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Big Brother persists: efforts of Central European countries towards reducing energy supply dependency on Russia

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Résumé

Russia will remain the main supplier of energy resources (crude oil, natural gas) to Central European countries for many years to come. Their current efforts to redesign their supply include imports of natural gas, not crude oil. This situation is the result of, among other things, the nature of the market, its high politicization, and forms of distribution (gas pipelines).

Central European countries are first and foremost taking steps to reduce emissions of harmful substances (CO_2), and only after that will they see their actions as a tool to reduce Russia's influence in the region (reducing liquid fuel and natural gas consumption). The formulated energy targets are set to ultimately change the structure of electricity generation, which will indirectly, in the long run, reduce Russia's importance in the energy policy of the region's countries (e.g., the development of the electric car market may lead to a decline in the consumption of liquid fuels used in transport).

Among the Central European countries, there are no countries that are "fully" safe (in terms of crude oil and natural gas supplies), although taking into account the nature and specificity of energy markets, this is the case with Croatia and Slovenia. On the other hand, the countries of the Visegrad Group, and Slovakia in particular, are among the countries most threatened by energy domination or the possibility of an energy impact from Russia. The Baltic states – also thanks to the development of energy infrastructure in recent years – are increasingly able to oppose Russia's position in the region (mainly in terms of natural gas supplies).

Stability, clarity, and transparency of the activities carried out are of key importance to ensure the energy security of Central European countries. In the countries of this region, strategies to reduce dependence on supplies of energy resources from Russia will be the result of many internal and external factors, and their effectiveness will also depend on regional energy cooperation.

Introduction

For many years, Russia has dominated the energy markets (crude oil, natural gas) in Central European countries, which is conditioned by many factors ranging from technological (e.g., appropriate crude oil processing installations) to infrastructure (e.g., the network of existing pipelines and gas pipelines). The current dependencies have their historical background, which sometimes makes it difficult to take specific actions to change the energy supply structure. The nature of energy policies implemented by Central European countries is influenced by many variables, both internal and external. In this context, the energy balances of individual countries, i.e., the role of specific energy carriers in the economy, play a significant role. Regardless

of this, all Central European countries import crude oil (if there are refineries), liquid fuels, and natural gas from Russia, but the scale of these supplies and the level of dependence are varied.

In this paper, the energy situation of the Baltic states (Lithuania, Latvia, Estonia), the Visegrad Group (Poland, Czech Republic, Slovakia, Hungary) and the Balkans (Bulgaria, Croatia, Romania, Slovenia), all of which belong to the European Union (EU), will be analysed. Each of these countries has a differently developed energy system and, therefore, the optics of threats and challenges are incomparably different. Nevertheless, taking into account the specificity of energy markets, including interdependencies (e.g., a fire at a refinery in Bosnia and Herzegovina in 2018 caused a shortage of asphalt in several countries in the region), several points of convergence that define energy policy can be found. These include both an attempt to reduce dependence on supplies of energy resources from Russia (diversification) and the active efforts to reduce CO2 emissions. Regardless of this perception of threats, all Central European countries are in favour of creating a more diversified structure for acquiring energy resources and recognize the increase in regional cooperation as a key objective. Only this type of cooperation, supported by participation in the work of international organizations or regional initiatives, will be a real tool to counter these energy challenges.

The aim of this paper is to analyse the conditions and strategies as well as the threats and prospects for reducing the energy dependence of Central European countries on Russia. The work was divided on the basis of geographic and problematic criteria, and each chapter covers a different region of Central Europe (the Baltic states, the Visegrad Group, and the Balkans), while individual fragments deal with similar issues that ultimately allow for a comparison of the efforts of these states towards diversification of sources and directions of energy supplies. As a result, the paper presents the role and importance of crude oil and natural gas in energy balances as well as the conditions (including infrastructural) of the dependence of the analysed countries on Russia (the first subsection). The study presents an important fragment of the strategies of the countries of individual regions to change the structure of energy imports (the second subsection). The key part of the work is to present the prospects for reducing dependence and the challenges for Central European countries in relation to crude oil and natural gas supplies from Russia (third subsection).

The level of dependence of the countries in this region is significant, and regional cooperation is still insufficient. In this context, efforts are made both at the national and international level (e.g., expansion of gas pipelines) to change the unfavourable environment. For many years, the EU has played a fundamental role in shaping and developing ener-

gy sectors. Solutions developed at the EU forum must be implemented by the member states, and some of them (developing infrastructure for vehicles not using fossil fuels) may reduce energy dependence on Russia.

1. The Baltic states (Lithuania, Latvia, Estonia)

1.1. Energy policies determinants

The optic of threats in the Baltic states (Lithuania, Latvia, and Estonia) is largely the effect of the structure of the energy balance, and thus the role of individual energy carriers in the economy (availability, production/extraction costs, usefulness, etc.). The Baltic states differ significantly in terms of the share of crude oil and natural gas in the total primary energy supply (TPES). While in Lithuania and Latvia the total share of these two commodities in 2019 was 73% and 56%, respectively, it was only something over 9% in relation to Estonia. In the latter case, it is the effect of

the great importance of oil shale, the share of which in Estonia's TPES was 66%. This does not mean, of course, that the importance of these two energy resources is small. In this context, it should be noted that crude oil and natural gas play a huge role in the economy, especially in industry and transport. The level of use of these two commodities for electricity production varies (respectively: 15% in Lithuania, 50% in Latvia, and 1% in Estonia), which causes a large dependence on Russia, especially in Latvia (a significant share of natural gas in energy electricity).

Energy resources are generally not produced in the Baltic states. Only Lithuania produces crude oil, but on a small scale[1]. As a consequence, Russia is seen in a different way in mutual energy relations. In these countries, there is only one refinery in Lithuania, in Mažeikiai (10.2 million tonnes per year), which has both positive and negative consequences for the local liquid fuel market. Undoubtedly, the plant makes it possible to supply Lithuania, Latvia, and Estonia with the appropriate amount of liquid fuel[2], increasing competitiveness in the region and thus limiting the need to import liquid fuels from other countries, including Belarus and Russia. An equally unfavourable element is the structure of crude oil processing in the refinery, with the dominant role of crude

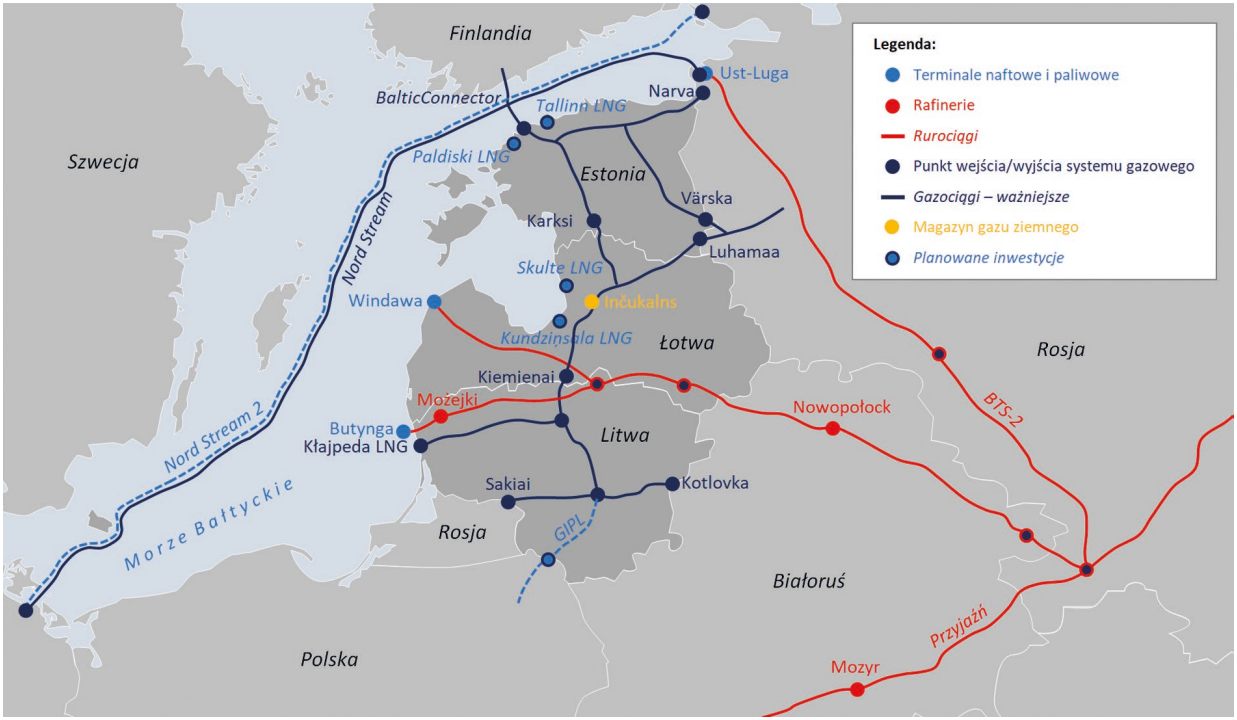
[1] In 2019, production stood at 39,000 tonnes, which was extracted by AB LOTOS Geonafta (a daughter company of Grupa LOTOS S.A.) and its subsidiaries. Crude oil which was produced was sent to that company's refinery in Gdańsk.

[2] International Energy Agency, *Lithuania 2021. Energy Policy Review*, Paris 2021, p. 143.

oil coming from Russia (90% in 2020)[3]. This situation is conditioned by several factors, including the existing installations, the demand for liquid fuels in the region (over the years, the consumption of diesel oil has been growing in relation to gasoline) as well as the available infrastructure (terminal-buoy in Butinge – 14 million tons per year). Due to the production capacity which exceeds the needs of the Baltic states, the plant is also focused on the export of liquid fuel products by sea, as a result of which its scope of operation depends on the international situation. While the crude oil market in the Baltic states is vulnerable to possible threats due to the dependence on natural gas supplies from Russia, the situation is much better in the context of the liquid fuel market. This is because of refineries existing in the region (high availability), infrastructure (oil terminals enabling the import of liquid fuels), and the nature of the market for these products. If crude oil supplies to the refineries in Lithuania were to be suspended, the market in the Baltic states would probably be supplied with liquid fuels from nearby refineries, and some products would be delivered by sea.

[3] The refinery also occasionally processes other types of crude oil from Saudi Arabia, the UK, and Norway.

Map 1. Selected elements of the oil and gas infrastructure in the Baltic states



Source: Author's own work based on International Energy Agency, *Lithuania 2021. Energy Policy Review*, Paris 2021, p. 153; Conexus, *Medium-term strategy for 2019-2023...*, p. 13.

Crude oil is supplied to the refinery through the buoy terminal in Butinga, and the plant mainly processes crude oil from Russia, but the direction and method of supply (sea) are not the most economical solution. In the past, crude oil was supplied via the Druzhba pipeline (northern line, Nowopołock- Mazeikiu section – 16.2 million tons per year) from Russia, but in 2006, when PKN ORLEN S.A. took over the Mazeikiu refinery, supplies were suspended. Undoubtedly, this was a reaction to the decision of the Lithuanian government, which agreed to the take over of the refinery by a Polish company, not Russian (the seller was the failing company OAO Yukos). As a result – due to infrastructural conditions – crude oil supplies take place only with the use of infrastructure at Būtingė.

In order to ensure the availability of liquid fuels on the market, there are terminals on the Baltic Sea coast, which are responsible for the import and export of these products. In terms of trade, the largest oil terminals in the region are Ventspils (Latvia), Tallinn (Estonia), and Riga (Latvia), which, in 2020, together accounted for 89% of liquid fuels imported to the Baltic states. On the other hand, in Lithuania, the port of Klaipeda plays the most important role. When it comes to liquid fuel exports to international markets, the ports in Ventspils (Latvia) and Klaipeda (Lithuania) have the highest turnover, accounting for 74% of their export in the region. In Estonia, this role is played by the port in Tallinn (almost 13% of all exported fuels). In these conditions, rail transport

plays an extremely important role as well, transporting commodities (crude oil to refineries in Belarus from Lithuania) and liquid fuels, both in terms of import and export[4].

The dependence of the Baltic states on Russia in the field of natural gas has a significant impact on energy security. The share of supplies of this commodity from the east is large and, in 2020, it amounted to 62%, 69%, and 65% for Lithuania, Latvia and Estonia, respectively. Importantly, no natural gas is produced in any of the Baltic states, so all domestic needs must be met by imports. Russia holds a vital role in the structure of natural gas imports, which is determined both by its proximity as the largest gas producer in the region and the existing infrastructure (gas pipeline connections). However, the situation has changed somewhat in recent years as a result of the expansion of the energy infrastructure (gas pipelines, LNG terminal). Problematic for the Baltic states is the lack of suitable entry points to the gas system, as those existing for years allowed gas supplies only from Russia. In addition, in the Baltic states, there is a lack of an extensive infrastructure for natural gas storage, which makes it difficult to balance the market in periods of peak

[4] A. Kuczyńska-Zonik, *Morze z widokiem na przyszłość. Potencjał i rozwój portów państw bałtyckich* (*A sea with a view to the future. Potential and development of the ports of the Baltic states*), "Komentarze IEŚ" 2021, no. 94, https://ies.lublin.pl/komentarze/morze-z-widokiem-na-przyszlosc-potencjal-i-rozwoj-portow-panstw-baltyckich/ [4.06.2021].

demand for gas (there is only one underground gas storage in Inčukalns, Latvia, with a capacity of 2.3 bcm)[5].

To sum up, in the Baltic states, crude oil and natural gas certainly play an important role in the energy balance (in Estonia, this is a consequence of the high share of oil shale, and in Latvia, the use of natural gas to generate electricity), which, in the absence of domestic resources, necessitates their import. The proximity and extensive infrastructure from the eastern direction have resulted in a great dependence of these countries on Russia. For several years now, active measures have been taken to increase energy security.

1.2. Energy policies strategies

Central Europe countries, in order to reduce energy supply dependence on Russia, are making multiple and multifaceted efforts. Under the adopted strategies, actions are targeted toward at least four areas (not implemented simultaneously in all countries). Firstly – changing energy supply structures, both on the basis of the existing infrastructure and as a result of the expansion and construction of new energy connections. Secondly – support for (where possible) domestic production of energy resources. Thirdly – modification of the energy balance structure, under which alternative forms of electricity generation are developed (ultimately reducing

[5] Conexus, *Information about storage*, https://www.conexus.lv/information-about-storage [5.06.2021].

the consumption of crude oil and natural gas). Fourthly – activity in the international arena through participation in the work of international organizations (e.g., the International Energy Agency, IEA) or regional political initiatives (e.g., the Three Seas Initiative).

The Baltic States, essentially due to the lack of domestic energy resources, only act within three of the four mentioned areas. Because of the specific nature of the crude oil market, supplies to the Mazeikiu refinery are the domain of ORLEN Lietuva AB. Over the years, the company has taken steps to change the structure of crude oil supplies, but the situation in this respect is difficult as a result of the level of technological advancement of the plant and financial benefits resulting from the processing of crude oil from Russia[6].

In 2020, the share of this commodity coming from Russia was still significant and in the coming years the situation may not change, because in order to ensure the profitability of the plant, this commodity will be supplied to enable the most effective use of the existing installations. The Baltic states are not directly dependent on crude oil supplies from

[6] Due to the difficult external environment in 2021 a proposal was presented to modernise the refinery by constructing new installations enabling an increase in the depth of crude oil processing and produced high-margin product (up to 86% from the current 73%). Orlen Lietuva, *PKN ORLEN and ORLEN Lietuva managers presented the ORLEN Group Strategy in Lithuania to the Prime Minister of the Republic of Lithuania*, https://www.orlenlietuva.lt/en/presscenter/news/Pages/PKN-ORLEN-and-ORLEN-Lietuva-managers-presented-ORLEN-Group-Strategy-in-Lithuania-to-the-Prime-Minister-of-the-Republic-of-L.aspx [3.06.2021].

Russia (there are not many refineries), but they import liquid fuels from that country. A key element of the strategy of the Baltic states, due to the specificity of the market and the operation of several plants in the region (Poland, Belarus, Russia), is to ensure product supplies through a developed import infrastructure (ports), which is ultimately intended to reduce Russia's influence on the liquid fuel market.

In the context of natural gas supplies, the situation is somewhat different as the FSRU regasification terminal in Klaipeda has been operating since 2014 (4 bcm per year), which enables natural gas supplies to be delivered from suppliers other than Russia. Importantly, it is an infrastructure that enables a real change in the structure of sources and directions of natural gas imports. For several years, it has been clearly seen that supplies of this commodity via the terminal have been growing, both to Lithuania and to other Baltic states. From 2020, also thanks to the commencement of the operation of the bi-directional gas pipeline BalticConnector (2.6 bcm per year), the energy markets in the region have been more fully integrated, thanks to which it is possible to ensure natural gas supplies from the Baltic states to Finland[7]. From the end of 2021, such a situation will also be possible in the opposite direction – as a result of the

[7] Baltic Connector, *Finland and Estonia celebrated the commissioning of the Balticconnector gas pipeline*, December 11, 2019, http://balticconnector.fi/en/finland-and-estonia-celebrated-the-commissioning-of-the-balticconnector-gas-pipeline/ [2.06.2021].

commissioning of the LNG terminal in the port of Hamina (4 bcm per year).

Since 2015, the import of natural gas to Lithuania has been increasing via the terminal in Klaipeda (in 2020 it was at the level of 56%). Undoubtedly, this is the most important tool for the diversification of natural gas supplies, reducing dependence on Russia, increasing the availability and competitiveness of natural gas from other countries in the market, which at the same time gives greater room for manoeuvre in business relations with Russia. As a result, the Klaipeda LNG terminal plays an important role in ensuring energy security in the energy strategies of the countries of the region. A similar task will also be performed by the GIPL (Gas Interconnection Poland-Lithuania) gas pipeline connecting Poland and Lithuania (2.4 bcm on the route from Poland to Lithuania and 1 bcm from Lithuania to Poland), which will further reduce the monopoly position of Russia in the region.

In terms of reducing CO2 emissions, the Baltic states take measures to change the structure of the energy balance. The targets adopted by the EU mean that there is a need to reduce the use of natural gas in the electricity generation process (Lithuania, Latvia) and oil shale, which have properties similar to coal (Estonia)[8]. Ultimately, the construction of

[8] K. Dośpiał-Borysiak, A. Kuczyńska-Zonik, D. Szacawa, D. Wilczewski, *Polityki klimatyczne Litwy, Łotwy i Estonii. Priorytet czy margines?* (*Climate policies of Lithu-*

appropriate electricity generation capacity is also planned. Taking into account the high share of crude oil in TPES, the development of infrastructure and the use of vehicles with alternative combustion engines are of key importance for these countries. The strategy of the Baltic states, therefore, includes the promotion of the use of electric cars and the production of energy from renewables.

In the context of the first target, the EU attaches great importance to environmental protection, and changing trends in reducing the share of traditional fuels in road transport is one of the key challenges in this regard. Undoubtedly, a decrease in demand for liquid fuels could result in a lower share of crude oil and, consequently, smaller supplies of this commodity from Russia. While the share of electric vehicles in the passenger car park of the Baltic states is not significant (1.0% on average), in the future it is likely to be a fast-growing segment of the automotive industry. EU regulations aimed at the development of infrastructure for vehicles with alternative combustion engines (BEV, PHEV, CNG etc.) and government programs encouraging the purchase of mainly electric cars will be supportive.

For the second target, natural gas plays an important role in the electricity generation process in Latvia and Lithuania (50% and 13%, respectively). On the other hand, in Estonia,

ania, Latvia, and Estonia. Priority or margin?), Instytut Europy Środkowej, Lublin 2020, p. 115-124.

taking into account the process of reducing CO2 emissions, it can be expected that the share of natural gas in the energy balance (including electricity generation) will increase. In addition to building alternative infrastructure connections (GIPL gas pipeline), the Baltic states may respond to the change in unfavourable trends and reduce dependence on natural gas supplies from Russia by building nuclear power plants on the one hand and developing offshore wind farms on the other. In 2020, the construction of a nuclear power plant was considered in Estonia (a government project), but a change of the prime minister means that currently work in this direction is not continued[9]. Nevertheless, changing the way electricity is generated in this country is extremely important, taking into account the fact that the primary source of electricity is oil shale (85%), which generates a significant amount of CO2. In Estonia, a project to build a small-scale nuclear power plant (200-300 MWe) is also being carried out by an independent company, Fermi Energia (construction is planned to start in 2030), but it is difficult to say whether a private company (without government support) will be able to finalize such an enterprise. Additionally, offshore wind energy plays an important role in the energy

[9] M. Paszkowski, *Region Morza Bałtyckiego: możliwe nowe punkty na mapie elektrowni jądrowych* (*Baltic Sea Region: possible new points on the map of nuclear power plants*), "Komentarze IEŚ" 2020, no. 196, https://ies.lublin.pl/komentarze/region-morza-baltyckiego-mozliwe-nowe-punkty-na-mapie-elektrowni-jadrowych/ [25.05.2021].

strategies of the Baltic states. The most advanced works are carried out in Lithuania, where, according to declarations, by 2040 – wind farms in the Baltic Sea with a total capacity of 1400 MWe are to be built in two stages. Estonia also has plans for the development of wind energy (three wind farms with a total production capacity of 1400 MWe are to be built by 2030 in the Gulf of Riga). In Latvia, on the other hand, it is planned to build wind farms with a capacity of at least 800 MWe in the next 10 years[10].

An important aspect of increasing energy security is membership in international organizations and regional political and economic initiatives. Since 2014, Estonia has participated in the work of one of the most important organizations of this type – the IEA. Lithuania is also in the process of joining this organization, which, in the long term, should contribute to increasing energy security in the region[11]. Among the Baltic states, only Latvia has not yet started the process of joining the organization, but it can formally submit an application as it has been a member of

[10] M. Paszkowski, *Oby wiało: plany budowy morskich farm wiatrowych w państwach regionu Morza Bałtyckiego* (*May the wind blow: plans to build offshore wind farms in the Baltic Sea countries*), "Komentarze IEŚ" 2021, no. 11, https://ies.lublin.pl/komentarze/oby-wialo-plany-budowy-morskich-farm-wiatrowych-w-panstwach-regionu-morza-baltyckiego/ [28.05.2021].

[11] M. Paszkowski, *Litwa coraz bliżej członkostwa w Międzynarodowej Agencji Energii* (*Lithuania is getting closer to membership of the International Energy Agency*), "Komentarze IEŚ" 2020, no. 160, https://ies.lublin.pl/komentarze/litwa-coraz-blizej-czlonkostwa-w-miedzynarodowej-agencji-energii/ [22.05.2021].

the Organization for Economic Co-operation and Development (OECD) since 2016. The participation of Estonia in the works of the IEA, and then of Lithuania, strengthens security and regional cooperation due to the possibility of these countries joining collective crisis actions and obtaining real support in the event of disruptions in crude oil and liquid fuel supplies. The key regional project is the Three Seas Initiative, the aim of which is to increase integration and cooperation, including energy. The projects formulated and promoted under the initiative are intended, in addition to the synchronization of the power systems of the Baltic states with Europe (BEMIP), to ultimately increase the availability of natural gas from various directions (e.g., in the context of the construction of the GIPL gas pipeline).

To summarise, it should be stated that the strategies of the Baltic states are based both on measures aimed at changing the structure of natural gas supplies (to a small extent, crude oil), modifying the structure of the energy balance (including development of offshore wind energy), and participation in works with international organizations and regional initiatives.

1.3. Prospects for reducing dependency and challenges for energy policies

A large share of the energy supplies from Russia to the Baltic states (mainly natural gas), in the absence of a diversified structure of imports from other directions, may pose

a threat to security. Only the Mazeikiu refinery is operating in these countries. The convenient sea location and relatively efficient logistics of crude oil supplies and liquid fuel exports mean that the import of these commodities can be ensured from other sources. It is impossible to restore crude oil imports to the plant by land. Nevertheless, it is mainly the economy and the existing technological conditions that maintain Russia as the main partner. However, it should be pointed out that the lack of plant modernization, a decrease in liquid fuel demand (also in the context of the COVID-19 pandemic), and the generally difficult situation for the refining sector around the world could even lead to plant closure, and then the countries operating in the region would be more dependent on liquid fuels derived from refineries, incl. from Russia and Belarus, and delivered from the sea.

In the case of the natural gas sector, taking into account the availability of the commodity, the proximity of a large exporter, and the existing infrastructure, the Baltic states still remain dependent on supplies from Russia. Undoubtedly, a change in market conditions occurred with the commissioning of the LNG terminal in Klaipeda, which initiated the process of actual diversification of the sources and directions of natural gas supplies. The next stages of building a more diversified structure of natural gas imports will include full use of the BalticConnector gas pipeline. Subsequently, the construction of the GIPL gas pipeline will provide the Baltic states with access to commodity exchanges

in Europe, the expanded market in Poland (e.g., the Baltic Pipe, LNG terminal in Świnoujście), and will also enable the export of this commodity (via LNG terminals in Klaipeda and in the port of Hamina) to Poland or to the south of Europe (e.g., Ukraine). Nevertheless, the excessive availability of natural gas from Russia in the region remains a threat. As a result of this situation, price competitiveness is limited, which creates concerns about the real possibility of counteracting Russia's monopoly position in the region. The difficulties in the functioning of the sector are still affected by the lack of an extensive storage system (currently, there is only one, in Inčukalns) enabling balancing, including in winter periods[12].

One of the solutions being considered, which would ensure the diversification of natural gas supply sources, is the construction of LNG terminals in Latvia and Estonia. However, the creation of this type of installation is difficult for several reasons, including the non-absorbent market and the lack of financial resources. One solution would be to build small-scale terminals, mainly used for ship bunkering. This is important because the Baltic Sea is a specially protected water area, and ships can only operate on marine fuel with a low sulphur content (0.1%). Further, the more restrictive regulations of the International Maritime Organization

[12] Conexus, *Medium-term strategy for 2019-2023*, p. 21-22, https://www.conexus.lv/uploads/filedir/Media/conexus_mid_term_strategy.pdf [2.06.2021].

(IMO) may make the use of alternative fuels, as opposed to the currently used fuels, including LNG, the best solution. In the Baltic states, the construction of LNG terminals has been considered several times (the Paldiski and Muuga projects near Tallinn in Estonia and in Skulte and Kundziņsala in Latvia), but the lack of EU funding under the Common Interest Project List (PCI) is a serious constraint that will affect the construction of new installations. The Three Seas Initiative may provide some support, where both Estonia and Latvia entered LNG terminal construction projects on the list of common priority investments of this Initiative[13].

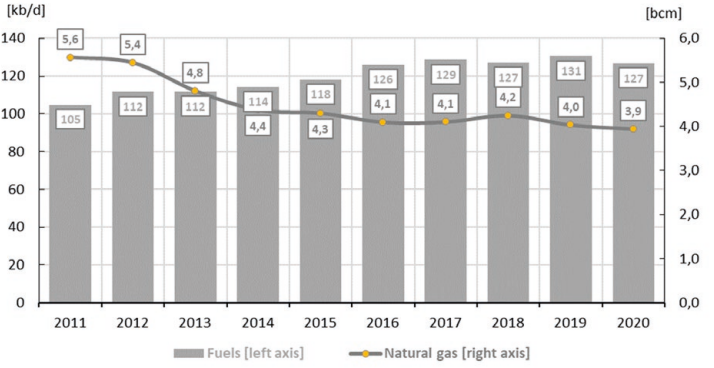
A drop in demand for liquid fuels and natural gas may translate into a reduction in dependence on Russia; however, the prospects for the development of energy markets in the region are varied. Over the last two years, the demand for liquid fuels and natural gas in the Baltic states has decreased, which was the result of several factors, including the difficult economic situation (a consequence of the crisis of 2008-2009), increased energy efficiency (mainly in heating), and the development of renewables (heat production). In these countries, several companies decided to abandon natural gas for heat production in favour of biomass (mainly Estonia)[14], and the closure of Nitrofert AS (a fertilizer pro-

[13] M. Paszkowski, *Region Morza Bałtyckiego…* (*Baltic Sea Region…*).

[14] International Energy Agency, *Estonia 2019 Review. Energy Policies of IEA Countries*, Paris 2019, p. 81-83.

ducer in Estonia) and the nuclear power plant in Ignalina (Lithuania) transformed the local market for this commodity (a decrease in consumption in Estonia, and partly an increase in Lithuania). In the coming years, as a result of the COVID-19 pandemic, a further decline in the consumption of both natural gas and liquid fuels can be expected[15]. This trend will be hampered by the promotion of zero-emission transport (bunkering LNG ships, powering road vehicles – CNG) and the recovery of economies after the pandemic.

Chart 1. Demand for liquid fuels and natural gas in the Baltic States (2011-2020)



Source: Author's own work based on Joint Organizations Data Initiative, https://www.jodidata.org/ [6.06.2021].

[15] This assessment was shared by the operator of the gas system in Estonia. Elering, *Estonian Gas Transmission Network Development Plan 2018-2027*, Tallin 2018, p. 12-17.

The decrease in liquid fuel demand (and thus a certain reduction in the need to import crude oil and products from Russia) will be possible in the context of increasing the efficiency of internal combustion engines on the one hand, and, on the other hand, increasing sales of electric vehicles. In the first respect, the change in the level of vehicle efficiency will be influenced by the change in the car fleet, because in 2019 the average age of passenger cars in the Baltic states was one of the highest in Europe (Lithuania – 16.8 years, Latvia – 14 years, Estonia – 16.7 years). In the EU, the average was 11.5 years[16]. Along with economic development and an improvement of the socio-economic conditions of the inhabitants, it can be predicted that newer and newer vehicles with more efficient engines will be sold. In the second range, electric cars (BEV and PHEV together)[17] are not common means of transport in the Baltic states. Models with hybrid engines are more popular, but due to the EU policy and the support of individual countries, the number of fully electric vehicles will continue o grow. In 2019, the percentage of BEV and PHEV vehicles in these countries was small (Lithuania – 1.6%, Latvia – 0.1%, Estonia – 1.4%), but it can be expected that

16 European Automobile Manufacturers' Association, *Average age of the EU vehicle fleet, by country*, February 1, 2021, https://www.acea.auto/figure/average-age-of-eu-vehicle-fleet-by-country/ [20.05.2021].

17 Electric cars include fully electric (BEV, battery electric vehicles) and hybrid (PHEV, plug-in hybrid electric vehicles).

such cars will become more and more popular which will affect the level of fuel supplies and dependence on Russia[18].

As part of changing the structure of the energy balance, the use of nuclear energy is focused on only to a limited extent. In Lithuania, the Ignalina nuclear power plant has not been operating since 2010, so this energy source is not used in the Baltic States. In 2020, in Estonia, the government of Prime Minister Jüri Ratas considered building a power plant as a panacea for the need to abandon oil shale in the long term. As a result of the change of government, plans related to the construction of the power plant were postponed, and the new electoral coalition focused on the development of renewables, including, in particular, offshore wind energy. The idea of building a power plant is still endorsed by the independent company Fermi Energia[19]. In these conditions, renewables will be the leader in reducing natural gas consumption, and thus reducing dependence on Russia.

In conclusion, it should be stated that in the last few years, significant changes in the development of energy infrastructure have occurred in the Baltic states. As a result, Russia's ability to influence the region has decreased. This

[18] European Automobile Manufacturers' Association, *Passenger car fleet by fuel type, European Union*, February 1, 2021, https://www.acea.auto/figure/passenger-car-fleet-by-fuel-type/ [21.05.2021].

[19] A. Kuczyńska-Zonik, *Estonia: między technologią łupkową a energią atomową* (*Estonia: between shale oil technology and nuclear energy*), "Komentarze IEŚ" 2020, no. 67, https://ies.lublin.pl/komentarze/estonia-miedzy-technologia-lupkowa-a-energia-atomowa/ [4.06.2021].

process will proceed mainly with the construction of the GIPL gas pipeline and the LNG terminal in the port of Hamina, as both projects will increase the availability of natural gas in the region. At the same time, along with the energy transformation process, the share of natural gas in the energy balance may decrease. As a result of the implementation of the goals related to the reduction of CO_2 emissions in the Baltic states, the energy balance will change. Estonia seems to be facing the greatest challenges in this regard.

2. The Visegrad Group countries (Poland, Czech Republic, Slovakia, Hungary)

2.1. Energy policies determinants

The Visegrad Group countries differ in many respects, including the level of use of crude oil and natural gas in the economy. The role of these energy carriers in TPES is the greatest in Hungary and amounts to over 64%, while slightly less in Poland, Slovakia, and the Czech Republic, where it is at the level of 46%, 45%, and 38%, respectively. Importantly, in Hungary, natural gas plays a dominant role in the energy balance, which shapes the nature of the implemented energy policy. Nuclear energy plays a key role in Slovakia, and mainly coal in Poland and the Czech Republic. In the

Visegrad Group countries, neither crude oil nor natural gas plays a dominant role in the electricity generation process, but the share of natural gas in the coming years will increase, taking into account the ongoing energy transformation process, where an important transitional role is assigned to this energy carrier. In 2019, in electricity generation, both commodities accounted for a total of 25% in Hungary, 12% in Slovakia, 10% in Poland, and 7% in the Czech Republic.

In the Visegrad Group countries (except Poland), the extraction of crude oil and natural gas is not significant, which means that this commodity must be imported[20]. Taking into account the infrastructural conditions (existing pipelines) and access to supply sources, Russia plays a key role in the structure of crude oil imports. The level of dependence of the eastern neighbour varies; in 2020, it amounted to 70% in Poland, the Czech Republic – 54%, Slovakia – 100%, and Hungary – 82%. In these countries, the refining sector is relatively well developed, and the operating plants differ in terms of size and depth of processing. The accompanying crude oil infrastructure also enables the efficient provision

[20] In Poland, crude oil extraction totalled 225,000 tonnes in 2020, in Hungary, it was 181,000 tonnes, and 20,000 tonnes in the Czech Republic (mainly in the Southern Moravia region), while in Slovakia production was halted in 2019. As far as natural gas is concerned, the greatest production is taking place in Poland, where it totalled 5.6 bcm in 2020, in Hungary this amount stood at 1.5 bcm, and in the Czech Republic it was 0.2 bcm, while in Slovakia it was only 0.1 bcm (Bratislava region).

of commodity supplies to the plants, despite its inland location (Czech Republic, Slovakia, Hungary).

There are three refineries in Poland, of which those in Płock (16.3 million tonnes per year) and Gdańsk (10.6 million tonnes per year) are of key importance for the domestic liquid fuel market. Both plants are constantly being modernized, which places them among the most modern refineries in Europe. The commodity is delivered both by land (the Druzhba pipeline with reloading capacity from the tank farm in Adamowo to the tank farm in Miszewko Strzałkowskie, with a capacity of 50 million tons per year) and by sea (oil terminal in Gdańsk – 40 million tons per year)[21]. The plants process various types of crude oil, and for many years efforts have been made toward changing the structure of the crude oil input into these installations (this process has dynamically accelerated since 2015). An efficiently operating and developed infrastructure enable the prevention of crisis situations, which was the case in the past, among others, in 2019, during the supply of contaminated crude oil from Russia[22].

[21] M. Mróz, *Dylematy infrastrukturalnego bezpieczeństwa energetycznego państw tranzytowych ropy naftowej – na przykładzie Polski, Białorusi i Ukrainy* (*The dilemmas of the infrastructural energy security of the oil transit countries – on the example of Poland, Belarus, and Ukraine*), "Rocznik Instytutu Europy Środkowo-Wschodniej", vol. 4, 2020, no. 18, p. 84-85.

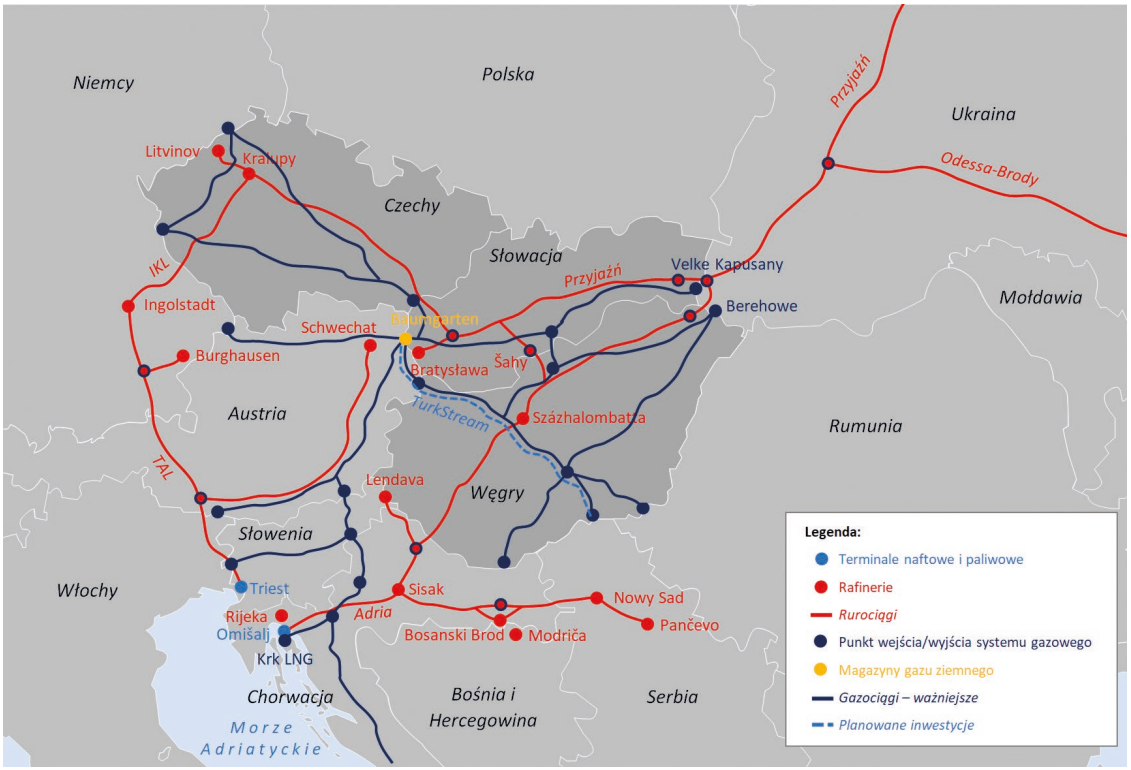
[22] O. Yagova, D. Zhdannikov, F. Tan, *Dirty oil crisis over for Russia, but contagion felt on high seas*, June 25, 2019, https://www.reuters.com/article/us-russia-oil-contamination-exclusive-idUSKCN1TP2WP [26.05.2021].

There are two refineries in the Czech Republic (Kralupy – 3.3 million tons per year and Litvínov – 5.4 million tons per year), and supplies are made via two routes, which is due to the type of crude oil processed. The plant in Litvínov mainly uses crude oil from Russia as input (deliveries via the southern line of the Druzhba pipeline), while the one located in Kralupy – mainly light/sweet grades (deliveries via the oil terminal in Trieste, and then the TAL pipeline – 43 million tons per year and IKL pipeline – 11 million tons per year)[23]. As a result, the suspension of crude oil supplies from one direction (e.g., via the Druzhba pipeline) should theoretically not limit the processing of crude oil and the production of liquid fuels in the other plant. Such a situation causes the level of energy security to be slightly higher (independence of processing).

In Slovakia, there is one refinery in Bratislava (6.1 million tonnes per year), which is fully supplied with crude oil from Russia via the Druzhba pipeline. The plant has not been using other types of this commodity for years, although such theoretical possibilities do exist. In 2015, the pipeline on the Šahy-Százhalombatta route (6 million tonnes per year) was renovated, making it possible to import crude oil via the Adria pipeline (17 million tonnes per year). However, this is not a frequently used solution for technical reasons, as the

[23] International Energy Agency, *Czech Republic 2016 Review. Energy Policies of IEA Countries*, Paris 2016, p. 140.

Map 2. Selected elements of the oil and gas infrastructure of the Czech Republic, Slovakia, and Hungary



Source: Author's own work based on Janaf Plc., *JANAF System*, https://janaf.hr/en/janaf-system [2.06.2021].

insufficient capacity of the Šahy-Százhalombatta and Adria pipelines limits the use of this route to alternative supplies in the event of interruptions in the import of crude oil from Russia[24].

In relation to Hungary, there is one refinery in the city of Százhalombatta (8.1 million tonnes per year)[25], which has well-developed logistics for the supply of crude oil, despite its inland location. Crude oil is imported both through the Druzhba pipeline (crude oil from Russia) and through the Adria pipeline (crude oil from various directions)[26]. As both connections are used continuously, this solution increases the flexibility of the system and creates favourable price conditions. The Adria pipeline is a limitation, as the main line is also used to supply other refineries (Croatia, Serbia, Bosnia and Herzegovina), but the infrastructure allows for a real diversification of sources and directions of crude oil supplies.

Taking into account the size of the markets, the demand for natural gas in the Visegrad Group countries is the highest among all Central European countries. The key importance of this commodity in the economies of individual countries means that they are the most endangered due to their ener-

24 International Energy Agency, *Slovak Republic 2018 Review. Energy Policies of IEA Countries*, Paris 2018, p. 32-33.

25 Three refineries used to operate in Hungary, but the plants in Tiszaújváros and Zalaegerszeg no longer process crude oil, with their work mainly involving asphalt production. International Energy Agency, *Hungary 2017 Review. Energy Policies of IEA Countries*, Paris 2017, p. 112.

26 Ibid., p. 113.

gy impact, including the suspension of natural gas supplies from Russia. While Poland and Hungary obtain part of the required commodity from domestic resources (25% and 16% in 2020, respectively), the Czech Republic and Slovakia are fully dependent on imports (extraction in 2020 accounted for 2% and 1%, respectively, of national needs). In addition, taking into account the existing infrastructure also developed after 1989 (e.g., the Yamal-Western Europe gas pipeline) and the importance of Russia as an exporter of energy resources in the Central European region, it is natural that most of the commodities of the Visegrad Group countries come from the East.

To sum up, the issue of the availability of crude oil and natural gas from various directions (dominated by the eastern direction) remains a problem for the Visegrad Group countries. Over the years, natural gas supplies to Poland, the Czech Republic, Slovakia, and Hungary were mainly from Russia, but the construction of regasification terminals (Świnoujście – 2015, Krk – 2021) creates the basis for increasing the diversification of sources and directions of natural gas imports. The share of these commodities in the balance sheets will still be significant, taking into account the indirect role in the transformation and plans related to the gasification process (mainly in Poland).

2.2. Energy policies strategies

In the last few years, Poland has made the greatest progress among the countries of the Visegrad Group in the context

of diversifying the sources and directions of crude oil supplies. These types of activities are supported by the existing infrastructure – primarily the crude oil terminal in Gdańsk, which enables the import of crude oil and liquid fuels. As a consequence, the structure of supplies has changed significantly. In 2020, the volume of imports from Russia amounted to 70%, compared to 92% in 2011. Additionally, due to the inland location of the largest refinery in Płock, in order to increase the flexibility of supply logistics, the expansion of the Pomeranian pipeline was initiated (a second line with a capacity of 25 million tons per year), which will also improve the supply of this commodity to refineries in Germany (Schwedt, Spergau). Through the ongoing expansion of storage capacities (the oil terminal in Gdańsk), including those on the Baltic Sea coast, the process of crude oil and liquid fuel supplies will be improved, as well as the ability to counteract threats resulting from the potential suspension of natural gas supplies from Russia. The effectiveness of the existing infrastructure was confirmed during the 2019 oil crisis when supplies of contaminated crude oil from Russia went to refineries in Central Europe. At that time, the oil terminal in Gdańsk and the stocks system played a key role in ensuring energy security.

While work is underway in Poland related to the expansion of the crude oil infrastructure, in other countries of the Visegrad Group, activities are mainly aimed at changing the supply structure itself. Crude oil is imported through the

already existing connections, with crude oil from Russia still of the greatest importance. Refineries in the Czech Republic, Slovakia, and Hungary have crude oil supply routes alternative to the Druzhba pipeline (Czech Republic – TAL and IKL pipelines, Slovakia and Hungary – Adria). Among these countries, the most difficult access to other sources of crude oil is the Bratislava refinery, although the modernized Šahy-Százhalombatta connection allows the plant to be supplied with crude oil via the Adria pipeline. At the same time, it should be noted that it is mostly technological and price conditions that affect the still-maintained, large supplies of crude oil from Russia. Consequently, taking into account the specificity of the market, the strategies undertaken by oil companies (to a lesser extent by states) mean that Russia remains the main economic partner. In the past, i.a., the company Unipetrol from the Czech Republic (a daughter company of PKN ORLEN S.A.) concluded a framework agreement with the company JANAF Plc. Croatia for the potential use of the Adria pipeline to transport crude oil to refineries[27], but no such deliveries are currently being made.

In the context of natural gas imports, the diversification strategy is implemented by all countries of the Visegrad Group. However, it is a more politicized commodity and plays

[27] Orlen Unipetrol, *Unipetrol Wants to Use JANAF Oil Pipeline*, February 27, 2019, https://www.unipetrol.cz/en/Media/PressReleases/Pages/20190226_TZ_ropovod%20Janaf_EN.aspx [2.06.2021].

an important role in Russia's efforts to make Central European countries dependent. This is what the construction of gas connections (Nord Stream – 55 bcm annually, Nord Stream 2 – 55 bcm annually, TurkStream – 12 bcm annually) was aimed at. Therefore, under the adopted strategies, projects implemented by Poland will be of great importance in ensuring security, also in the context of the entire Central Europe. Ultimately, natural gas investments (expansion of the LNG terminal in Świnoujście to 7.5 bcm annually, construction of the Baltic Pipe gas pipeline – 10 bcm annually towards Poland, construction of the FSRU LNG terminal in Gdańsk with a capacity of at least 4.5 bcm annually, construction of the GIPL gas pipeline, construction of the Poland-Slovakia gas connection with a transport capacity of 5.7 bcm annually from Slovakia to Poland and 4.7 bcm annually from Poland to Slovakia) will contribute to increasing the availability of natural gas in the region offered by other producers (including the US, Qatar, Norway). The planned projects will not only allow for the diversification of natural gas supplies to Poland (the contract for supplies from Russia ends in 2022) but also potentially create a natural gas transport and trade centre (hub)[28].

[28] M. Paszkowski, *Hub gazowy w Polsce: w kierunku budowy niezależności energetycznej regionu Morza Bałtyckiego* (*Gas hub in Poland: towards building the energy independence of the Baltic Sea region*), "Komentarze IEŚ" 2021, no. 54, https://ies.lublin.pl/komentarze/hub-gazowy-w-polsce-w-kierunku-budowy-niezaleznosci-energetycznej-regionu-morza-baltyckiego/ [5.06.2021].

Other countries of the Visegrad Group are also making efforts to change the structure or at least the conditions of natural gas supplies. In this context, the Czech Republic, Slovakia, and Hungary are trying to expand the system in such a way as to enable supplies from other directions[29]. The construction of connections with both Poland (deliveries from the LNG terminal in Świnoujście) and with Azerbaijan remains of key importance in this respect. The latter includes the construction of the Eastring gas pipeline (from 20 to 40 bcm annually), which is to enable the import of natural gas from Azerbaijan via Bulgaria and Romania to Hungary and Slovakia and then to the Czech Republic[30]. A significant change in ensuring the availability of natural gas in Central Europe from various directions was the construction of the FSRU LNG terminal in Croatia, on the island of Krk (2.6 bcm per year). Its creation has made it possible to improve the conditions of natural gas supplies, including the negotiating position with Russia. Nevertheless, it should be remembered that the construction of new LNG terminals, which would

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29 Hungary is not giving up on importing natural gas from Russia, but is striving to build connections with as many countries as possible, including Serbia, although the source of natural gas will be Russia. PAP, *Media: Węgry i Serbia połączyły rurociągi, by popłynął rosyjski gaz* (*Media: Hungary and Serbia linked pipelines to flow Russian gas*), July 5, 2021, https://www.pap.pl/aktualnosci/news%2C904472%2Cmedia-wegry-i-serbia-polaczyly-rurociagi-poplynal-rosyjski-gaz.html [8.07.2021].

30 Three Seas, *HU-SI gas interconnector*, https://projects.3seas.eu/projects/hu-si-gas-interconnector-submitted-by-slovenia [25.05.2021].

allow for the diversification of the source of the commodity, is still a key aspect necessary to limit Russia's monopoly position in Central Europe. This function will also be performed by natural gas connections enabling supplies from Azerbaijan and ultimately also from Israel.

In the Visegrad Group countries, energy resources are generally not produced. Only in Poland is work in this area carried out. While the extracted crude oil plays a minor role (4%) in the structure of the charge for refining installations[31], the extraction of natural gas is much more significant (20%). The production of this commodity takes place in two regions of Poland: in the south (Podkarpackie Province) and in the west (Lubuskie Province). For years, PGNiG has been undertaking work aimed at maintaining the level of production of this commodity, but the prospects for increasing production are limited. Additionally, one of the elements of the strategy is the development of energy cooperation in the region of Central and Eastern Europe, including Ukraine[32]. Due to the implementation of the project for the development of nat-

[31] For the production are responsible LOTOS Petrobaltic S.A. (deposits in the Baltic Sea) and PGNiG S.A. (deposits in Lubuskie Voivodeship).

[32] The aim is to conduct the process of exploration and production of Ukrainian energy resources in areas which geologically are extensions of the structures exploited by the company in Poland. PGNiG, *PGNiG i Naftogaz: krok w kierunku wspólnego wydobycia gazu na Ukrainie* (*PGNiG and Naftogaz: a step towards joint gas extraction in Ukraine*), March 30, 2021, https://pgnig.pl/aktualnosci/-/news-list/id/pgnig-i-naftogaz-krok-w-kierunku-wspolnego-wydobycia-gazu-na-ukrainie/newsGroupId/10184 [2.06.2021].

ural gas deposits in the Baltic Sea (B4/B6 gas fields), in the coming years, it will be possible to increase the extraction of this commodity in sea areas[33]. Nevertheless, Poland's strategic goal is to ensure access to alternative sources of natural gas supplies, including from its own resources, which results in the process of acquiring deposits in Norway[34].

A key element of the strategy of the Visegrad Group countries is the modification of the energy balance structure, which is dictated both by the growing costs of generating electricity from coal and the need to reduce CO2 emissions in connection with EU legal regulations. Along with the progressing energy transformation in these countries, the share of coal will be reduced and the share of renewables (in Poland in terms of the development of offshore wind energy) and nuclear energy (construction and expansion of already existing power plants) will be increased. In Poland, the use of offshore wind energy is a pillar of activities to reduce CO2 emissions. The planned installed capacity will be greater than in the case of the considered construction of a nuclear power plant. On the other hand, in other coun-

33 Cleaner Energy, *Wkrótce decyzja Lotosu w sprawie złóż B4/B6 na Bałtyku* (*Lotos will soon decide on the B4/B6 fields in the Baltic Sea*), October 10, 2019, https://cleanerenergy.pl/2019/10/30/wkrotce-decyzja-lotosu-w-sprawie-zloz-b4-b6-na-baltyku/ [23.05.2021].

34 CIRE, *PGNiG kupuje aktywa norweskiej firmy wydobywczej Ineos E&P Norge AS* (*PGNiG buys the assets of the Norwegian mining company Ineos E&P Norge AS*), March 25, 2021, https://www.cire.pl/item,214396,1,0,0,0,0,0,pgnig-kupuje-aktywa-norweskiej-firmy-wydobywczej-ineos-ep-norge-as.html [2.06.2021].

tries, as part of the implementation of climate obligations and the development of renewables, an increase in the use of solar energy is predicted. The role of natural gas as an indirect energy carrier in the energy transformation should continue to be significant, while an efficient infrastructure enabling the diversification of sources and directions of supplies of this commodity remains of key importance for these countries.

The second pillar of energy security and changes in the structure of the energy balance will be the development of nuclear energy. Such an installation has not yet been built in Poland. In turn, in other Visegrad Group countries, energy generated from nuclear power plants in 2019 played a significant role (Czech Republic – 35%, Slovakia – 56%, Hungary – 48%). It is expected that such installations will constitute the basis of a low-emission economy, as well as an element of the hydrogen strategy being built[35]. In the Czech Republic, Slovakia, and Hungary, work related to the construction of new nuclear power plants is underway, which in the long term will play a fundamental role in ensuring energy security. Currently, the construction of the second block of the Dukovany power plant is in progress in the Czech Republic. It is intended to partially replace the existing nuclear units,

[35] CIRE, *Według UE wodór z energii jądrowej będzie uważany za „niskoemisyjny"* (*According to the EU, hydrogen from nuclear energy will be considered as "low carbon"*), October 19, 2020, https://www.cire.pl/item,207589,1,0,0,0,0,0,wedlug-ue-wodor-z-energii-jadrowej-bedzie-uwazany-za-niskoemisyjny.html [5.05.2021].

which will end their life by 2040[36]. The situation in Hungary is similar, where work is underway on the construction of two new units at the Paks II nuclear power plant to replace the existing plant in Paks (four reactors to be closed in 2032-2037)[37].

In addition to activities aimed at the development of renewables and nuclear energy, solutions for the development of alternative forms of private and public transport (including electric cars, CNG, etc.) are being promoted among the Visegrad Group countries. The wider use of BEV and PHEV vehicles, with a stable electricity supply structure, may constitute an opportunity to reduce dependence on crude oil supplies.

The Visegrad Group countries attach an important role to membership in international organizations and regional initiatives that may ultimately increase energy security. Undoubtedly, taking into account the level of dependence on supplies of energy resources from Russia, the increased transparency of the markets and the possibility of international cooperation will make it possible to counteract the monopolization of energy markets. This purpose is also

[36] Sz. Czarnecki, M. Paszkowski, *Elektrownia jądrowa Dukovany: panaceum na przyszłe problemy energetyczne Republiki Czeskiej* (*Dukovany Nuclear Power Plant: a panacea for the Czech Republic's future energy problems*), "Komentarze IEŚ" 2021, no. 69, https://ies.lublin.pl/komentarze/elektrownia-jadrowa-dukovany-panaceum-na-przyszle-problemy-energetyczne-republiki-czeskiej/ [23.05.2021].

[37] International Energy Agency, *Hungary*…, p. 102.

served by participation in the process of creating legal provisions on the EU forum and the possibility of participating in the work of the IEA in the context of counteracting crisis situations. In addition, through active regional cooperation in other formats (e.g., the Three Seas Initiative), regional exchange and cooperation are growing, the aim of which is, inter alia, increasing the presence of American companies and ensuring greater availability of natural gas in the region (mainly from the USA)[38].

To recapitulate, it should be pointed out that the strategies of the Visegrad Group countries are focused on the one hand on the import of energy resources from alternative sources to Russia (mainly in Poland due to its maritime location), and on the development of infrastructure, and on the other hand – on the modification of the energy balance (renewables, nuclear energy). In this respect, it is crucial to base any projects on regulations at the EU level, which guarantees transparency and may affect the monopoly position of Russia. It should be remembered that while the process of building the foundations for the diversification of the sources and directions of natural gas imports is underway (this goal is also served by the Three Seas Initiative), in the

[38] CIRE, *Izba Reprezentantów USA przyjęła rezolucję wspierającą Inicjatywę Trójmorza* (*The US House of Representatives adopted a resolution supporting the Three Seas Initiative*), November 18, 2020, https://www.cire.pl/item,207537,1,0,0,0,0,0,izba-reprezentantow-usa-przyjela-rezolucje-wspierajaca-inicjatywe-trojmorza.html [15.05.2021].

case of crude oil, it has been suspended (mainly in the Czech Republic and Slovakia).

2.3. Prospects for reducing dependency and challenges for energy policies

Taking into account the great dependence of the Visegrad Group countries on Russia, ensuring security in this region requires, on the one hand, attempts to change the structure of energy sources of origin, and, on the other hand, an efficiently functioning infrastructure. The threats resulting from the import of crude oil from one dominant source are real, the more so because in the past there have already been temporary limitations in supplies. The most serious crisis took place in 2019 – at that time, crude oil with increased content of organic chlorides was exported (in Poland, supplies from Russia were suspended for 43 days). The problem was extremely serious and required the use of alternative crude oil supply routes (oil terminals) and the release of stocks. Such a situation, consisting of the suspension of supplies, may arise in the future, so it remains of key importance to provide individual refineries with access to alternative routes of crude oil supply. In this case, it would be extremely important for refineries in the Czech Republic, Slovakia, and Hungary that crude oil terminals in Croatia (Omišalj – 34 million tonnes per year) and in Ukraine (Pivdennyj near Odesa – 14.5 million tonnes per year) are operational. In the past, PKN ORLEN S.A. considered the

possibility of importing crude oil via Croatia to the Czech Republic, but there was no commercial supply. Access to the terminal in Omišalj would also create an opportunity for oil imports to the Slovak refinery. The use of the terminal in Ukraine would also be important for crude oil processing plants in the Czech Republic, Slovakia, and Hungary. Unfortunately, the position of Slovakia remains problematic in this respect. The creation of alternative supply routes, even without using their full transmission capacity, would put refineries from the Visegrad Group countries in a favourable negotiating position with partners from Russia. With regard to Poland, the project of building the second line of the Pomeranian pipeline carried out by PERN S.A. will enable, among other things, more efficient operation of the pipeline system, and will allow for more effective prevention of crisis situations (mainly in the context of access to the oil terminal in Gdańsk for the refineries in Płock and in Schwedt and Spergau). The process of diversifying the sources (but not necessarily the directions) of crude oil supplies is taking place mainly in Poland. With regard to other countries of the Visegrad Group, no real steps are taken in this regard, which is technologically, infrastructurally (existing pipelines), structurally (high consumption of diesel oil), and price-related. In the Central Europe region, this commodity from Russia is the main source of input to refinery installations and the situation is not likely to change dramatically in the coming years.

With regard to natural gas, Russia's monopoly position in the region continues to be the greatest threat to the Visegrad Group countries. The main problem is the high availability of this commodity from this country, which means that any energy projects aimed at diversification must take into account the availability and the price of natural gas offered by Russia.

In recent years, the activities of OAO Gazprom have been intensified to build natural gas connections, the purpose of which is to bypass Ukraine and indirectly also other Central Europe countries. As a result of the commissioning of the Nord Stream, TurkStream, and Nord Stream 2 gas pipelines (under construction), the availability of natural gas in the region will not decrease, but only a redirection of natural gas supplies to Europe will occur. All the countries of the Visegrad Group are exposed to the influence of Russia, and only the development of infrastructure (construction of new entry points to the system) and the integration of domestic markets may limit Russian influence. Due to the energy projects being implemented as well as the change in market conditions (market liberalization, increased transparency, EU regulations), there are grounds for increasing the diversification of sources and directions of natural gas supplies. The key aspect, apart from logistics, is the source of the commodity (including Azerbaijan, the US, Qatar, and Norway). Along with the construction of new gas pipelines (including the Baltic Pipe, GIPL, Poland-Slovakia intercon-

nector) and regasification terminals (expansion of the LNG terminal in Świnoujście, construction of the FSRU LNG terminal in Gdańsk), the foundations will be created for the construction of a more diversified structure of natural gas supplies to Central European countries. Hungary is in a favourable position due to the already realized gas supplies from Croatia[39], and further expansion of the infrastructure in southern Europe (TAP gas pipeline, construction of the Greece-Bulgaria interconnector, IGB gas pipeline) means that, in future, these countries can be supplied from Azerbaijan[40].

Russia is striving to monopolize the market of Central European countries and the Balkan countries (including via TurkStream)[41]. However, the expansion of the import infrastructure and the fact that Russian projects are subject to EU regulations will allow countries in this region to import natural gas from various suppliers. In these conditions, the commodity from Russia will constitute one of the products

[39] I. Pavlova, *Shell to supply gas to Hungary via Croatia's Krk LNG terminal*, September 7, 2020, https://seenews.com/news/shell-to-supply-gas-to-hungary-via-croatias-krk-lng-terminal-712667 [10.05.2021].

[40] The construction of the IGB gas pipeline (Greece-Bulgaria interconnector) will most likely be completed in 2022. Reuters, *Gas pipeline link between Bulgaria and Greece delayed until June 2022*, https://www.reuters.com/business/energy/gas-pipeline-link-between-bulgaria-greece-delayed-until-june-2022-2021-05-26/ [29.05.2021].

[41] For more on the project see K. Smoleń, *The geopolitical dimensions of the TurkStream pipeline*, "Rocznik Instytutu Europy Środkowo-Wschodniej", vol. 4, 2019, no. 17, p. 101-121.

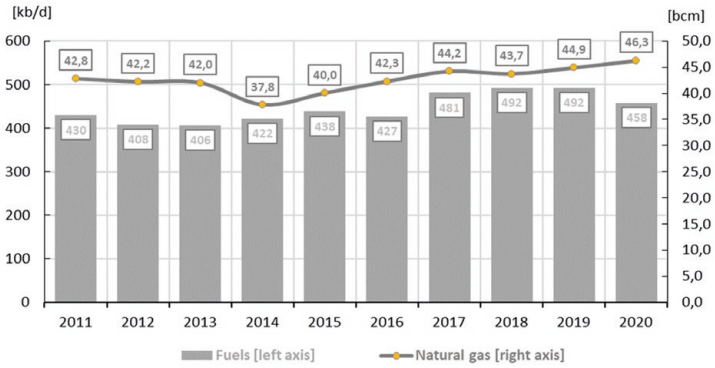
offered on the market, and the increased competition should translate into lower prices and favourable contract conditions for the recipient. Additionally, along with the potential construction of other gas connections in southern Europe, including mainly the BRUA gas pipeline (4.4 bcm per year), the availability of natural gas in Hungary from Azerbaijan would be ensured. Funds from the EU (PCI) and the Three Seas Initiative may be of key importance for the implementation of some of these infrastructure projects[42].

The level of dependence of the Visegrad Group countries is significant, and a change in the level of demand for liquid fuels and natural gas may play an important role in reducing these dependencies. In the first case, the infrastructure for vehicles with engine alternatives to internal combustion is being developed. In 2020, during of the COVID-19 pandemic, there was a decrease in liquid fuel demand, but this indicator should change as economies recover. However, in the second case, the consumption of natural gas has been systematically growing for several years in all countries of the Visegrad Group. Prospects for the use of this commodity, taking into account, inter alia, the phasing out of coal, are therefore positive (in Poland, for example, Gaz-System

[42] N. Theisen, J. Szabo, *Black Sea natural gas games: A fork in the road for the BRUA Pipeline project?*, March 29, 2019, https://www.atlanticcouncil.org/blogs/energysource/black-sea-natural-gas-games-a-fork-in-the-road-for-the-brua-pipeline-project/ [29.05.2021].

S.A. anticipates a large increase in demand for natural gas, both in the power industry and in households)[43].

Chart 2. Demand for liquid fuels and natural gas in the Visegrad Group countries (2011-2020)



Source: Author's own work based on Joint Organizations Data Initiative, https://www.jodidata.org/ [6.06.2021].

Along with the economic development – also after the COVID-19 pandemic – an increase in the consumption of transported liquid fuels (mainly road fuels) can be expected, whereas, in the longer term, the prospects for an increase in the consumption of all fuels are limited. This situation will be influenced by the process of increased efficiency of internal combustion engines and the popularity of electric cars.

[43] Energetyka24, *Gaz-System prognozuje olbrzymi skok zapotrzebowania na gaz. Czy Polsce starczy surowca?* (*Gaz-System forecasts a huge jump in gas demand. Will Poland have enough natural gas?*), March 18, 2021, https://www.energetyka24.com/gaz-system-prognozuje-olbrzymi-skok-zapotrzebowania-na-gaz-czy-polsce-starczy-surowca [20.05.2021].

In 2019, in the Visegrad Group countries, the average age of passenger cars was above the EU average (Poland – 14.1 years, Czech Republic – 14.9 years, Slovakia – 14 years, Hungary – 13.5 years)[44]. In the following years, it can be expected that cars which will not meet environmental standards (due to the increasing costs of their maintenance) will not be used. In EU countries, from 2020, new, stricter CO2 emission standards have been introduced, according to which manufacturers have to pay a fine of EUR 95 for each gram of emissions above 95 g/km, which increases the cost of purchasing cars with internal combustion engines[45]. The answer to this type of regulation is active measures for the sale of electric cars (BEV, PHEV). In the Visegrad Group countries, as in other Central European countries, the hybrid car market is the most developed. However, the extended government support system, numerous information and promotional campaigns, and the development of infrastructure (charging points) will also contribute to increasing the number of typically electric vehicles. In 2019, the proportion of BEV and PHEV vehicles in the average car park was not significant (Poland – 0.3%, Czech Republic – 0.4%, Slovakia – 0.5%,

44 European Automobile Manufacturers' Association, *Average age*…

45 M. Paszkowski, *Elektrykiem po kontynencie: rynek samochodów elektrycznych w państwach Europy Środkowej* (*Trip by electric car across the continent: the electric car market in Central European countries*), "Komentarze IEŚ" 2021, no. 48, https://ies.lublin.pl/komentarze/elektrykiem-po-kontynencie-rynek-samochodow-elektrycznych-w-panstwach-europy-srodkowej/ [26.05.2021].

Hungary – 1.4%), but the growth dynamics of this type of car are much higher than in the case of cars with internal combustion engines (only electric vehicles in 2020 recorded an increase in sales in EU countries, among which the Visegrad Group countries experienced a 184% rise compared to 2019).

The most important solutions promoted by the Visegrad Group countries, aimed at changing the structure of the energy balance and reducing the consumption of natural gas by abandoning coal as a carrier enabling the production of electricity, include the construction and expansion of nuclear power plants. Among these countries, there are no nuclear power plants in Poland yet, but the first nuclear unit is planned to be launched in 2033[46]. On the other hand, in other countries, energy generated in this type of plant plays an important role, significantly increasing energy security (Czech Republic – 35%, Slovakia – 56%, Hungary – 48%)[47]. In the Czech Republic, work is underway on the construction of a second nuclear unit at the Dukovany power plant (the issues of choosing the technology and thus the partner and ensuring financing of the investment remain to be resolved). The currently-operating power plants (a total of six units at two power plants in Dukovany and Temelín) will have to be shut down before 2040. The construction of new nuclear

[46] Ministerstwo Klimatu i Środowiska, *Polityka energetyczna Polski do 2040 r.* (*Ministry of Climate and Environment, Poland's energy policy until 2040*), Warsaw 2021, p. 8.

[47] European Automobile Manufacturers' Association, *Passenger car fleet*…

units is important in terms of reducing CO2 emissions and ensuring energy security. Also in Hungary, work is underway related to the construction of two new units of the Paks II power plant, which is to maintain the share of nuclear energy in the electricity generation structure (the Russian technology that will be used to build the plant remains a controversial issue)[48]. The Visegrad Group countries, due to the ambitious goals of the EU related to achieving climate neutrality by 2050, will also have to develop renewables. In Poland, an important role in this context is assigned to the construction of offshore wind farms, which are to constitute, next to the nuclear power plant, the pillar of the energy transformation. According to these plans, offshore wind energy is to be responsible for the largest amount of electricity generated among all types of renewables to provide up to 20% of electricity generated in Poland.

Summing up, the prospects for reducing dependence on Russia in terms of crude oil supplies are significantly limited, and the lack of developed cooperation with Ukraine is an additional barrier. Technological, financial, and political conditions are of key importance in this respect. With regard to the import of natural gas, the importance of this commodity will increase along with the gasification process and the

[48] World Nuclear News, *Hungary's Paks II project receives construction approval*, November 23, 2020, https://world-nuclear-news.org/Articles/Energy-regulator-issues-construction-permit-for-Pa [25.04.2021].

role that natural gas will play in the energy transformation. For the Visegrad Group countries, along with the move away from coal, it will be important to modify the energy balance in favour of nuclear energy and renewables, and not natural gas, which will limit Russia's influence on energy markets.

3. Selected Balkan countries (Slovenia, Croatia, Bulgaria, Romania)

3.1. Energy policies determinants

In the Balkan countries, the perception of energy challenges and threats is highly varied and conditioned by the historically existing resource base as well as by the investments carried out over the years. Similar differences exist in terms of primary energy consumption between Croatia and Bulgaria, Romania and Slovenia. While the first three countries are dominated by crude oil and natural gas, which together account for 68%, 65%, and 58% of primary energy, respectively, in Slovenia it is 45%. Of course, this does not mean that both these commodities play the same role in the process

of generating electricity, because in most cases, in addition to natural gas, coal, nuclear energy, and renewables (mainly water and wind energy) are used for these purposes. In this respect, Croatia is a relatively safe country with a diversified structure of electricity generation, where hydropower plays a key role (47%). The situation in Bulgaria is slightly different, as the country's economy is based on the use of coal (39%) and nuclear energy (37%). Electricity is also generated differently in Romania, where there is no dominant source of energy, with major roles played by hydropower (26%), coal (24%), nuclear energy (19%), natural gas (15%), and wind energy (11%). Meanwhile, in Slovenia, the most important role in electricity generation is played by nuclear energy (36%) and renewables (hydropower – 29%). At the same time, the extraction of crude oil and natural gas is not of great importance in the case of Croatia and Bulgaria[49], while in Romania, domestic production of natural gas is of great importance (almost 10 bcm annually). As a result, any energy perturbations are the result of many factors, and the perception of Russia varies significantly between countries.

[49] In Croatia crude oil production totalled 142,000 tonnes in 2020 (including the North Adriatic, Marica, and Izabela deposits), in Romania the figure stood at 811,000 tonnes, while in Bulgaria, this commodity is not extracted. With regard to natural gas in Croatia, production in 2020 stood at 0.9 bcm, in Bulgaria it was only 0.06 bcm, and in Romania 9.7 bcm, while neither crude oil nor natural gas is extracted in Slovenia.

The Balkan countries have a long history in the crude oil and natural gas industry (in particular Romania, which is considered one of the oldest areas for the production of this energy resource), and over the past decade, the industry has undergone a major transformation. In Bulgaria, there is one refinery in Burgas (7 million tons per year), which, thanks to its very favourable location, is able to import crude oil from various directions. However, due to the easy access to this commodity offered in the Black Sea, Russia and Azerbaijan play a dominant role in the structure of the charge for refining installations (the company belongs to the Russian company OAO Lukoil)[50].

The fuel sector in Bulgaria is relatively well developed, as in Romania, where there are several refineries, incl. in Năvodari (Petromidia – 5.1 million tonnes per year), Ploiești (Petrotel – 2.6 million tonnes per year, Petrobrazi – 3.4 million tonnes per year) and Onești (Rafo – 3.4 million tonnes per year). Most of them are plants whose depth of processing is relatively shorter than in other refineries in Central Europe. In addition, only the plant in Năvodari has a favourable location on the Black Sea, while the remaining plants are supplied with crude oil from the oil terminal in Constana and

[50] A fiscal investigation was launched at the refinery in June 2021, because for years the plant has reported losses and has not paid any tax. Euractive, *Bulgaria launches inspection of Russian oil giant Lukoil*, June 2, 2021, https://www.euractiv.com/section/politics/short_news/bulgaria-launches-inspection-of-russian-oil-giant-lukoil/ [4.06.2021].

through an appropriate pipeline system. The existing infrastructure enables efficient operation of the plants, which, however, require modernization.

The situation is slightly different in Croatia, where the inland Sisak refinery (3.1 million tonnes per year) was closed in 2019, and currently, only a second plant is in operation, in Rijeka (4.7 million tonnes per year), located above the Adriatic Sea. Crude oil supplies to this plant are carried out via the Omišalj oil terminal and a short offshore pipeline between Omišalj and Rijeka. Other plants in the Balkans are supplied mainly through the Adria pipeline, which is of great importance for energy security in Central Europe, enabling the supply of crude oil to refineries in Bosnia and Herzegovina (Bosanski Brod), Serbia (Novi Sad, Pančevo), Hungary (Százhalombatta), and theoretically also in Slovakia (Bratislava) and the Czech Republic (Kralupy, Litvínov)[51]. As a result, this type of infrastructure ensures the diversification of sources and directions of crude oil supplies for many plants in Central Europe, thus strengthening regional cooperation and security.

In Slovenia, in 2000, the only plant operating in the country, the Lendava refinery (a small plant with a processing depth of 1.5 million tonnes per year) was closed, which means that currently, all fuels used in the economy must be import-

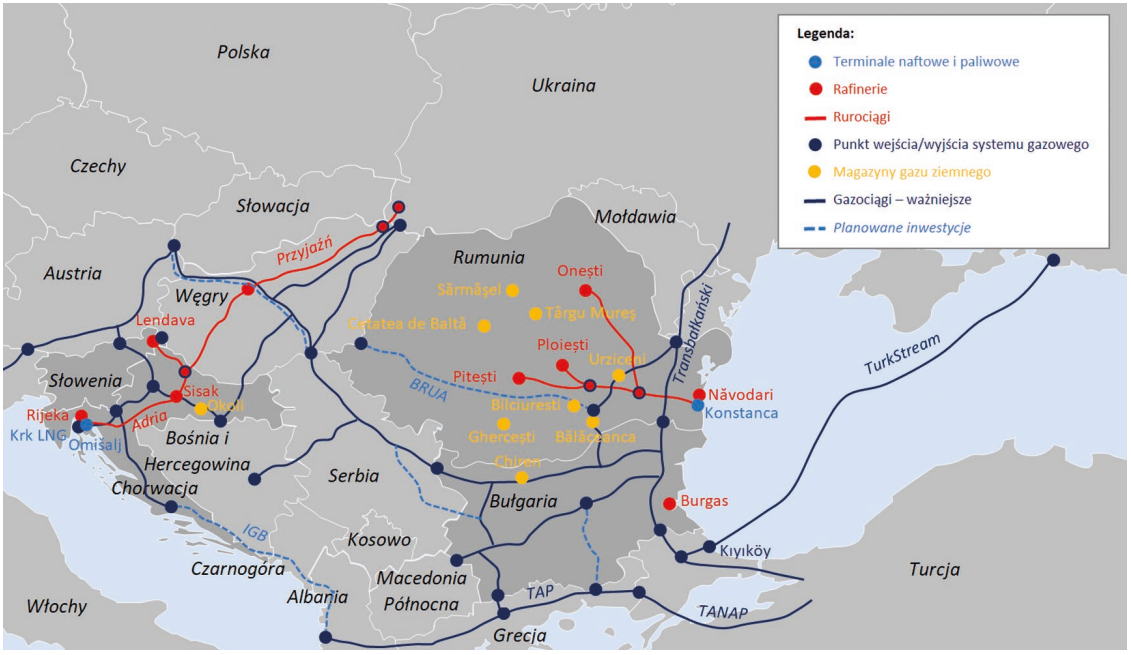
[51] G. Sekulić, D. Kovačević, D. Vrbić, V. Veselica, *Strategic Role of Oil Pipelines in EU Energy Supply*, "Journal of Energy", vol. 1, 2019, no. 68, p. 33-41.

ed. This country does not produce crude oil, and the license rounds aimed at exploring energy resources conducted in the previous years did not bring any results. The domestic market is dominated by Petrol, which controls most of the filling stations. The products sold are imported from nearby refineries (Austria, Croatia, Italy), which means that the level of energy security is high.

The importance of natural gas in the Balkan countries varies greatly, as does Russia's influence through the supply of this commodity. The largest share of natural gas in the energy balance occurs in Romania, while this country is also one of the most significant producers of natural gas among all the EU countries, and extraction covers 80% of domestic needs. Under these circumstances, the dependence on Russia is limited, but taking into account both the low level of gasification of the state and the plans to shut down coal-fired power plants, the demand for natural gas will show an upward trend. Apart from domestic production, part of the demand for natural gas is covered by imports, mainly from Russia. Due to the new routes connecting Russia with recipients in Europe, including Central Europe, from April 1, 2021, Romania no longer imports the natural gas via Ukraine (via the Trans-Balkan gas pipeline – 27 bcm annually), but by the TurkStream gas pipeline[52].

[52] A. Sabadus, *Romania key recipient of TurkStream gas as prices soar, Balkan lines uncertain*, April 2, 2021, https://www.icis.com/explore/resources/

Map 3. Selected elements of the oil and gas infrastructure of the Balkan states



Source: Author's own work based on Janaf Plc., *JANAF System*, https://janaf.hr/en/janaf-system [2.06.2021].

In Bulgaria and Croatia, the situation in the gas sector is completely different. In both countries, the demand for this commodity is on a similar level, but the production is higher in the case of Croatia. Consequently, production meets domestic needs at the level of 2% in Bulgaria and 30% in Croatia. Both countries have a favourable geographic location and work that has been going on for many years to increase the availability of various sources of natural gas supplies. In Croatia, in 2021, a regasification terminal of the FSRU type on the island of Krk began operating, which enables the supply of both domestic and international recipients with this commodity (including reloading capacity contracted by companies from Hungary)[53]. At the same time, thanks to the entry points to the national gas system on the border with Slovenia and Hungary, it is possible to supply customers in this country with natural gas from various directions and from various suppliers (Russia, Algeria, Tunisia, etc.). On the other hand, in the case of Bulgaria, the commissioning of the TurkStream gas pipeline (2020) meant that natural gas from Russia is now supplied (similarly to Romania), bypassing Ukraine[54]. If the construction of the IGB gas pipeline is completed, it will be possible for Bulgaria

news/2021/04/20/10630238/romania-key-recipient-of-turkstream-gas-as-prices-soar-balkan-lines-uncertain [5.06.2021].

53 D. Petrushevska, *Croatia's Krk LNG terminal starts commercial operations*, January 4, 2021, https://seenews.com/news/croatias-krk-lng-terminal-starts-commercial-operations-726606 [2.06.2021].

54 M. Ruszel, A. Kucharska, *Dywersyfikacja źródeł dostaw gazu ziemnego do państw Grupy Wyszehradzkiej – wyzwania i perspektywy rozwoju* (*Diversification of natural*

to import natural gas also from Azerbaijan. In the future, the structure of natural gas imports to this country may be even more diversified if the construction of the EastMed gas pipeline (10 bcm per year) is completed, connecting the offshore natural gas deposits in Israel with Cyprus, Greece, and Western Europe via Italy[55]. Importantly, Bulgaria also acts as a transit country because natural gas is delivered to North Macedonia, mainly from Russia, via the Zidilovo-Kyustendil transmission point on the border of North Macedonia and Bulgaria (at present, it is the only point that allows this country to be supplied with this commodity). As in the case of Romania, Bulgaria is also taking steps to change the structure of the energy balance (giving up coal), which will affect the demand for natural gas. However, in the case of Slovenia, the domestic demand is low, and the lack of extraction means that all natural gas consumed must be imported. Nevertheless, the favourable geographic location means that deliveries can be made both via Italy and, from 2021, also via Croatia.

To sum up, in the Balkan countries the share of crude oil and natural gas in the energy balance is highly diversified. As a result, the way these countries perceive Russia is different. For Croatia and Slovenia, cooperation with this

gas supply sources to the Visegrad Group countries – challenges and development prospects), Instytut Europy Środkowej, Lublin 2020, p. 30.

55 S. Michalopoulos, *Athens and Cairo mull changing the route of EastMed pipeline*, March 4, 2021, https://www.euractiv.com/section/energy/news/athens-and-cairo-mull-changing-the-route-of-eastmed-pipeline/ [10.05.2021].

country does not pose a major threat (which is the result of the diversified structure of the energy balance). On the other hand, the position of Bulgaria and Romania in relations with Russia is gradually changing, although the possibility of this country's influence in the context of supplies of both crude oil and natural gas is still large.

3.2. Energy policies strategies

The energy strategies of the Balkan countries are the result of their share of individual energy resources in the overall balance and the level of energy supply dependence. There is no longer a refinery in Slovenia and fuel availability is ensured by supplies from plants located in the region. The favourable location means that fuels can be supplied from many sources from different suppliers, and consequently the problem of dependence on the supply of this type of products from one dominant supplier is limited. The situation is somewhat different in Croatia, where two refineries have operated for years, in Rijeka and Sisak. Market conditions (low margins) – including strong competition with plants in the region – made INA (a subsidiary company belonging to the MOL Group) decide to convert the refinery in Sisak into a biofuel production plant[56]. On the other hand, the refinery

[56] *Croatian oil firm INA aims for $282 million biorefinery investment*, June 23, 2020, https://www.reuters.com/article/us-croatia-ina-refineries-idUSKBN23U1Y4 [15.05.2021].

in Rijeka, thanks to its favourable location on the coast of the Adriatic Sea, is in a slightly better financial condition, and the import of commodities is carried out from various directions. Ultimately, by 2023, the completion of the construction of the delayed coking installation at the plant is planned, which will increase the depth of processing of crude oil and improve margins[57].

In the remaining Balkan countries, dependence on crude oil supplies from Russia is primarily determined by the availability of this commodity in the Black Sea region (Bulgaria, Romania). Over the years, no significant steps have been taken to change the unfavourable supply structure there, also due to technological conditions. In addition, while in the past Romania belonged to the group of large oil producers (the peak occurred in 1976-1977), the production of this commodity has been decreasing for many years, mainly due to the natural depletion of deposits and the lack of interest of companies in the implementation of production projects. This situation is influenced by the low profitability of carrying out this type of work in Romania. However, in 2020, production at the level of 70 thousand barrels per day satisfied 32% of the domestic refinery's needs. As a consequence, the refineries in Romania and Bulgaria import a large part of the

[57] R. Brelsford, *Croatia's INA lets contract for Rijeka refinery delayed coking project*, January 20, 2020, https://www.ogj.com/general-interest/article/14075406/croatias-ina-lets-contract-for-rijeka-refinery-delayed-coking-project [8.05.2021].

necessary commodity primarily from Russia. However, there is an infrastructure that could influence the implementation of diversification projects (oil terminals on the Black Sea, in the Midia port near Constana in Romania, and also Burgas in Bulgaria). Due to the favourable geographic location, in the event of a crude oil supply being interrupted, it is possible to supply the plants located in these two countries with crude oil from alternative sources.

In terms of natural gas supplies, Slovenia is in an extremely favourable position. The well-developed, but at the same time still expanding, natural gas market in Italy means that gas supplies can be carried out from various directions. The same situation applies to supplies via Austria (a large part of the natural gas connections built are directed to this country). Increasing integration and energy cooperation in the region would take place when the gas connection on the Hungary-Slovenia-Italy route (this project is on the PCI list)[58] is built. Undoubtedly, the construction of the LNG terminal on the island of Krk in Croatia made it possible to import this commodity from various directions, and as a result, the dependence of Slovenia and other countries in the region on natural gas supplies from Russia has decreased. The terminal plays an important diversification function, and at the same time increases the availability for this commodity from other sources (the US, Qatar).

[58] Three Seas, *HU-SI gas*…

For several years, Bulgaria's position and energy importance has been growing in the Balkans, which is a consequence of the development of its energy infrastructure. In 2020, the TurkStream gas pipeline was commissioned. As a result, natural gas supplies to Bulgaria are no longer carried out via the territory of Ukraine, but on the other hand, the importance of this country has increased in the context of natural gas transit to Europe. In addition, Bulgaria's position is still changing, because after the construction of the IGB gas pipeline, there will be an opportunity to ensure natural gas supplies also from Azerbaijan (via the TAP gas pipeline). In these circumstances, Bulgaria's strategy is aimed at creating the largest possible network of gas connections and acting as an intermediary in the supply of natural gas to the Balkan states. In order to ensure a better market position, the only operating natural gas storage facility in Chiren is being expanded in this country (1 bcm per year)[59].

A similar strategy has been adopted in Romania, because both the existing natural gas connections and the ones under construction (the BRUA gas pipeline) will be able to be supplied with natural gas from other countries. For years, Russia has been the main supplier of natural gas, although domestic production also plays a major role. Along with

[59] M. Tanev, *Bulgaria signs 2.7 mln euro deal for design of Chiren gas storage upgrade*, March 29, 2021, https://seenews.com/news/bulgaria-signs-27-mln-euro-deal-for-design-of-chiren-gas-storage-upgrade-736168 [10.05.2021].

the development of gas pipelines, supplies will be ensured not only from Russia but also from Azerbaijan. In addition, along with the construction and operation of regasification terminals in Turkey and Greece, it will also be possible to deliver supplies from other directions. In Romania, plans have been made for several years related to the development of offshore natural gas deposits. Nevertheless, the legal regulations introduced in 2018 (an unfavourable change in the tax system), and the low prices of this commodity in 2020, have altered the economics, which will negatively affect the prospects for natural gas production in this country. As a consequence, several companies are considering or have already decided to abandon upstream projects in Romania (including Exxon Mobil)[60].

In the Balkan states, the structure of the energy balance has been changing for many years. Crude oil continues to play an important role in transport (road, sea, air), and natural gas plays an important role in the generation of electricity (mainly in Croatia and Romania). In this context, dependence on energy supply influences the implemented policy. The Balkan states are at different stages of economic

[60] M. Passwaters, *Romania's Romgaz makes offer to buy out ExxonMobil's stake in Neptun Deep joint venture*, March 31, 2021, https://www.upstreamonline.com/field-development/romanias-romgaz-makes-offer-to-buy-out-exxonmobils-stake-in-neptun-deep-joint-venture/2-1-990437 [29.05.2021]; M. Paszkowski, *Złoże Neptun: problemy gazowe Rumunii* (*Neptune field: Romania's gas problems*), "Komentarze IEŚ" 2021, no. 109, https://ies.lublin.pl/komentarze/zloze-neptun-problemy-gazowe-rumunii/ [27.06.2021].

development, including energy development, and, therefore, the efforts made in this regard differ significantly. However, along with the process of reducing dependence on Russia, steps will be taken in two areas: reducing the use of liquid fuels used in transport and modifying the structure of electricity generation.

Taking into account the role of liquid fuels in the economy as well as the EU's goals in reducing CO2 emissions, the process of electrification of the car fleet is progressing in the Balkan countries. This will be a long term process, given the low importance of this type of vehicle in these countries at present. At the same time, along with the process of reducing CO2 emissions, there will be a change in the structure of energy generation from coal in favour of renewables and nuclear energy. In particular, it is a big challenge for Bulgaria, Romania, and Slovenia, where the share of these commodities in electricity production ranges from 24% (Romania) to 39% (Bulgaria). Without taking far-reaching steps, it is possible to anticipate great difficulties in the functioning of the coal industry, and thus in ensuring energy security. The surge in CO2 emission allowances recorded since 2021 makes the financial condition of the power plants operating in these countries extremely difficult. Importantly, in Bulgaria, coal plays an important role in ensuring energy independence. Therefore, in line with the government's declarations, it is planned to reform the industry towards the use of coal in a more environmentally friendly manner (the use of carbon

capture and storage, CCS)[61]. Despite this, the government does not plan to launch new coal-fired power plants. The significant importance of coal in electricity generation also applies to Romania and Slovenia; in both of these countries, taking into account the importance of nuclear energy and renewables (hydroelectric power), the role of these energy resources in the balance sheet will increase due to the need to achieve EU objectives in the field of decarbonisation of the economy. Natural gas also plays an important role in the energy strategies of these countries, and the convenient geographic location (Slovenia) and planned infrastructure development (BRUA gas pipeline) will make it possible to use these commodities in the economy in the near future.

A slightly different energy policy is implemented in Croatia, where 66% of electricity produced already comes from non-fossil sources. In this context, the possibility of meeting the EU's CO2 targets is much simpler. In particular, Croatia attaches an important role to geothermal sources, as the potential in this regard is significant[62]. The dominant form of electricity production is generated by falling water, which means that the level of dependence on other energy carri-

61 M. Paszkowski, *Czarne złoto w odwrocie: sektor węglowy w państwach Europy Środkowej* (*Black gold in retreat: the coal sector in Central European countries*), "Komentarze IEŚ" 2021, no. 74, https://ies.lublin.pl/komentarze/czarne-zloto-w-odwrocie-sektor-weglowy-w-panstwach-europy-srodkowej/ [23.05.2021].

62 A. Richter, *Bids for all four geothermal exploration areas set up for tender in Croatia*, September 2, 2020, https://www.thinkgeoenergy.com/bids-for-all-four-geothermal-exploration-areas-set-up-for-tender-in-croatia/ [3.06.2021].

ers as well as the import of energy resources from Russia is limited.

In the Balkan states, strategies in the field of international cooperation are formulated in different ways. Slovenia, Croatia, Bulgaria, and Romania are EU member states, but in recent years they have made limited efforts to participate in the work of other international organizations. In this context, only Slovenia, as an OECD member state, could formally start applying for IEA membership. However, there is currently no work in this direction. The Balkan states only participate in the work of organizations with a nuclear profile (Nuclear Energy Agency). In addition, Bulgaria and Romania (from 2021) are members of the International Energy Forum (IEF), which aims to promote transparency and energy cooperation between the signatories to the charter. As a result, energy dialogue and participation in the work of international organizations are important components of the Balkan states' strategy. On the other hand, participation in cooperation platforms of a regional nature (the Three Seas Initiative) serves to develop a framework for regional and international cooperation. In this aspect, the key is the integration of energy markets in Central Europe and the creation of frameworks and platforms for cooperation with the US (as a counterweight to the position in the Russian region).

Summing up, it should be pointed out that the energy strategies of the Balkan states differ due to different eco-

nomic and political conditions. It is of vital importance that there is development of infrastructure and regional cooperation, mainly in the field of natural gas (gas supplies from Azerbaijan). The challenge, especially for Bulgaria and Romania, is, on the one hand, dependence on crude oil supplies from Russia, and, on the other hand, the need to modify the electricity generation structure. An important component of the strategy is increasing market transparency (EU regulations) and developing regional cooperation.

3.3. Prospects for reducing dependency and challenges for energy policies

Energy cooperation with Russia is treated differently in the Balkan states. While the refineries in Bulgaria and Romania largely process crude oil from this country, in Croatia, the supply of this commodity is not a priority. There is no cooperation in this area in Slovenia. The large share of Russia in the supply of crude oil to refineries located by the Black Sea is a consequence of both the need for processing optimalization (plants are adapted to the liquid fuels produced from that type of crude oil, which are familiar to Russia) and liquid fuel requirements in the region (a large share of diesel oil, not gasoline), and to a certain extent the availability of crude oil. Historical factors (close relations with Russia) made the oil industry of the Balkan states closely correlated with Russia's position and importance in the region. Nevertheless, the maritime location creates opportunities

for a greater diversification of the sources and directions of crude oil supplies, although the costs of import in such cases may be higher. This situation, in consequence, affects the source of this commodity. As part of the implemented energy policy, refineries in Bulgaria and Romania are also supplied with grades from locations such as Azerbaijan, Iraq, and Libya. However, the Turkish Straits are a certain limitation (high fees for passing ships affect the financial conditions for purchasing crude oil). The situation is slightly different in Croatia, where the unfavourable market environment and the high availability of liquid fuels in the region place the plant in Rijeka in a difficult position (only modernization can improve the financial conditions of the plant). The EU regulations also mean that the margins obtained are relatively low. In these circumstances, plants in the Balkan countries operate under great pressure from plants in the Middle East and the former USSR region (mainly Russia). Additionally, it should be noted that the sea location and the existing oil terminals ensure that the supplies of ready-made fuels are ensured, so in fact the level of Russia's influence is somewhat reduced. At the same time, along with the expansion of the quay in the port of Ploče in Croatia, the volume of reloaded liquid fuels will increase, and the planned construction of liquid fuels and LPG tanks will strengthen energy security[63].

[63] Three Seas, *Oil and Gas Terminal in Port of Ploče*, https://projects.3seas.eu/projects/oil-and-gas-terminal-in-port-of-ploce [30.05.2021].

The situation in the context of natural gas supplies is somewhat different, as Russia has for years been striving to maximize the energy impact in the region and, to this end, all projects enabling the diversification of sources and directions of supplies of this commodity are being limited. Thanks to the commissioning of the TurkStream gas pipeline, a large amount of natural gas is still available in the region, supplied not as in the past by Ukraine, but now via Turkey. For Bulgaria in particular, the perception of threats has undergone a significant redefinition – from a country dependent on natural gas from Russia to one of the most important energy partners and pillars of natural gas transit to Europe. The commissioning of the TANAP and TAP gas pipelines means that gas from Azerbaijan is already available in the region and, thanks to regasification terminals in Greece (Revithoussa LNG, Alexandroupolis LPG – under construction) and Turkey (Marmara Ereğlisi LNG, Botaş Dörtyol LNG, and Egegaz Aliağa LNG), the chance to buy natural gas from other directions increases. When the IGB gas pipeline is put into operation, Bulgaria will play a key role in the regional natural gas market. As a result, the likelihood of suspending deliveries to the Balkan states and the potential negative consequences of such an event will decrease. Romania will play a limited role due to the end of the transit of natural gas from Russia to the Balkan countries (via

Ukraine and the Trans-Balkan gas pipeline). Romania's level of energy security will be enhanced by the planned development of natural gas fields in the Black Sea. At the same time, the construction of the BRUA gas pipeline would increase the integration of Central European markets, however, unfortunately, investment problems such as the resignation of two Hungarian companies from the already-reserved capacity on the border between Hungary and Romania in July 2020, meant that the project will probably be delayed. In addition, in the Adriatic Sea region, the expansion of the Slovenia-Hungary interconnector is of key importance, as it will enable Slovenia to increase access to various sources of natural gas from southern Europe.

The shape of the demand and the consumption trends of liquid fuels and natural gas influences the perception of threats and the implemented policy, the more so as their consumption in the Balkan states has grown significantly in recent years (and, as a result, so have imports). Additionally, the COVID-19 pandemic had an impact on the level of consumption of individual energy carriers, causing a decrease in fuel consumption (the effect of lower transport of goods and holiday travel to southern Europe) and an increase in natural gas. This is a consequence of, among other things, lower prices on the exchanges of this commodity, which has successfully competed with coal and nuclear energy. In the coming years, we can still expect an increase in the

consumption of natural gas, as well as – in the short term – liquid fuels (economic recovery).

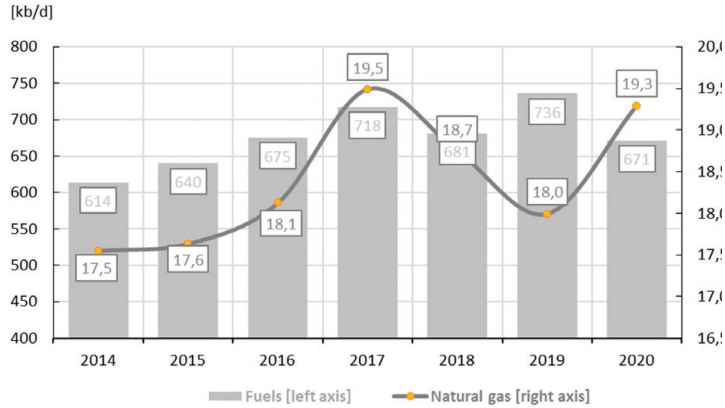
In the Balkan countries, the development of the sector of vehicles with alternative engines to internal combustion is in its initial phase. The ongoing and projected economic recovery will only partially increase the popularity of this type of transport, regardless of the strong incentives from governments to promote electric cars, because the lack of extensive infrastructure is still an obstacle. As a consequence, in 2019 the share of BEV and PHEV vehicles in the average car park was small (Croatia – 0.2%, Bulgaria – 0.2%, Romania – 0.2%, Slovenia – 0.3%)[64]. Nevertheless, taking into account government programs in the future, it will be a sector that is constantly evolving, and thus will affect the level of fuel demand. At the same time, this tendency will be influenced by the change in the age of the car fleet, which is currently one of the oldest in Europe (Croatia – 14.6 years, Bulgaria – 15.5 years, Romania – 16.5 years, Slovenia – 11.7 years)[65]. Along with the change of vehicles, the efficiency of internal combustion engines will also increase and, consequently, the demand for liquid fuel will decrease.

The most important tasks facing the Balkan countries include changing the structure of the energy balance, including reducing the share of coal in favour of renewables

64 European Automobile Manufacturers' Association, *Average age*…

65 European Automobile Manufacturers' Association, *Passenger car fleet*…

Chart 3. Demand for liquid fuels and natural gas in selected Balkan countries (2014-2020)



Source: Author's own work based on Joint Organizations Data Initiative, https://www.jodidata.org/ [6.06.2021].

(mainly in Bulgaria and Romania). In this context, support programs for the development of these energy resources (in particular solar and wind energy) have been being developed for years. The ongoing energy transformation will require appropriate financial resources, and EU programs will support these tasks and help in their implementation. Bulgaria, Romania, and Slovenia are in a convenient situation due to the use of nuclear energy in their economy. These countries are striving to increase electricity generation from existing power plants and plan to build new and modernize the existing ones.

In conclusion, it should be noted that the situation in the Balkans has changed significantly over the past few years, also under the influence of Russia's actions. The TurkStream

gas pipeline under construction was intended to bypass Ukraine, but under the influence of the EU, it was subject to regulations that limit its possible negative consequences for the countries of the region (local operators are responsible for the construction and operation of individual sections of the pipeline, among others). Undoubtedly, the Russian project coincided with the expansion of the LNG terminals and the construction of the TANAP and TAP gas pipelines (gas supplies from Azerbaijan). Due to such conditions, the level of Russia's influence in this part of Europe has decreased. Nevertheless, the high availability of natural gas in the region remains a key threat. In the context of crude oil supplies, technological issues and the lack of viable alternatives will play a major role in Russia's position in Bulgaria and Romania, but much less in Croatia and Slovenia.

Conclusions

The Central European countries are to a different extent dependent on crude oil and natural gas supplies from Russia, which is a consequence of various historical, economic, and political conditions. The specificity of the energy systems of the Baltic states, the Visegrad Group, and the Balkans is different, and as a result, the share of these commodities in energy balances is also different. Over the years, the cooperation with Russia has been influenced by the infrastructure existing in the region, which prevented or significantly limited the creation of a balanced structure of energy imports. For a long time, the individual countries of Central Europe

have been taking active steps to change the unfavourable conditions by developing supply logistics and building new underground storage and infrastructure connections. Legal regulations (in many cases formulated on the EU forum) are also of key importance in this respect, as they allow for increased transparency and competitiveness, and thus limit Russia's monopoly position in the region. In addition to creating new infrastructure, cooperation with producers of energy resources (e.g., the USA, Norway, or Qatar) is also important.

Threats resulting from the suspension of crude oil supplies to the Baltic states are limited, but for the refinery operating in Lithuania, market conditions (low margin levels) are a problem. The availability of liquid fuels may be ensured, inter alia, via sea oil terminals or rail links with refineries in the region. In the context of natural gas supplies, the existing (LNG terminal in Klaipeda, BalticConnector gas pipeline) and developed infrastructure (GIPL gas pipeline, LNG terminal in Hamina) give the Baltic states a chance to create a real counterbalance to the supply of energy resources from Russia in the Baltic states. It is the natural gas sector that is of critical importance, and its politicization means that the efforts of the Baltic states are focused on reducing dependence on imports of this commodity from Russia. Additionally, for Estonia, along with the process of phasing out the use of oil shale, redefining the structure of the energy balance will be a great challenge. Therefore, measures

aimed at the use of renewables and electricity rather than natural gas would be more beneficial.

Due to the existing infrastructural conditions, the countries of the Visegrad Group are exposed to the energy impact of Russia. The crude oil processed in the refineries comes primarily from Russia, and while there are (to a limited extent) alternative supply routes, they are not fully used. The costs of importing this commodity and its availability are of key importance in this respect. The energy threats are real, as evidenced by the 2019 oil crisis and so, in the context of natural gas supplies, the market of the Visegrad Group countries has undergone a huge change. The existing and developed infrastructure creates the basis for increasing the availability of natural gas from various producers in the region. Nevertheless, Russia's pressure in the region remains high, which is a consequence of the ongoing investments. The only counterbalance to these threats is, on the one hand, the further development of the infrastructure, and, on the other hand, the pursuit of greater market transparency.

With regard to the Balkan states, efforts have been made for years to build a more diversified structure of energy imports. Activities are primarily undertaken in the field of natural gas supplies, as the lack of EU funds limits the implementation of oil projects. In Croatia and Slovenia, the complex environment means that imports of liquid fuels are starting to play an increasingly important role, while in the coming years Russia may be expected to maintain

its key position in the supply of crude oil to refineries in Bulgaria and Romania. With regard to natural gas supplies, infrastructure has been undergoing expansion for many years. Planned or already implemented projects will have an impact on the energy sector and will positively affect the possibility of implementing the diversification strategy.

Consequently, it is important for Central European countries to carry out activities in various areas aimed at both changing the structure of crude oil and natural gas supplies and reorganizing the structure of energy markets towards a greater share of other forms of obtaining electricity. An important component in this is also participation in the work of international organizations and regional cooperation platforms. Along with the decrease in the share of liquid fuels used in private and public transport in favour of electric vehicles, the importance of crude oil in the economy, and thus the level of dependence on supplies of this commodity from Russia, will decrease. Also, greater use of renewables and nuclear energy, along with the process of phasing out coal, will be aimed at reducing the share of natural gas in the economy. In the near future, this commodity will remain an important component of the energy transformation as an indirect energy carrier, while the full reorganization of the energy sectors will only take place in the next dozen or so years.

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