

Katarína Sárvári:¹

The V4's Gas Market transition towards the EU's Energy Security²

Current development of the European gas market uncovers several new opportunities and challenges for energy security that developed from big changes in production, transit and supply ways of natural gas to Europe. New European gas market model builds on the principles of diversification, the security of supply, interconnectivity and liberalization. Realization of the EU Third Energy Package related to a progressive shift from long-term oil-linked gas supply contracts and development of alternative gas supply sources and lines, as well as the rivalry between already established gas transit lines and the new supply lines present new challenges and require transition for the V4 countries. In this article I studied what are the new changes and challenges of the transition of V4 countries towards the EU's energy security? To adjust to transition V4 countries should build the new infrastructure on the short-term pricing market and the ways how it will be funded. If V4 countries want to trade gas with the neighbours and transport most of the Russian gas to Europe, they need to invest into reforms of pipelines' networks or to find other alternatives of diversification in the next decades. Returns on investment on a liberalized market with a multitude of competitors will be manageable but require serious reforms. The V4 countries will have to enter into the spot markets to efficiently trade gas. Available gas hubs in Europe are much smaller, less liquid, and mostly supplied by the same companies as the long-term traded gas hubs. This kind of markets is easy to manipulate. Therefore, it is important for the V4 countries to plan how to coordinate their national energy policies and name EU's energy targets for the future.

Introduction

Energy security and power industry are among the most important strategic policies of the EU. Forming a common EU energy policy and cross-border cooperation with neighbours at governmental, non-governmental and business levels creates a key framework for decision-making and consideration of further development of the energy sector. The European Commission in 2014 defined the establishment of the European Energy Union as one of its top priorities. Its main target is to give consumers (EU's Member States) secure, sustainable, competitive and affordable energy [European Commission Press Release on Energy Union, 2016]. The most important challenge in obtaining this goal is to build an open, liquid and competitive European internal energy market, permitting the EU to act in its relations with external energy suppliers. In the Energy Union, a collaboration of member states with their neighbours when implementing their energy policy has crucial significance. Transparency of member states regarding their energy relations with third countries and agreement to internal EU market regulations are key requirements for the well-functioning internal energy market.

¹ M.A. Ph.D. candidate at Doctoral School of International Relations and Political Science at the Corvinus University of Budapest

² "The present publication is the outcome of the project „From Talent to Young Researcher project aimed at activities supporting the research career model in higher education”, identifier EFOP3.6.3-VEKOP-16-2017-00007 co-supported by the European Union, Hungary and the European Social Fund.”

DOI: 10.14267/RETP2021.02.16

The EU needs to make use of its economic and political influence in the world and to protect its networks, views and interests on the global energy market. In doing so, the V4 countries as a strategic region of EU's energy market must act in a stronger way in order to engage in a more constructive and ambitious dialogue with its major energy partners, including Russia. Better global governance of energy markets will lead to a more competitive and transparent energy mechanism, for the mutual benefit of all parties. The V4 region is placed at the confluence of regional interests of both EU and Russia, and the energy dimension of the EU-Russia relations influences and orients the action taken in the direction of these four countries. In this article, we discuss the challenges and further steps of the transition of V4 countries towards the EU's energy security through the prism of the realization of the EU Third Energy Package and the EU-Russia energy relations.

EU's new energy policy: Reverse gas flows and new gas interconnectors

Last decade, the European Union announced adaptation of a new approach in the energy area, aiming at confirming its role as a major and unique player in the region. A distinguished step forward in this direction is the adoption of the Lisbon Treaty (2009), delegating the EU explicit competences in the field of energy. The substantial principles of this Treaty in its energy part are solidarity, responsibility and transparency among all Member States in a way to easier the establishment of common European energy policy. The Treaty starts the process of Europeanization of the energy policy, considering the creation of a unique EU energy market. This should permit the EU to have one voice in its relations with the main energy suppliers and then contribute to the transparent and market-based relations between producers, transit countries and the consumers.

Fast action at national and European level is needed, to provide credible, secure, environmentally sustainable and affordable energy for European countries. Achieving these goals seems almost impossible without creating close cooperation with the major energy suppliers, among which Russia is an important partner. Nowadays, Russia's main interests in the EU-Russia Energy Dialogue [Aalto, 2008a] originate from the country's needs to ensure the security of demand for its energy resources and to innovate its energy sector. The development of the Russian energy sector contains vast importation of technologies available in the West. The realization of large infrastructure projects secures new extraction, transportation and storage capacities, crucial for maintaining Russia's place on the European energy market. Also, as a supply to big Soviet-type infrastructure, the country has an interest in the implementation of energy efficiency measures. While implementing an energy policy collated on openminded concerted measures with the EU, Russia adopts a different logic. Hence, the diversification of the EU energy supply seems like a sign of mistrust in EU-Russia relations. The EU is looking for new energy sources and alternative ways to supply energy to its consumers, which for the decades is seen by Russia as the main risk. From Russia's viewpoint, diversification of energy supply aims additional costs, paid by the consumers, and thus lowering the competitiveness in the sector [Shmatko, 2010].

While Russia is resilient towards the EU's efforts aimed at diversification of natural gas supply routes, it is pushing a number of projects aimed at bringing gas to EU via alternative routes. These projects are not so much aiming to increase Russia's presence on EU natural gas market, but rather to reduce the role of traditional transit countries (Ukraine) and therefore increasing additional leverage in the Russia-Ukraine relations. Ukraine has the possibility to benefit from changing contracting rules in Europe for initiating gas reverse from the West. In November 2012, Ukraine's major gas company Naftogaz signed an agreement with German RWE

creating a legal framework for the possible import of natural gas from Europe [DW, 2014] moreover, this agreement would not include obligatory purchase or supply bonds. After, Ukraine started purchasing gas from RWE via Poland and later, in 2013, had been testing reverse gas supplies from Hungary and Slovakia [Chłoń, 2014]. In the first half of 2019 Ukrainian imports of natural gas through Poland, Slovakia and Hungary reached more than 4 billion cubic meters of natural gas yearly (bcm/y), which was the highest since the beginning of 2014 [DG Energy Report, 2019].

Nonetheless, the introduction of gas reverse to Ukraine from the EU market has some particularities and represent some risks. First, due to legal doubts, the reverse probably will be carried out only by the physical interconnection of the Ukrainian gas transmission system with the pipelines of neighbouring countries. The examinations of the gas reverse with Slovakia discovered that real-time unified rules and data transfer are needed to ensure the fairness of virtual gas flows and avoid the legal obstacles with the gas owner - Russian Gazprom (shipper-codes that prove the gas origin). In this case, the question of who will invest in new physical interconnectors remains unresolved. Second, the plans for new gas deliveries in the V4 region (LNG supplies) and gas demand show that it will not be the notable capacity of traded gas there as the region is quite small in European scale [DG Energy Report, 2019].

The situation may be changed only if shale gas will outflow to this market which is also feasible but not define today. Third, there will be no big price difference for traded spot gas and pipeline gas in long-term and for this reason, the gas reverse may not become commercially feasible. All the above-mentioned scenarios will be available for Ukraine only after integration to common gas market of the EU which also can be a long-lasting and difficult path. Reducing external suppliers' action on EU internal energy matters passes also through the identification of infrastructure solutions. Such as the instalment of reverse flows, permitting to supply the gas networks from different alternative sources is a capable step to guarantee the security of supply in times of temporary shortages, or in case of regional conflicts that might impact the flow of gas.

In cases of temporary disruptions of gas flows, close collaboration between EU neighbours is crucial, which is also declared in the 2014 European Commission's Report on short-term resilience in the gas sector [European Commission Report on LNG, 2016]. For the oil sector, the Oil Stocks Directive (2009) includes several bonds for EU members, to establish in the nearest future the infrastructure needed for stocking crude oil and oil products. This step ensures the EU energy market resilience in times of oil supply disruptions. Increasing the share of Liquefied Natural Gas (LNG) supplied by third partners: Algeria, Nigeria, Egypt, Trinidad, Qatar [Noël, 2008] in the internal energy mix is another way to guarantee diversification of energy supply and decrease dependence on energy imported from Russia.

Nowadays, due to high liquefaction, transportation and re-gasification costs, LNG prices on the world market are higher compared to pipeline gas. Regardless, a substantial increase of LNG storage capacities in Europe and efficient connections linking LNG with the European internal energy network will help to a fall of LNG price [DG Energy Report, 2019]. The EU Commission's LNG strategy heads to increase Europe's LNG storage capacities and to accommodate the regulatory framework [Framework Energy Union Strategy, 2015]. Russia, the pipeline hegemony, is a small player on the global liquefied gas market (5%) and focuses mainly on diversification of exports towards Asia [Henderson and Mitrova, 2015].

However, speaking about LNG in the V4 region, it brings possibilities of supply and route diversification. Further, at least two regasification terminals should be able to supply the market: Swinoujscie in Poland's Baltic Sea and the Croatian island of Krk in Adriatic Sea. Both are part of the North-South corridor connecting the Baltic and Adriatic Seas through the V4 countries and both will be supported by the EU's funds. EU's LNG Strategy presented in 2016 called for more efficient use of existing LNG infrastructure and gas storage, before building new regasification terminals. Nevertheless, the EU has co-financed or committed to co-finance new LNG infrastructure projects worth over €638 million for 14 LNG projects, which will increase capacity by another 15 bcm by 2021, in addition to the 150 bcm of spare capacity that currently exists" [CEEP First Quarter Report, 2019: 11]. For now, all these 14 projects are placed mainly in the Baltic, Mediterranean and Adriatic seas.

Although this is a great opportunity for the region, it also brings risks. The first is the high prices of LNG ports and its maintenance, which is difficult to carry for the cash-strapped V4's energy companies [Bralewski and Wolanin, 2019]. Swinoujscie, whose cost is around five hundred million EUR, has secured funding from the European Bank for Reconstruction and Development, the European Investment Bank and from the Polish transit company Gaz-System S.A. On October 2012, Gaz-System S.A. signed an agreement with the European Bank for Reconstruction and Development for a 73.38 million EUR investment loan to be used for the development of the LNG terminal in Swinoujscie [Gaz-System S.A. Annual Report, 2012]. The price for such a huge infrastructural scheme can grow, mostly due to construction delays. Swinoujscie's construction has already been belated due to the Polish builders stretched by the Euro 2012 soccer cup. If LNG imports would partly replace pipeline gas, V4 countries together with Ukraine must search for a new role of their transit companies.

Moreover, another risk is connected to the nature of the LNG market. Similar to the pipeline market, it is dominated by long-term contracts linked to oil prices with a strict obligation to import. The contract enclosed by the Polish gas company PGNiG with Qatargas covers a ten-year period, uses oil-price indexation, and imposes gas intake (1.5 bcm/y) with little regard to demand [Reuters, 2017]. This type of contract secures supplies to Poland, but it is a very rigid contract that currently lows Gazprom to push PGNiG to the wall. Although Swinoujscie has around 35% of capacity reserved for spot-traded gas, PGNiG may find itself tied to another heavyweight supplier. Another dangerous aspect is the LNG market's dominance by Asia's demand (70% against Europe's 21% in 2012) and wholesale prices (in Japan they are 50-70% higher than in Europe) [DG Energy Report, 2013]. Exporting LNG to Asia is economically more lucrative.

Another important issue is insufficient demand for the Baltic port. The same applies to new distribution of infrastructure in Adriatic Sea. European Union's gas demand is to increase slightly by 2035 (by 0.6% per year on average), the situation in CEE is estimated on being above the EU average [IEA, 2012]. In the V4 countries concretely gas has many competitors. Nuclear energy's share in the Czech, Hungarian, Ukrainian, and Slovak electricity mix is above 30% [IEA, 2012], and all V4 countries and Ukraine plan for new reactors in the next 20 years [IAEA, 2016]. In the same time, Germany brings to the table the proposal of the short-term nuclear power and its replacement by cheap coal to supplement the weather-dependent renewables.

The creation of a free, open and competitive internal EU energy market is impossible without a strong legal and regulatory framework. A series of policy tools in this respect is contained within the Third Internal Energy

Market Package (2009). Recently, the European Commission is controlling the implementation of the provisions of the Third Energy Package. Consistent EU-oriented functioning of national energy regulatory bodies is at the core of the Third Package. In the same time, domestic regulatory agencies of member states are often oriented towards the defence of national companies. Also, they need to set up capable cooperation with energy transmission system operators in order to contribute to the emergence of a truly integrated EU energy system. The Third Energy Package institutes the Agency for Cooperation of Energy Regulators (ACER), whose main role is to support national regulator bodies. However, ACER has limited decision-making power, acting mainly through recommendations. Regulatory functions at the EU level need to be strengthened and have privilege on cross-border issues. The new European energy system's degree of integration will rely on the effectivity of the European Networks of Transmission System Operators for Electricity and Gas (ENTSO-E/G), established by the Third Energy Package [Framework Energy Union Strategy, 2015].

Current challenges of the V4 gas market within the European framework

Recent developments of the European gas market uncovered several threats for energy security that developed from crucial changes in production, transit and supply routes of natural gas to Europe. New European gas market model is constructed on the principles of diversification, the security of supply, interconnectivity and liberalization. It is expected to grant new possibilities and challenges for gas transiting countries in Europe. Progressive switch to spot gas markets in Europe will represent fair pricing driven by competition. Moreover, change of long-term pipeline supply agreements will bring a high level of volatility and price fluctuations for such countries as V4, that lack diversification of supply sources. This situation will force the V4 region to search for the new sources of supply. For example, craft reverse supply contracts in the framework of the Third Energy Package, finance investments in new transit and interconnection infrastructure and development of trading hubs for better matching of demand and supply of gas in the region. These challenges should be addressed based on deeper cooperation between the main gas transiting countries in the V4 region, including Ukraine.

During the 90's Russia had a dominant position on the European energy market with the aim to set up a new structure of economic, but also of political cooperation with the EU15, and after 2004 and 2007, with the EU27 Member States. Russia's economic position on the energy market and its role as a major energy supplier to the EU was confirmed in the Partnership and Cooperation Agreement signed between the Russian Federation and the European Union in 1994 [Yunusov, 2014]. Today, Russia continues to be the main supplier of energy resources to the EU, mainly gas and crude oil. Russian gas as a share of primary energy consumption is stabilized at approximately 6.5% over the last 25 years [BP Statistical Review of World Energy, 2015]. Since the dissolution of Soviet Union, Russia's share of gas imports to the EU Member States has rapidly fallen, from 75% to approximately 45%, showing to the EU example of a successful implementation of diversification of supply strategy [Eurostat, 2013]. In 2013, 33.5% of the total EU's crude oil imports and 28.8% of total EU coal imports are imported from the Russian sources [Eurostat, 2013]. Also, the EU is by far Russia's most significant trade partner.

Data from the International Energy Agency (IEA) show, that most Russian gas imports to Europe are delivered through Ukraine and Belarus, and V4 countries. These countries host the largest Russian gas transit pipelines

to Europe with a cumulative capacity of 180 bcm or about 70% of the total orders to the EU [Corbeau and Yermakov, 2016]. Among them, Ukraine has a strategic position with up to 142 bcm of transit capacity [Bilgin, 2019]. The V4 region and Ukraine are also important for European energy security as a big holder of underground gas storages (UGS). All these five countries together own 36 UGS able to storage almost 50 bcm of gas [UN and IGU, 2013]. These storage types of equipment constructed along already established gas transit pipelines to Europe and are crucial for levelling off daily gas consumption fluctuations, providing important security of supply in case of the sudden cut-off. Also, UGS in normal circumstances serve as an alleviating factor in gas pricing by softening seasonal price fluctuations in the gas market and can be understood as an important article of spot gas trade, however not the ultimate one.

V4 region is more dependent on gas from Russia and highlights energy security more than the western EU Member States. The Czech Republic has almost no natural gas resources, domestic production (mainly in South Moravia) not exceeding 0.2 bcm/y. This covers around 2% of annual demand for gas of the country [Tarnawski, 2015]. The Czech Republic has the most deregulated natural gas market within the EU since it completely privatized the incumbent gas company Transgas in 2002 [Princova, 2019]. As the market was deregulated in 2006, the company was divided into RWE TransgasNet, the operator of the gas network, and RWE Gas Storage, the operator of storage facilities [Langvad, 2017]. The Czech Republic obtained vast flexibility that it buys directly from Gazprom only when the contract price is below the German hub price and thus the problem of dependency is no longer a real concern.

Population in V4 region is now more environmentally conscious and hydraulic fracturing has faced aversion by local communities. Environmental dangers are introduced as the main reason for a moratorium on both exploration and production of unconventional gas in the Czech Republic. In 2012, the Czech Ministry of the Environment has announced the moratorium for a period of two years ending in July 2014 [Ministry of the Environment, 2013]. Ministry of the Environment is currently searching an opportunity for comprehensive legislation on unconventional gas. Estimated deposits of unconventional gas in the country are very universal and many projections do not expect production larger than a few percent of the country's overall consumption. Today, about 98% of Czech natural gas is imported (75% of imports come from Russia and the rest from Norway), so important local production would be convenient for the country's energy security [Eurostat, 2019].

Own production of gas in Slovakia amounts to 0.15 bcm/y covering around 3% of domestic consumption [Tarnawski, 2015]. The rest of the gas is imported from Russia. Although gas transfer and distribution sectors were deregulated in Slovakia after 2006, the main importer of gas is Eustream (owned by German E.ON Ruhrgas, French GDF Suez and the Slovak Energetický a průmyslový holding - EPH) [Tarnawski, 2015]. Eustream is one of the largest transmission system operators in Europe and focuses primarily on the transit of Russian gas to Western and Southern Europe. There are two companies operating in the gas storage market: Nafta and Pozagas. The major transit networks in Slovakia have four interconnectors with other countries, the annual transmission capacity of this pipelines is around 90 bcm/y [Kovács et al., 2011]. Gas from the East is transported via Ukraine (Velke Kapusany station), whereas the two main exit points for western-bound gas are Lanzhot (on the border with the Czech Republic) Baumgarten (on the border with Austria).

Shale gas and other unconventional options have not started a vast public debate in Slovakia. Current energy policy draft does not introduce possible domestic production of unconventional gas at all [Ministry of

Economy, 2013]. British Aurelian Oil & Gas has been exploring for shale in eastern Slovakia, but finally, construction did not take place. There are hopes that some shale formation in the south of Poland might overlap with Slovakia [European Commission, 2019]. There are also plans for interconnector linking up the Slovak and Hungarian networks (between the towns of Velke Zlievce and Vecsés) [Euractiv, 2014]. The 115 km long pipeline is to help create the North-South corridor and connect LNG terminal in Poland and Slovakia in the future. The capacity of gas storage in Slovakia amounts of approximately 3 bcm/y [Tarnawski, 2015].

Hungary has relatively a significant level of local production of gas and, therefore, has some advantage before other V4 countries. Domestic gas production covers around 20% of demand of natural gas [Tarnawski, 2015], the rest being imported mainly from Russia (apart from gas purchased from Germany and Austria on European commodity exchanges). Hungary import Russian gas through Beregdaróc pipeline on the border with Ukraine. The gas coming from the European market reaches Hungary via Mosonmagyaróvár on the Austrian border. Hungary is also a key transit country for Russian gas sent to South-East Europe (Serbia, Bosnia and Hercegovina, Macedonia) and plans to increase its role in transit. Out of the total flow capacity of the Hungarian pipeline network (12 bcm), about 3 bcm is used for transit - the interconnector with Romania works since 2010 (Szeged - Arad with the capacity of 3 bcm/y), while the pipeline with Croatia has been active since 2011 (Városföld - Slobodnica, flow capacity 6 bcm/y) [Tarnawski, 2015]. Hungary also has a high share of natural gas in its energy mix (38% in 2010) [IEA, 2011]. Geological surveys suggested shale gas basin suitable for drilling. MOL, the largest energy producer in the country, formed a joint venture with ExxonMobil to examine options of drilling, but after some unsuccessful examination drilling, ExxonMobil decided to withdraw from the project in 2010 [Lehr et al., 2016].

Poland is one of the V4 countries with the most advantageous projections for unconventional gas deposits, even though the latest assessments decreased earlier estimates. It also has a significantly strong gas production lobby not only because it depends on the Russian gas (around 9 bcm) [Czekanski, 2019], but also because it needs to scale down its greenhouse gas emissions from burning coal, and cheap domestic gas is the best solution. The regulation of the Council of Ministers which settles the minimum level of diversification of natural gas supplies implements a level of total gas imported from a single source by 2020 at 70% and declares a decrease to 33% [Regulation CM, 2017]. This is the reason, why Poland implemented several investments concerning natural gas, including the extension of production and distribution infrastructure, the optimization of own resources, and the diversification of gas supplies. Projects have been made to widen the country's potential of storing natural gas supplies carried out by sea through the Northern Gate. Apart from plans to extend the LNG terminal in Swinoujscie, there were projects planning the construction of the Baltic Pipe, successive offshore FSRU installations (Floating Storage Regasification Unit FSRU), as well as announcements concerning the construction of small LNG terminal within the port of Gdynia, or the construction of a next submarine gas pipeline connecting B-8 oil field with Wladyslawowo [Mietkiewicz, 2019].

Further, Poland awarded over 100 licenses for unconventional gas exploration [U.S. Geological Survey, 2011]. Yet, the results are not promising much, and some companies already decided to leave Poland, but that does not necessarily mean that drilling in Poland is not commercially feasible. Examples from other countries

showed, that it needs constant effort and patience to achieve commercially viable production. Moreover, unconventional gas in Poland has in fact very rigorous regulatory framework and high taxation. According to the Mining Law of this country, exploration licenses are now granted through state's tenders.

On the other hand, after the major gas supply cut-off in 2006 and 2009 due to the Russian-Ukrainian gas disputes, the V4 countries have essentially strengthened their gas networks and increased interconnectivity, both within the V4 region and with the other EU Members States. Poland finalized its main LNG terminal project in 2015 (import capacity of 5 bcm/y), thus creating the preconditions to bring a completely new source of gas into V4 (Harper, 2019). It also introduced reverse flows on its main transit Yamal pipeline from Russia through Belarus to Europe. The Czech Republic and Slovakia did the same on their sections of the Brotherhood pipeline through Ukraine. Hungary has built new interconnections with almost all neighbours: Croatia (2010), Romania (2011) and Slovakia (2014) (European Commission, 2014). All these investments rapidly improved gas system resilience to potential supply disruption and all V4 countries performed infrastructure security standards (N-1) [Boersma, 2015].

Conclusion

Energy markets in the V4 region are in the process of serious transformation. Gas markets from rigid, monopolistic, and rather isolated structures, are becoming more dynamic, competitive and integrated with neighbours and the other EU Member States. These variations are primarily visible in the V4 countries and Ukraine, but the whole CEE region is slowly following. The main achievement is higher interconnectivity, permitting these countries to secure supplies in the crisis.

The investments to the bi-directional flows on main pipelines, as well as some new infrastructural investments, have raised the region's resilience to potential supply disruptions, but diversification of sources, crucial for long term energy security, is still missing. V4 countries must decide how the new infrastructure on the short-term pricing market will be funded. If these countries and Ukraine have the interest to trade gas with their neighbours and keep transporting most of the Russian gas to Europe, they need to invest in reconstruction as well as construction of new networks. The significant investment, which can guarantee access to completely new gas sources in the V4 region has been the establishment of Polish LNG terminal as well as the Polish project of the Northern Gate. By supporting similar projects, V4 countries could establish a regional market along with the European Gas Target Model with liquid regional hubs and interconnectors and move towards harmonization of national market regulation. Better interconnection of networks could also benefit the unconventional gas production.

Also, the European Commission decision on the OPAL (Nord Stream 1) pipeline put into service in 2011 (Euractiv, 2016), increased the risk of gas supply distortions to the V4 region and represent a challenge for the use of current gas infrastructure as well as the legal constraints. The region should keep beaming on the intensification of infrastructure development efforts enabling access of other than Russian gas to the region as the key precondition for the functional regional market. Active work on new development of transparent and competitive gas storage services, withdrawal from gas market strain measures such as regulation of gas prices, the establishment of attractive conditions to invest in generation capacities, transmission and

distribution of lines, active involvement in the current debate over new electricity market design, along with new renewables and efficiency measures can bring new potential actors and new investments in the future.

EU-Russia relationships introduce a two-way road, important to observe from V4 countries' perspective. The idea of interdependence is very actual in the diplomatic discourse used by both parts and it means supply and transportation of hydrocarbon energy resources from Russia to the EU, in exchange for economic investment and transfer of modern technology from the EU to Russia. Security of energy supply and energy demand are central issues, underlining the EU-Russia relations. While the EU deals more with the economic aspects of Russia's presence on its energy market, the Russian side traditionally mixes economic and political aspects of the energy question. Russia is missing development in real modernization and liberalization of its internal energy structure. Despite increasing global energy demand, Russia's share in the EU energy mix is shrinking over the past years. In that regard, V4 countries should support the construction of interconnectors in Ukraine and South-eastern Europe by arranging their national energy policies and name EU's energy targets for the next decades. Introducing gas trading at the Ukrainian border with the EU based on Ukrainian and V4 gas storage capacities under the Third Energy Package could improve the energy security of the region in the future. Development of spot markets to efficiently trade gas could also help because EU's gas hubs are small, less liquid, and partly supplied by the same companies as the long-term traded gas. The V4's trading hub in Baumgarten (Austria) serves mainly the gas transit. Such markets can be easily manipulated, especially when the number of suppliers is limited. Therefore, finding the right balance between short-term financial and market considerations on the one side, and a long-term vision for building a truly integrated and diversified region on the other, seems to be the key challenge to keep pace with infrastructural development.

References

- Aalto, P. (2008a): "The EU-Russian energy dialogue: Europe's future energy security." Farnham: Ashgate.
- Bilgin, M. (2019): *Russia's Geo-Economic Realism of Energy and International Relations. The New Geopolitical Realities for Russia: From the Black Sea to the Mediterranean.* Lexington Books. London. ISBN 9781793602442.
- Birol, F. (2006): "Policy Forum: The Future of Energy Markets: World Energy Prospects and Challenges." *The Australian Economic Review*, 39(2), pp.190-195.
- Boersma, T. (2015): *Energy Security and Natural Gas Markets in Europe: Lessons from the EU and United States.* Routledge, New York, pp.60-66. ISBN 978-1-138-79512-9.
- Bohi, D. R. and Toman M. A. (1993): "Energy Security: Externalities and Policies." *Energy Policy*, 21(11), pp. 1093-1109.
- Bralewski, A. and Wolanin J. (2019): "Analyses of Threats and Involving Liquefied Natural Gas (LNG) – Review of Literature Sources." *SFT*. Vol. 54(2), pp. 32-54.
- CEEP First Quarter Report (2011): "Future of gas - market regulatory package and the role of LNG." No. 1(56), pp.11. Available at: <https://www.ceep.be/www/wp-content/uploads/2019/04/CEEP-REPORT-Q1-2019-OK.pdf> (accessed: 10 April 2020).
- Chłoń, T. (2014): "Gas reverse flow from Slovakia to Ukraine." *Visegrad Insight*, 17 March 2014. Available at: <https://visegradinsight.eu/reverse-flow-gas-from-slovakia-to-ukraine/> (accessed: 10 April 2020).
- Corbeau, A. S. and Yermakov V. (2016): "Will There Be A Price War Between US LNG and Russia Pipeline Gas." Riyadh: KAPSARC.

- Czekanski, M. (2019): "Poland will not extend 9bcm gas supply deal with Russia." Montel News, 15 November 2019. Available at: <https://www.montelnews.com/en/story/poland-will-not-extend-9bcm-gas-supply-deal-with-russia/1060225> (accessed: 2 April 2020).
- Deese, D. A. and Nye J. S. (1981): *Energy and security*. Cambridge, Mass.: Ballinger Pub. Co.
- DG Energy Report (2013): Report on European Gas Markets, Vol. 6(2).
- DG Energy Report (2019): Vol. 12(2). Available at: https://ec.europa.eu/energy/sites/ener/files/documents/quarterly_report_on_european_gas_markets_q2_2019_final_v1.pdf (accessed: 15 April 2020).
- DW (2014): "Germany's RWE first EU company to deliver gas to Ukraine." 15 April 2014. Available at: <https://www.dw.com/en/germanys-rwe-first-eu-company-to-deliver-gas-to-ukraine/a-17567424> (accessed: 26 March 2020).
- Energy Union Strategy (2015): "Framework Strategy for a Resilient Energy Union with a Forward-Looking Climate Change Policy." COM/2015/080. Available at: <http://eur-lex.europa.eu/legalcontent/EN/TXT/?uri=COM%3A2015%3A80%3AFIN> (accessed: 8 April 2020).
- Energy Union Strategy (2015): Available at: [https://www.europarl.europa.eu/RegData/etudes/BRIE/2015/551310/EPRS_BRI\(2015\)551310_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/BRIE/2015/551310/EPRS_BRI(2015)551310_EN.pdf) (accessed: 10 April 2020).
- Euractiv (2014): "Hungary and Slovakia link their gas grids." 28 March 2014. Available at: <https://www.euractiv.com/section/energy/news/hungary-and-slovakia-link-their-gas-grids/> (accessed: 5 April 2020).
- Euractiv (2016): "Poland appeals to European Court over Opal pipeline decision." 19 December 2016. Available at: <https://www.euractiv.com/section/energy/news/poland-appeals-to-european-court-over-opal-pipeline-decision/> (accessed: 5 April 2020).
- Eurostat (2013): "Main origin of primary energy imports, EU-28, 2003 – 2013." Available at: [http://ec.europa.eu/eurostat/statisticsexplained/index.php/File:Main_origin_of_primary_energy_imports,_EU28,_2003%E2%80%932013_\(%25_of_extra_EU-28_imports\)_YB15.png](http://ec.europa.eu/eurostat/statisticsexplained/index.php/File:Main_origin_of_primary_energy_imports,_EU28,_2003%E2%80%932013_(%25_of_extra_EU-28_imports)_YB15.png) (accessed: 12 April 2020).
- Eurostat (2019): EU imports of energy products – recent developments. Available at: <https://ec.europa.eu/eurostat/statistics-explained/pdfscache/46126.pdf> (accessed: 24 March 2020).
- European Commission. 2014. "Progress towards completing the Internal Energy Market." Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52014SC0311> (accessed: 20 March 2020).
- European Commission (2016): Available at: https://ec.europa.eu/commission/presscorner/detail/en/MEMO_16_30.8 (accessed: 18 March 2020).
- European Commission (2019): "Construction of the Poland-Slovakia gas interconnector is well under way thanks to EU funding", 6 September 2019. Available at: <https://ec.europa.eu/inea/en/news-events/newsroom/construction-poland-slovakia-gas-interconnector-well-under-way-thanks-to-eu> (accessed: 25 March 2020).
- European Commission Press Release on Energy Union (2016): "Towards Energy Union: The Commission presents sustainable energy security package." Available at: http://europa.eu/rapid/press-release_IP16-307_en.htm (accessed: 10 March 2020).
- European Commission Press Release on LNG (2016): "Liquefied Natural Gas and gas storage will boost EU's energy security." Available at: http://europa.eu/rapid/press-release_MEMO-16-310_en.htm (accessed: 13 March 2020).
- Gautam, S. (1984): *The military origins of industrialisation and international trade rivalry*. Pinter London.
- Gaz-System S.A. Annual Report (2012): Available at: https://en.gaz-system.pl/fileadmin/centrum_prasowe/wydawnictwa/EN/GAZSYSTEM_Annual_report_2012.pdf (accessed: 22 February 2020).
- Goldman, M. I. (2003): *The Privatization of Russia: Russian Reform Goes Awry*. Routledge.

- Goldwyn, D. L. and Kalicki J. H. (2005): "Energy and Security: Toward a New Foreign Policy Strategy." Illustrated edition. The Johns Hopkins University Press.
- Harper, J. (2019): "Poland pushes ahead with gas import plans." *Obserwator finansowy*, 9 April 2019. Available at: <https://www.obserwatorfinansowy.pl/in-english/poland-pushes-ahead-with-gas-import-plans/> (accessed: 10 February 2020).
- Harris, M. C. (2001): "The Globalization of Energy Markets." in *The Global Century: Globalization and National Security*, ed. Richard L. Kugler and Ellen L. Frost, Washington, D.C.: National Defense University Press, 272.
- Henderson, J. and Mitrova T. (2015): "The transformation of Russia's gas export policy in Europe." Oxford Institute for Energy Studies. ISBN 978-1-78467-039-9. Available at: https://www.researchgate.net/publication/276396630_The_transformation_of_Russia's_gas_export_policy_in_Europe (accessed: 13 December 2019).
- IEA (2010): *World Energy Outlook*. Available at: <https://www.oecd.org/berlin/46389140.pdf> (accessed: 17 March 2020).
- IEA (2011): *Energy Policies of IEA Countries: Hungary 2011*. Paris: Organisation for Economic Cooperation and Development. Available at: <http://www.oecd-ilibrary.org/content/book/9789264098237-en> (accessed: 18 February 2020).
- IEA (2012): *World Energy Outlook*. Available at: <https://www.oecd.org/greengrowth/05%20Cozzi%20Paris%20OECD%20green%20growth.pdf> (accessed: 4 February 2020).
- IAEA (2016): *Country Nuclear Power Profiles*. Available at: <https://cnpp.iaea.org/countryprofiles/Ukraine/Ukraine.htm> (accessed: 19 February 2020).
- Kovács, P. et al. (2011): "Energy security of the V4 countries. How do energy relations change in Europe?" *Kosciuszko Institute*. ISBN: 978-83-931093-2-6. Available at: <https://www.amo.cz/wp-content/uploads/2015/11/Energy-security-of-the-V4-countries-How-do-energy-relations-change-in-Europe.pdf> (accessed: 6 January 2020).
- Langvad, E. (2017): *Institute for Foreign Affairs and Trade*. ISSN 2064-9460. Available at: https://kki.hu/assets/upload/08_KKI-Studies_HUN-CZE_Langvad_20171017_00000002.pdf (accessed: 14 January 2020).
- Lehr, J. H. et al. (2016): *Alternative Energy and Shale Gas Encyclopedia*. John Wiley and sons. ISBN 978-0-470-89441-5.
- Mietkiewicz, R. A. (2019): "Sea gas" inclinations for the Polish energetic system safety." *Energy Policy Journal*. Vol.22(2). pp. 47-60. DOI: 10.33223/epj/109855.
- Ministry of the Environment (2013): "Při posuzování stanovování území pro vyhledávání a průzkum břidlicového plynu bude ochrana životního prostředí na prvním místě". Available at: https://www.mzp.cz/cz/news_130220_bridlice (accessed: 29 January 2020).
- Muller, S. et al. (2011): "Renewable Energy: Policy Considerations for Deploying Renewables". IEA, Paris.
- Noël, P. 2008. "Beyond Dependence: How to deal with Russian Gas." *Policy Brief of the European Council on Foreign Relations*. ECFR/09, London, UK.
- Nosko, A. (2013): "Energy security in transition: Coping with energy import dependence in the Czech Republic, Slovakia and Hungary." *Central European University*.
- Pollock, M. E. (2012): "How the United States Benefits from Its Alliance with Israel." *Strategic report*. The Washington Institute for Near East Policy.
- Princova, Z. (2019): "Challenges of Industrial Gas Demand in the Czech Republic, Poland and Slovakia." *Oxford Institute for Energy Studies*. DOI: <https://doi.org/10.26889/9781784671389>.

- Regulation CM. (2017): "Regulation of the Council of Ministers of 24 April 2017 on the minimum level of diversification of natural gas import from abroad." Journal of Laws, item 902. Council of Ministers (CM), §3.1.
- Reuters (2017): "UPDATE 2-Qatargas agrees to double LNG supplies to Poland", 14 March 2017. Available at: <https://www.reuters.com/article/qatar-poland-lng/update-2-qatargas-agrees-to-double-lng-supplies-to-poland-idUSL5N1GR30N> (accessed: 13 February 2020).
- Shmatko, S. I. (2010): Minister for Energy of the Russian Federation, Keynote Speech at the 10th Anniversary Conference of the EU - Russia Energy Dialogue, Brussels, 22 November 2010.
- Sovacool, B. K. and Mukherjee I. (2011): "Conceptualizing and measuring energy security: A synthesized approach." Energy 36, No.8.
- Tarnawski, M. (2015): "Security of Gas Supply in the Countries of the Visegrád Group." Securitologia, Vol. 21(1), ICID: 1184242.
- UN and IGU (2013): Study on Underground Gas Storage in Europe and Central Asia. Available at: https://www.unece.org/fileadmin/DAM/energy/se/pdfs/wpgas/pub/Report_UGS_Study_www.pdf (accessed: 19 January 2020).
- U.S. Geological Survey (2011): Area Report-international-Europe and Central Eurasia: *U.S. Geological Survey Mineral Yearbook* 2011, Vol.3. ISBN 978 1 4113 3781 1.
- Vernon, R. (1976): *The Oil crisis*. New York: Norton.
- Von Hippel, D. et al. (2011): "Energy security and sustainability in Northeast Asia." Energy Policy 39, no.11. pp. 6719–6730. Available at: <http://www.sciencedirect.com/science/article/pii/S0301421509005138> (accessed: 18 March 2020).
- Yunusov, K. (2014): "Partnership and Cooperation Agreements of the European Union with Central Asian Countries." *Studii Europene*. Vol. 1, pp. 9-18. Available at: <https://nbn-resolving.org/urn:nbn:de:0168-ssoar-418806> (accessed: 22 March 2020).