is called for. The strategy furthermore stresses the need for interconnectors and the building of LNG/CNG terminals at the Black Sea cost. Finally, the extraction of the shale gases is to be actively supported.[139] Because of pressure from the opposition, the centre-right government had to take long-term gas contracts with Russia out of the options named in the energy strategy. Analysts argue that especially shale gas has the potential to provide the country with large quantities of domestically produced energy, as there are huge reserves both on land and in the Black Sea.[140] Looking at all options, Bulgaria has four possible ways to diversify its energy supply: (1) pipelines, such as Nabucco or South Stream; (2) interconnectors and gas storage systems; (3) LNG; and (4) domestic off-shore production.[141] Thus, if shale gas is such a promising alternative, why did Bulgaria put a moratorium on the exploration?

In January 2012, only one week after a demonstration with hundreds of participants in Sofia, the Bulgarian parliament banned the use of hydraulic fracturing by a 166 to 6 vote.[142] The ban, that is valid on the whole teritory of the country, including on the territorial waters of the Black Sea, puts a fine of 65 million Euros on anyone violating the memorandum.[143] The ban came after the

136 Stefanov et al., *Energy and Good Governance in Bulgaria*.
137 Government of the Republic of Bulgaria, "Energy Strategy of Bulgaria."
138 CE Weekly, "Bulgaria: The Role of Nuclear Energy and Renewable Sources of Energy Emphasised in the Country's Energy Strategy."
139 Government of the Republic of Bulgaria, "Energy Strategy of Bulgaria"; Stefanov et al., *Energy and Good Governance in Bulgaria*.
140 LaBelle, "Fracking to Reduce Risks (1)."
141 Ibid.
142 BBC, "Bulgaria Bans Shale Gas Drilling with 'Fracking' Method."
143 InTech, "Bulgaria Bans Gas Fracking"; Konstantinova and Caroll, "Bulgaria Bans Gas Fracking, Thwarting

government hat previously embraced the technology and given out licences to foreign companies, such as Chevron, for the exploration of the shale gas potential of Bulgaria.[144] The protesters were demanding the stop of explorations in light of the environmental dangers and the government claimed that the reason for the moratorium was the unclear environmental impact of the technology. However, the question remains why the licences have been given out in the first place and the circumstances suggest further, if not even completely other motives behind the decision. In the first place, it needs to be acknowledged that the environmental impact of hydraulic fracturing is questionable, as already touched upon in the previous sections of this paper. Furthermore, there was a wide consensus in the Bulgarian society to put a moratorium on the use of hydraulic fracturing[145] and the protesters were very well organized, having support from abroad.[146] Especially efficient was their strategy to put pressure on individual members of parliament.[147] However, critics say that the international support was not only directed against hydraulic fracturing as a technology but also the result of one party highly interested in a ban of the technology: Russia.[148] A CEO of a gas company therefore even called it pseudo-civic pressure.[149] However, while the result was clearly in the interest of the Russian state, it is very difficult to prove the connection.

Instead of speculating about the influence of different actors on the domestic sphere, the analysis of the policy risks Bulgarian energy supplies are facing seems more promising. The focus of this analysis has to be what aspects Bulgaria has to deal with when relying entirely on Russian gas. It shows that there are arguments in favour of increased diversification but also some that suggest that this is not the highest priority for Bulgarian energy security. Some of the arguments relate to short-term policy goals, while others deal with long-term strategic planning. Based on these policy risks, the quality of the decision to ban hydraulic fracturing can be evaluated more objectively. The first and major question is whether Bulgarian gas supplies are safe at all, if the

Chevron Drilling Plan."

144 Konstantinova and Caroll, "Bulgaria Bans Gas Fracking, Thwarting Chevron Drilling Plan."

145 LaBelle, "Fracking to Reduce Risks (2)."

146 Castle, *The Global Movement Against Fracking: Lessons from Bulgaria, the UK and New York State*.

147 Ibid.

148 Daly, "Russia Behind Bulgarian Anti-Fracking Protests?".

149 Ibid.

country relies solely on Russia as a supplier. On the short run, the answer to this question is a yes. Because of existing contracts and the necessity of Gazprom to be seen as a reliable partner, the company will do everything to guarantee the gas supply to the conditions given in the contracts. Therefore, the supply-situation appears rather stable on the short run.[150] As Bulgarians do not consider Russia a threat per se – 88 percent have a positive image of the country and only 10 percent a negative one[151] - there is no necessity to exclude the notion of relying on Russia as the major supplier on default. The question whether Bulgaria should rely on Russia is to be answered much more rationally, instead. One important factor is, how reliance would affect the domestic gas price in Bulgaria. Analysts consider the price development in that situation as predictable and constant. The only problems the country might be facing is the lack of competition to lower the prices and that Russian gas is more expensive than domestically produced gas, which is 40 percent cheaper.[152] Another aspect is the question of reliability: The situation in 2009 has raised the question whether Bulgaria can actually rely on Russia always performing according to the contracts. The building of the South Stream pipeline and further diversification of supply routes should positively affect this aspect. In case Nabucco would actually be built, this was even more the case, as it would not only lead to a diversification of supply routes but of suppliers. Figure 2 illustrates the geographical importance of Bulgaria for both projects. However, the future of Nabucco is highly questionable at this point in time.[153] If the pipeline will be built at all, it will be reduced to the Nabucco West, which only goes until Turkey. Nevertheless, does Bulgaria need to increase its storage capacities and build interconnectors if it relies on Russia as the only supplier. A third aspect is that Bulgaria, by relying on Russian gas, simply outsources the environmental risks to Russia.[154] If environmental concerns really did matter in the decision taken, then this is an important aspect for the future.

[150] LaBelle, "Fracking to Reduce Risks (2)."
[151] Akaliyski, "Public Opinion on Strategic Alignment in Bulgaria."
[152] LaBelle, "Fracking to Reduce Risks (2)."
[153] Socor, "South Strean Gas Project Defeating Nabucco by Default."
[154] LaBelle, "Fracking to Reduce Risks (2)."

Figure 2: Routes of the original NABUCCO and South Stream pipelines

Besides the short-term risks that the country is facing by relying on Russia, there are also least two major factors that affect the long-term energy security of Bulgaria. One point is that the policy shift adds up to a series of problematic decisions concerning big projects in the past. Examples for this bad practice are the problems that occurred with the building of the Belene power plant – an ongoing issue that still is not solved and has a number of parallels to the shale gas debate – and the financing of the Nabucco pipeline.[155] This could reduce the attractiveness for investors to invest into the Bulgarian energy market in the future. A second aspect is the regulatory framework in Bulgaria in general. It is insufficient as it is too complicated[156] and could keep investors from investing into the country's energy market.

In the light of the aspects discussed above, the problem with reliance on Russian gas and the moratorium on hydraulic fracturing is not the decision itself. As a matter of fact, one can argue that the negative consequences that come with the use of the technology are too severe and it should therefore be avoided, as well as that Russia is an adequate source of gas supply for the country. The problem, much more, is that Bulgaria – despite an energy strategy – seems to lack a strategic vision of how its energy future is supposed to look like. The energy governance and environmental law have been criticised as insufficient, as has been the degree of strategic planning.[157] Instead of a few

[155] Ibid.
[156] CE Weekly, "Bulgaria: The Role of Nuclear Energy and Renewable Sources of Energy Emphasised in the Country's Energy Strategy."
[157] Stefanov et al., *Energy and Good Governance in Bulgaria*.

target goals, the country has in the recent past had several possible priorities, such as natural gas, Nabucco, interconnectors, NPPs, etc.[158] One could argue that this speaks for a policy of high diversification. However, the frequent policy shifts suggests a lack of a vision for Bulgaria's energy future, instead.

Besides the chaos with the prohibition of hydraulic fracturing, the criticism regarding a lack of a long term vision has been supported in another context, too: The building of the NPP in Belene. Bulgaria has a long history of utilization of nuclear energy and in times when all reactors in Kozloduy were still running, the country was a major exporter of electricity in the region.[159] In the light of the shut-down of two reactors and the upcoming shut down of the remaining reactors of Kozloduy[160], the project promised to restore Bulgaria's dominant position on the electricity exports market on the Balkans and meet an expected increase in energy consumption[161]. Originally, the project has been launched in the 1980s but frozen after the collapse of Communism in the 1990s for the lack of funding. After a decade of debates, the project had been re-launched in 2006.[162] However, various problems have caused a delay in building that led to very different estimates for the final price of the NPP. In the light of this and the problematic investment climate in the country, German energy company RWE withdrew from the project in 2009 and the Bulgarian state remained as the only stakeholder in the project, without the necessary financial means to complete it, though. In this situation, Russia offered a loan until an investor would be found, which the Bulgarian government rejected.[163] On the technical side, nevertheless, Bulgaria and Russia cooperated on the project, with Russian nuclear power company Rosatom building the NPP.[164] However, a legal battle broke out between the two sides, regarding the costs in 2011 in which both sides went in front of different international courts.[165] The situation even worsened following the Fukushima nuclear catastrophe that lead to a debate about building NPPs in regions that are in danger of suffering

[158] Ibid.
[159] Kondov, "Bulgaria, Russia Go to Court over Belene Nuclear Project."
[160] International Atomic Energy Agency, *Bulgaria Reporting Progress in Quest for Energy Security*.
[161] Ibid.
[162] Kondov, "Bulgaria, Russia Go to Court over Belene Nuclear Project."
[163] Novinite, "Bulgaria Rejects Russian Loan, Share at Belene Nuclear Plant - Novinite.com - Sofia News Agency."
[164] Reznichenko, "Russia and Bulgaria Fall Out over Belene Nuclear Plant."
[165] Kondov, "Bulgaria, Russia Go to Court over Belene Nuclear Project."

earthquakes, such as Bulgaria, and to stricter safety standards. Ultimately, the Bulgarian government decided to terminate the participation in the project but still co-operations with the Russian side at Kozloduy.[166] The Bulgarian government has been arguing that the increased costs have led to the cancellation, which seems implausible considering the compensation that might have to be paid to Russia and that could be up to one billion Euros.[167] Instead, U.S. pressure might have led to the decision, as a further increase in dependency following the decision on shale gas was seen as problematic by the U.S. government.[168] This still does not mean the end for the project, though, as following the cancellation of the project, the Socialist party initiated a referendum in which the majority of the population supported the building of a new NPP. However, the turn-out was quite low (21.8%) and the vote was seen more as a vote on party preferences than on the issue in question.[169] Because of the low turn-out, the referendum is not legally binding[170] and the political instability of the last months has stopped further progress in the issue. What the recent government change will mean for the project is questionable at this point in time.

So why does an example about a NPP matter with regard to the question of hydraulic fracturing? There are three major points why this I the case: First, it shows that instead of a long-term strategy, the political decision in Bulgaria are subjects to party policies. In a country with such frequent government changes (since 1990, the country has had 10 prime ministers), this leads to a great instability in the energy policy. Second, it shows to which extent political decisions in Bulgaria in the field of energy are subject to international pressure, particularly from the U.S. and Russia, but also from the EU, as the shut down of the Kozloduy NPP is happening in the context of EU legislation. Third, it illustrates the public debate concerning large projects. This has been dominated by strong lobbying from all sides but no real public discourse.[171] As long Bulgaria is facing these problems, its energy policy is going to remain inconsistent and long-term energy

[166] Gaydazhieva, "Bulgaria-one of Russia's Most Important Partners in the Field of Nuclear Energy."
[167] Kondov, "Bulgaria, Russia Go to Court over Belene Nuclear Project."
[168] Reznichenko, "Russia and Bulgaria Fall Out over Belene Nuclear Plant"; Vikhrov, "Bulgarias Nuclear Future."
[169] Hang, "Bulgarian Referendum Reflects Uncertainty of Nuclear Energy Development."
[170] EurActiv.com, "In Historic Vote, Bulgarian Voters Back New Nuclear Plant."
[171] Stefanov et al., *Energy and Good Governance in Bulgaria*.

security questionable – with hydraulic fracturing or without.

Conclusion

The starting point for this analysis has been the question how European two countries with expected huge shale gas reserves could have taken such different stances on the issue and how this relates to the concept of energy security. Concretely, the question this paper has been looking at was "How does the discovery of shale gas affect the approaches to energy security taken by Bulgaria and Poland?" It has been shown that Poland and Bulgaria both had arguments in favour and against the use of hydraulic fracturing and have come to different conclusions about it. It has been claimed that the approaches taken by different states need to be looked at in the context of the international system, therefore a neo-classical Realist perspective has been adopted.

In Poland, hydraulic fracturing is being supported mainly because of the perception of Russia, as part of a diversification process, and in light of necessities to reduce carbon dioxide emissions. While the explorations are still in an early stage, there have been a number of problems and various concerns raised, the technology is still being pushed as it fits in the general strategy Poland is pursuing. In spite of the existing problems, it appears to be promising to have a positive impact on the Polish energy securiy.

In Bulgaria, the picture is different. In contradiction to its own energy strategy, the government has opposed hydraulic fracturing, as well as the building of a new NPP. The reasons for the decisions of the Bulgarian government are not always evident. However, they appear as a combination of external pressures, mainly by Russia and the U.S., but also by the EU, domestic perceptions of the own energy situation, and a lack of a clear policy direction. While the decision of Bulgaria to not use hydraulic fracturing is understandable, it is inexplicable that the country does not follow a clear strategy.

What this paper has been arguing was that Bulgaria and Poland have chosen very different approaches to hydraulic fracturing. Nevertheless, these approaches are ultimately just a reflection of the two country's energy policy in general, as they have taken very different approaches to their energy security in general. This notion has been shown by the analysis of the cases. It became

particularly evident that, while Poland has developed a clear strategy of how to achieve energy security and is pursuing it, Bulgaria is subject to frequent shifts that have negatively affected the investment climate in the energy market. This has shown the complexity of energy strategies and how multiple factors, mainly from the international system, influence these. It has been argued that while the choice of sources remains subject to the particularities of the given country, there are always policy choices that can be chosen. The implication of this finding is that what matters most for achieving energy security is consistency in politics, not the choice of source.

Limitations

This paper has mainly relied on academic sources, government and NGO reports and newspaper sources. Each one of these sources has their advantages and disadvantages, which were tried to be balanced against each other. While academic literature is of high quality and reliable, it was only available in very limited ways, both qualitatively and quantitatively. While there is a sufficient basis of academic literature for the conceptual side of energy security and the theoretical background of neo-classical realism but there is hardly any academic literature on hydraulic fracturing and the energy security of one of the two cases, Bulgaria. With regard to hydraulic fracturing, there are sources available but they often are quite technical and do not particularly deal with the political implications of the use of the technology. Government documents, in contrast, are very recent and available in a high number. However, there are some problems related to them. First, only EU documents and major national governments, such as energy strategies, are available in multiple languages, while others are in the language of the issuing country. Therefore, the lacking knowledge in Bulgarian and Polish might have served as a limitation to this paper. However, this was not the major problem with government sources. The bigger problem, was that government sources present the public position of the government on the issue, not necessarily the true position. Therefore, they can only be used as one among many sources. The third major source, the media is a good source to compare the academic and government sources to, but as the other two, it has its downsides.

Particularly, there usually is an agenda influencing the coverage and it is difficult to check the sources used, as in contrast to academic literature, they are usually not listed. In combination with other sources, media sources were highly helpful, anyway. For the purpose of this research, these sources proved sufficient. However, the findings could have been improved further if interviews were been conducted. Due to time constraints, this was not possible. The lack of time was a a limitation of this paper, in general. Finally, there is one more limitation that this paper has faced. It was the missing applicability to (all) other cases within the European Union, as the situations in the different member states simply are too different. However, this gives room for further research.

Further Research

As mentioned above, the cases discussed are individually interesting but do only allow general conclusions towards the nature of energy policy but not towards the actions of different member states of the European Union with regard to hydraulic fracturing.

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