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NATURAL GAS GEOPOLITICS OF THE ENERGY TRANSITION

Overview

The global energy scene is in flux. Eurasia is a major region for hydrocarbon production and transit, as well as a central arena for geopolitical tensions, with the ruling players in the changing energy environment. Europe is at the heart of this region having a dominant role in the energy environment. With the adoption of the Climate and Energy Package by the EU in 2009, promotion of renewable energy became a distinct element of climate policy. The guidelines, issued by the EU set the frame within which the member states conduct their individual energy policies. Thus, the transition to sustainable energy systems accelerated and spread throughout Europe. This transition paves the way to significant changes in the states' economy, energy trade and supply security, accordingly affecting the geopolitical balance. Transitions always have been a challenging process, being able fundamentally change markets, create winners and losers. The energy related changes in their turn make changes at a geopolitical level. This paper aims to analyze geopolitical changes in respect of Germany's natural gas politics, resulted from the energy transition. Being the biggest continental gas market, a major hub and transport country, Germany provides a useful case study. Furthermore, with its leading role in the EU in respect of policy rules and innovative technologies, Germany is a good case study for the other European countries, following the energy transition. From the perspective of objectives this research is considered as a correlational and explanatory research. Correlational characteristics of the research are based on the existence of a relationship/interdependence between the German energy transition and the German natural gas politics. Furthermore, the research clarifies why and how there is a relationship between the mentioned two aspects, which classifies it as an explanatory research.

Germany at the stage of a new energy era

Germany is considered as a pioneer in the transition to renewables and low-carbon technologies, as its national policy began to incorporate renewable energies relatively early on. It should be also noted that Germany used its 2007 presidency of the EU to enhance the EU's attention to renewable energy development. It was in 2007 that the EU 2020 Climate and Energy Package targets were set. Namely, Germany brought climate change and energy security issues on the focus of the EU Agenda [1]. The main driver for climate change is GHG emissions as a result of the usage of fossil fuels for energy supply. The energy transition, named as "Energiewende," intends to change Germany's energy system from conventional, fossil-fuel, and nuclear-based means of energy production to cleaner, sustainable production and consumption. The primary goal of the Energiewende starts with a reduction in GHG emissions. German policy makers have

taken a substantial decision to move towards a sustainable energy supply over the long term. The Energy Concept, adopted by the Federal Government of Germany in 2010, determined renewable energy as the main source of the future energy supply. Germany set an ambitious GHG reduction target of 40% by 2020, 55% by 2030, 70% by 2040 and up to 95% by 2050 each relative to 1990 [2]. The government has successfully used feed-in tariffs to support investments in wind, solar, and biomass and has achieved an accelerated growth in the use of these various forms of renewable energy. The impacts of these policy measures are increasingly evident, as greenhouse gas emissions reduce, renewable energy production increases, and new industries are born [3]. It is worth noting that feed-in tariffs are not just a startup mechanism for the most expensive types of renewable energy, but rather a way of protecting small investors in competition with corporations as a way of turning citizens into power producers. In the long perspective, this transition has a macroeconomic impact on Germany's national economy, by creating a switch from corporate-owned conventional energy to community-owned renewables [4]. Germany's goals with the Energiewende include not only increasing the share of green energy, but also energy efficiency measures. In this regard, Germany's achievements are not less remarkable than renewable energy development. Primary energy consumption in the country has been cut by 7.6% between 2008 and 2015, which is a significant mark [5].

Theoretical expectations from the energy transition

In general, the transition to sustainable energy systems should affect the demand for hydrocarbons. Decreased demand for hydrocarbons in turn, as a rule, affects the economies of states that rely on revenues from hydrocarbon exports. On the contrary, countries that have political support for financing the renewable energy development strengthen their own economy, as well as technological infrastructure. Consequently, in the long term, renewable energy industry boom leads to a change in the existing geopolitical balance, by modifying traditional energy dependencies, as it leads to the reduced fossil energy imports. Thus, with the energy transition the current state of affairs is expected to change significantly. According to expert forecasts, the expected changes will differ between different areas of the world. In regard to the demand for hydrocarbons, the largest drop is expected in the industrialised Europe and North America. It is also expected that the demand for electricity will grow as vehicles become more electrified [6]. As a result of the energy transition, the European states with their integrated power systems and super grids, connecting vast areas together will become more interconnected. From the political point of view, energy cooperation between European countries has a crucial effect in strengthening this process. In this cooperation, those who have networks and energy storage capacities will have an advantage [7].

The expected geopolitical losers and winners from this transition are evident. The main beneficiaries are the states, having scarce energy resources, with high energy consumption. The losers include the countries, having large fossil fuel resources, the economy of which mainly depends on energy exports. From a geopolitical point of view, this tendency leads to a reduced political power of the energy exporting states, as energy policy of the energy exporting states usually interflows with their foreign policy, using own reserves as a weapon of foreign policy.

It is remarkable fact, that about 150 states have already legal frameworks that promote the use of alternative energies and greater energy efficiency [7]. By using incentive mechanisms for the development of renewables, clean energy obtains geo-economic importance in international energy policy. In this regard, the economic and political conditions for the renewable energy development are not less important as geographical availability of the renewables. In respect of the fossil fuel rich states, the decreased exports, resulting in a decline in revenue can raise an impetus for energy policy reforms toward sustainability and economic diversification.

Security aspects of the Energiewende

Energy is a strong driver of foreign affairs politics. For decades this driving role was belong to fossil fuels. Energiewende is considered as one of Germany's most important political projects, tending to gradually change the existing driving force in energy diplomacy. The strong dependence on energy imports creates a security basis for renewable energy development and energy efficiency. With regard to security of supply, the planned energy transition has not less political background than environmental. Eventually, sustainable energy growth paves the way to not only a cleaner ecological environment, but also to a reducing dependence on energy imports. The Bundeswehr Transformation Center argues that the states dependent on energy imports are forced to show more pragmatism toward energy-producing states in their foreign policy. In this case, political priorities have to be partly subordinated, placing security of supply concerns on focus [8]. Availability of energy resources is very significant for Germany, as its economy differs from those of other advanced industrial economies in many aspects. The main important aspect in this regard is Germany's reliance on exports. Actually, a large access to energy resources is vital to many of the high-tech applications of German industry. It is defined by many scholars as an economic form of realism known as geo-economics, placing the national economic interests as the primary value in a state's foreign policy.

Natural gas always was a point of discussion at a geopolitical and security level. According to BMWi, Germany obtains 94% of overall gas demand from other countries via pipelines (BMWi, 2018) [5]. The country benefits from its strategically-favorable location at the geographical center of Europe. It has an easy access to supplies from the North Sea, the Netherlands and Russia. Significant amounts of gas are transported across Germany to the other EU countries.

Year	*Import (in TJ)*
2000	2,841,697
2001	2,951,423
2002	3,063,709
2003	3,187,328
2004	3,389,857
2005	3,420,663
2006	3,519,141
2007	3,323,694
2008	3,480,471
2009	3,551,278
2010	3,731,148
2011	3,637,502
2012	3,644,797
2013	3,744,750
2014	3,604,567
2015	4,283,360
2016	4,156,376
2017	4,778,136

Since 2000, Germany's natural gas exports significantly raised. Indeed, it became the major continental European transit hub for gas from third-parties.

This table shows Germany's natural gas imports since 2000 from its supplier countries, mainly including the Netherlands, Norway and Russia. The table clearly demonstrates a tangible rise in natural gas imports since 2000. The strong dependence on natural gas imports makes the security of gas supply essential. In this regard, the international dimensions of the political and economic risks of the energy transition are of high importance.

Figure 1. Germany's total natural gas imports. Source: BAFA [9]

Another figure reflects Germany's natural gas dependency in respect of the three main supplier countries – Russia, Norway and the Netherlands, since 2009 with the transition to renewables.

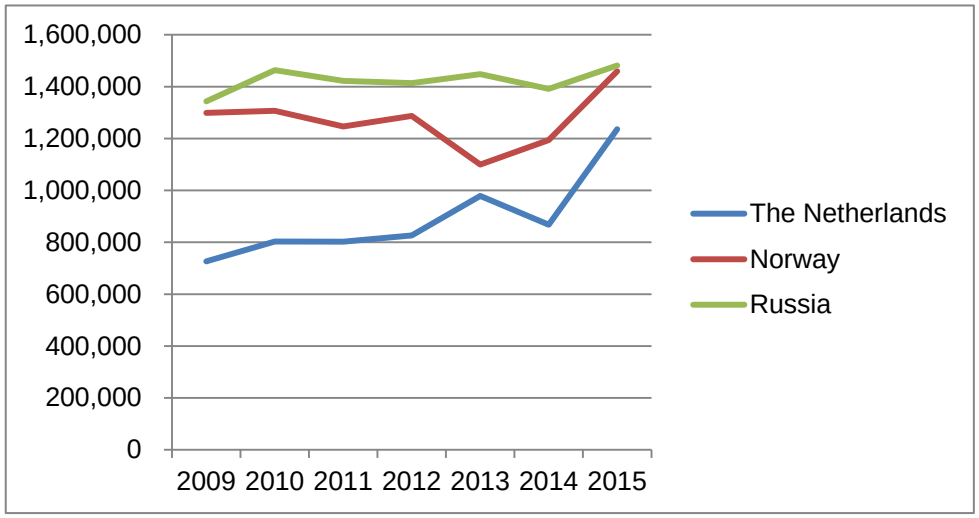

Figure 2. Germany's natural gas imports from Russia, Norway and the Netherlands. Source: BAFA [9]

The above figures clearly demonstrate raised natural gas imports to Germany since the introduction of the energy transition, which in respect of the renewable energy boom is puzzling. Further clarification brings clarity to this puzzle.

The realities of the Energiewende

Germany is very successful in diversification and expansion of its energy supply system in comparison with other countries, one of the main reasons of which could be the country's technological development [10]. With obvious advantages in technology, Germany pays special attention to the creation and development of industries related to renewable energy sources. The attractive incentive measures for renewable energy development in the country further accelerate this process. The legislations related to the energy transition, as well as the following support policies and mechanisms, influence strategic priority setting and investment decisions by energy companies. Green activities are successfully used in marketing initiatives. Even large fossil-fuel companies of the country have adapted a part of own activity to renewable energy development. In 2016, the investments in the construction of renewable energy plants estimated at 15.1 billion Euros [11]. On the other hand, the renewable energy development inhibited a more prominent role of gas in power generation. According to BMWi, in 2016 the share of renewables in the German electricity generation was 29%, for comparison, the share of natural gas was only 12,4% (BMWi, 2017) [5]. Actually, Germany's energy transition has influenced different components of the German energy industry.

Looking at the German energy mix in general, lignite and hard coal have traditionally played a significant role among domestic resources. Particularly, lignite is still an important part of the German power generation sector, being perceived as an "industrial stronghold" of Germany. However, Germany met a steadily falling domestic natural gas production. A large price divergence between coal and gas made the reduction of CO2 emissions by the utilization of gas-fired plants more expensive. It affected the operation feasibility of the local gas-fired power plants, by promoting the relative profitability of coal over gas. This price decrease brought old coal-fired power plants back into operation, and even resulted in the creation of new power plants, dominated by coal- and renewable-based power capabilities [12; 13]. Furthermore, by switching from coal to gas in the USA power generation, the USA coal has been largely available and exported at particularly competitive prices since 2009. Attractive global coal prices and favorable conditions for renewable energy development further undercut the profitability of gas-fired power plants. Eventually, in August 2012, the profit margin for power, generated from gas reached its minimum, unfeasibility of gas-fired plants even resulted in declaration about the closure of own facilities by some large national energy companies [12]. Consequently, the

stopped power generation had to be compensated by coal and renewables, and of course increased imports.

However, renewable energies have unpredictable and unreliable nature, due to which at the current stage of their development can adversely affect Germany's energy security. Renewable energies' nature of relying on natural phenomena such as sunshine and wind, make their extraction levels fluctuating. Germany's unfavorable climate conditions for the development of solar and wind energy adds more to this challenge. On the other hand, the geographical distance between the areas of renewable energy generation and industrial centers could be a potential limitation for a good functioning of the Energiewende. For example, the largest part of the renewable electricity of Germany is generated by wind power in the north, but industrial center is in the south of the country [14].

The decision at the same time converting the country's existing energy production system and withdrawing from nuclear energy creates a big challenge for its energy supply. Both environmental concerns caused by GHG emissions and the decision to phase out nuclear power in Germany indirectly support usage of natural gas, as it is more climate-friendly compared to other fossil fuels, because of less carbon emissions. However, it is widely considered, that in the German debate on the energy transition, the potential of gas was not sufficiently addressed. The Ethic Commission further acknowledged that the potentials of gas as a bridging fuel were insufficiently addressed in the Government's 2010 Energy Concept [12].

Denuclearization of the Germany's energy mix

NPPs are generally seen as credible sources for base-load supply. They are relatively better at ensuring steady power, and therefore have a stabilizing influence on the electrical grid, which is vulnerable to sudden swings in load or demand. Nuclear energy has been an integral part of the German energy mix since its implementation in 1968. Perception of the risks of nuclear energy has been significantly changed in Germany after the Fukushima accident. The disaster in Fukushima clearly demonstrated the limitations of human precautions against accidents. The fact, that the reactor disaster happened in the country with a high level of technology like Japan, caused people to suppose that such kind of disaster could also happen in Germany. Consequences in terms of the health and environment received a greater amount of attention than the economic or political aspects. Following this accident in 2011, the eight oldest nuclear plants operating in Germany immediately stopped the activity. This decision was remarkable, because only half a year earlier the accident the ruling coalition of CDU/CSU-FDP had ratified the 11th amendment of the Atomic Energy Act, aiming to extend the life of pre-1980 reactors by eight years and that of post-1980 reactors by 14 years. In June 2011, the Bundestag settled by a large majority that, by the end of 2022 Germany will fully terminate the generation of power by NPPs [15].

Nuclear energy was not a minor portion of Germany's electricity generation mix, accounting for over 20% of the country's electricity production at the time. In fact, nuclear energy provided Germany an opportunity of decrease of its foreign energy dependency. As a result of the activity termination of the eight NPPs, Germany moved from being a net exporter to a net importer and it had also an impact on electricity availability in other European countries. The official publication of BNetzA of 27 May 2011 Press Conference mentioned about the emerged vulnerability: "*In case of a permanent shutdown of the eight nuclear power plants affected by the moratorium, Germany as of today can no longer support security of supply in the European interconnected grid to the extent it has done so far. …This development is not without problems as neighbouring countries have so far counted and relied on German exports*" [16].

On the other hand, nuclear phase-out creates difficulties for Germany in achieving its GHG emissions reduction targets, as actually nuclear power emits very low emissions. The resulting

decrease in Germany's power capacity, previously generated by the closed nuclear power plants had to be compensated by increased generation from lignite-based power plants and renewable energy sources, a lower level of electricity consumption and of course increased imports, thus, strengthening Germany's natural gas dependence from external suppliers.

Increased natural gas imports as a solution to secure energy supply

Here comes another issue, raised natural gas imports, in some aspects, considered as a result of energy transition. As already noted, the main part of the imported natural gas volumes to Germany come from the Netherlands, Norway and Russia, among which the latter has a major role. The cooperation between Germany and Russia is based on the both states' economic benefits and geopolitical advantages. Germany is interested in a natural gas supply security. Russia's geographic proximity and enormous natural gas resources make it an ideal gas supplier for Germany. Many scholars see this relationship based on the economic interdependence between the two countries [17; 18]. The well-known gas disputes between Russia and Ukraine raised an issue of a reliability of the existing transit routes for natural gas imports from Russia to Europe. Germany and Russia found a solution to this problem in a direct gas pipeline between the two countries, independent of transit states. This proposed pipeline was the Nord Stream, a 55-bcm per year natural gas pipeline, consisted of two strings on the bottom of the Baltic Sea in the exclusive economic zones of Denmark, Finland, and Sweden, with the onshore terminals in Germany and Russia. It was intended to bring reliability and safety to the gas transport infrastructure between the two countries. At the time of its introduction the project raised several environmental and political concerns. But the Nord Stream was able to neutralize the political and environmental resistance, Germany and Russia proceeded with the proposed cooperation, and the pipeline came into effect, becoming the longest underwater pipeline in the world. Having a high geopolitical and economic significance, the Nord Stream project was promoted by the two governments, furthermore, the development of the project had a political support by national authorities of gas-importing countries - the older EU members.

The shareholders of the Nord Stream were already assessing the possibility of an expansion of the project in 2012 [19]. The European Energy Security Strategy, adopted by the EC in May 2014 included: "*much progress has been done in the last few years to enhance Europe's energy security. Despite these achievements, Europe remains vulnerable to energy shocks*." [20]. It reflects the EU approach in regard to the expansion of the Nord Stream pipeline.

According to expert calculations, the expansion of the project costs even more than its predecessor. In fact, the construction of a long-distance pipeline should be guaranteed with sufficient amount of gas to justify the construction costs. The one is clear, that the expansion of this project aims to provide Europe with more volume of natural gas, which once again emphasises the increased need in natural gas as environmentally-friendly fuel. The main political benefit for Germany from the realization of the Nord Stream 2 project is improved energy security. Its geopolitical benefits even larger, including Germany's importance as a major energy transit hub and its raising significance in the European gas market as a reseller of natural gas.

Concluding Remarks

Germany's success in renewable energy development is remarkable, and carries considerable implications to its energy security, and eventually decreased import dependence. Improved technologies and incentive schemes, being a part of favorable conditions for renewable energy development have achieved a positive outcome. But the reverse effect of this development was the deterioration of the functioning of gas-based power plants. As renewable energies do not expend fuel, the marginal cost of them does not exist, due to which they could be sold inexpensively and eventually are more preferable. Namely this outcome of the energy transition was one of the reasons affecting feasibility of the traditional German gas power plants, as a result

forcing Germany to rely more on natural gas imports. Undoubtedly, renewable energy development is expected to make Germany less dependent on fossil fuel imports in the long run. However it is too early to achieve this effect at the current stage.

Another factor, affecting the geopolitics of natural gas is nuclear phase-out. Before the Fukushima accident, Germany's climate and energy policies were mainly focused on energy efficiency and increasing the share of renewables in the energy mix, however nuclear phase-out did not allow Germany to use the advantages of climate change to reduce its gas dependence from external suppliers.

The research revealed, that despite the success in renewable energy generation and energy efficiency, due to the falling domestic production and the necessity to cover the power, generated by the closed nuclear power plants, Germany's continued natural gas import dependence was inevitable. It means natural gas as a transitional fuel continues to play an important role in determining geopolitical priorities. Nevertheless, in this case there is also a positive outcome. Germany benefits from the current position in order to strengthen its geopolitical importance in the European gas market on a larger scale.

Abbreviations

BAFA - Federal Office for Economic Affairs and Export Control
bcm - billion cubic metres
BMWi - Federal Ministry for Economic Affairs and Energy
BNetzA - German Federal Network Agency (Bundesnetzagentur)
CDU - Christian Democratic Union
CSU - Christian Social Union
EC - European Commission
EU - European Union
FDP - Free Democratic Party
GHG - Greenhouse Gas
NPP - Nuclear Power Plant
TJ - Terajoule (equal to one trillion (10^{12}) joules; or about 0.278 GWh)
USA - United States of America

Bibliography

1. 2020 Climate and Energy Package. European Commission, updated October 18, 2016. Available at: http://ec.europa.eu/clima/policies/strategies/2020/index_en.htm
2. Energy Concept for an Environmentally Sound, Reliable and Affordable Energy Supply. 28 September 2010
3. Schreurs, M. "Breaking the impasse in the international climate negotiations: The potential of green technologies." 2012
4. Morris. C. "Germany's Energiewende: Community-Driven since the 1970s." 2014
5. Official website of the Federal Ministry for Economic Affairs and Energy of Germany. Available at: http://www.bmwi.de/
6. Semkin. N; Lyyra. S; Sipilä O. "Global energy sector transitions will have an impact on geopolitics." Policy Brief. 2017
7. Hübner C. "Geopolitics of energy transition." Konrad Adenauer Stiftung
8. Szabo, Stephen. "Security and Geo-Economics." Germany, Russia, and the

Rise of Geo-Economics. London: Bloomsbury Academic. 2015
9. Official website of the Federal Office for Economic Affairs and Export Control. Available at: http://www.bafa.de/EN/Home/home_node.html
10. Muradkhanli, N. "Natural gas as a bridge fuel into a sustainable future for Germany." IAEE Energy Forum. Second Quarter 2016
11. Renewable Energy Sources in Figures. National and International Development, 2016. Federal Ministry for Economic Affairs and Energy
12. Kopp, Sandu-Daniel. "Politics, markets and EU gas supply security: case studies of the UK and Germany." 2015
13. Vavilov, A.; Kovalishina, G.; Trofimov, G. "The new export route and Gazprom's strategic opportunities in Europe." 2015
14. Borden, E.; Stonington, J. "Germany's Energiewende." 2014
15. Jahn, Detlef; Korolczuk, Sebastian. "German Exceptionalism: the End of Nuclear Energy in Germany!" *Environmental Politics* 21, no. 1. 2012
16. Update of Bundesnetzagentur report on the impact of nuclear power moratorium on the transmission networks and security of supply. Press Conference of 27 May 2011, Bundesnetzagentur, Bonn. May 27, 2011. Available at: http://www.bundesnetzagentur.de/SharedDocs/Downloads/EN/BNetzA/PressSection/ReportsPublications/2011/110527PressConferenceNuclearPowerMoratoriumpdf.pdf?__blob=publicationFile
17. Wagner, R. Harrison. "Economic interdependence, bargaining power, and political influence." International Organization, Vol. 42, No.3. 1988
18. Grant, Iain M. "Russia, Germany and the contest for hegemony in European natural gas." 2011
19. Sakamoto, Philemon. "German energy security and its implications on regional security." 2016
20. European Energy Security Strategy. Communication from the Commission to the European Parliament and the Council. EC. Brussels, 28.05.2014

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