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The geopolitical dimension of gas security in the European Union

Abstract: The objective scope of the analysis performed in the text encompasses the energy security in the European Union and its member states, and includes the perspective of geopolitical conditions. The geopolitical conditions should be understood as a variety of relations between geographical conditions and decision-making processes concerned with energy security. The main objective of the text is to present a selection of theoretical problems encountered in the study of energy security, as well as to link them with such issues as gas import dependence and the risk of gas supply disruptions, mainly from the Russian direction. In order to elaborate the objective scope of analysis, the following research questions are presented: (1) To what extent do geographical conditions determine decision-making processes in the energy policy pursued by the European Union?; and (2) To what extent do geographical conditions determine threats to the security of gas supplies to the European Union and its member states? The text is chiefly an overview, but the theoretical part loosely makes use of the premises of the research program concerned with the integration of knowledge as part of the studies of energy security and energy transitions, presented by E. Brutschina, A. Cherp, J. Jewell, B. K. Sovacool and V. Vinichenka. Additionally, knowledge contained in the literature on energy and gas security has been synthesized and enriched with a critical approach, and the author's own assessments and conclusions.

Key words: energy policy, energy security, gas security, gas supply security, the European Union

The objective scope of the research problem is concerned with energy security in the European Union and its member states in the context of geopolitical conditions. The issues concerned with energy security are exemplified here with a selection of aspects related to gas supply security. The starting point for the discussion undertaken in the text is defined by terminological, categorial and theoretical issues which concern the concept of energy and gas security as well as geographical conditions. It is presupposed that it is possible to demonstrate the interrelation or direct causal relation between geographical conditions and the processes of making decisions

about energy security (and, more broadly, energy policy). These kinds of relations and interrelations have been covered with one common category of geopolitical conditions. The crucial geographical conditions have been recognised as including spatial conditions and the potential of the energy resources found in the European Union and its individual member states.

The main objective of the text is to present a selection of terminological, categorial and theoretical problems encountered in the study of energy security, as well as to link them with such issues as import dependence, diversification and scenarios of gas supply disruptions. In order to elaborate the objective scope of the research problem, the following research questions have been addressed in the text: (1) To what extent do geographical conditions determine decision-making processes in the energy policy of the European Union?; and (2) To what extent do geographical conditions determine threats to the security of the gas supply to the European Union and its member states?

The text is primarily an overview of a conceptual character with regard to the analysis of gas security in the European Union. The analysis makes selective use of the premises of the research program integrating knowledge as part of the studies of energy security and energy transitions, as presented by E. Brutschin, A. Cherp, J. Jewell, B. K. Sovacool and V. Vinichenka (Cherp, Jewell, 2011, pp. 202–212; Cherp et al., 2018, pp. 175–190). Additionally, the knowledge contained in the literature on energy and gas security has been synthesised. The analysis of the collected and processed material and of the literature has been supplemented with the author’s own conclusions and evaluations. A critical approach to the presented issues has been adopted; the approach has been supplemented with an analysis of import dependence, diversification and scenarios of gas supply disruptions in the European Union and its member states. Besides scientific literature and popular scientific literature, the text also makes use of reports by BP, ENTSO-G, Eurostat, the European Commission, Gazprom and IEA.

1. Preliminary issues

1.1. The concept of energy and gas security

It is to be noted that, despite a multitude of presented definitions, the category of energy security has not been unambiguously delineated and

separated from other similar categories. This can be illustrated with the interchangeable use of the categories of energy policy and energy security, which results in analyses making use of identical features that are expected to characterise them, or indexes whose values are expected to serve as evaluation points. As regards quantitative research, this results in a multitude of operative definitions of the categories of energy security which have specific features, along with their representative indexes attributed to them, the effect possibly being varying scales of energy security and their evaluations. There is no doubt that, in the context of quantitative research, widespread investigation is being conducted with regard to the issue of the construction of synthetic indexes of energy security, which are an effect of the combination of other statistical values that are measurements of various parameters recognised as relevant by individual researchers. Statistical research also makes use of other instruments characterising energy security, e.g. methods of multidimensional comparative analysis or methods of quantitative forecasting. In the studies of this kind characterization of energy security makes use of the following indexes: a level of energy resources, energy production, energy consumption, a share of individual energy carriers in the structure of energy production or consumption, energy import, diversification of energy supply, emissions performance of the energy sector or of individual energy carriers, emissions performance of other sectors than the energy sector, energy efficiency, the condition of the energy infrastructure (e.g. generating units, transmission and distribution lines of electricity or fuels), the innovativeness level of the economy (including the energy sector), the structure of the energy market, energy prices, fiscal burdens applying to the energy sector or energy end users, and energy poverty (Baumann, 2008, pp. 4–12; Gupta, 2008, pp. 1195–1211; Kruyt et al., 2009, pp. 2166–2181; Chester, 2010, pp. 887–895; Löschel, Moslener, Rübbelke, 2010, pp. 1665–1671; Stirling, 2010, pp. 1622–1634; Vivoda, 2010, pp. 5258–5263; Sovacool, Mukherjee, 2011, pp. 5343–5355; Frondel, Ritter, Schmidt, 2012, pp. 29–42; Sovacool, 2012, pp. 835–840; Pach-Gurgul, 2013, pp. 85–106; Sharifuddin, 2014, pp. 574–582; Obadi, Korček, 2017, pp. 113–120; Rosicki, 2017, pp. 45–60).

In the analysis of the issues concerned with energy security, literature from the field of the political and economic sciences frequently resorts to a device whereby it presents various energy structures of states and regions, the level of import, as well as the influence of external and

internal political factors on decision-making processes within the energy industry. As for the latter, political processes in the energy industry are presented by way of highlighting either institutional solutions or the activities of various socio-political actors viewed as formal or informal interest groups. As for international issues, attention is drawn to the fact of the existing threats to energy supplies on account of import dependence on other countries. Hence, energy diversification in respect of directions as well as sources of supply is an indispensable element in energy security. A good example is furnished by the European Union and its member states, which on account of their limited reserves are dependent on the supply of energy resources, not infrequently from regions that are hardly stable in political terms. What is more, just like in the case of gas, the problem of resource supplies is becoming a crucial problem of energy solidarity in the European Union itself, and is also constituting a subject of political and geopolitical conflict in the region. It is noteworthy that energy as such is viewed by some analysts as an instrument of foreign policy, or even as a unique kind of weapon, which can be particularly seen in the case of the “policy of gas pipelines” pursued by the Russian Federation in the territory of Europe (cf. Wasilewski, 2004, pp. 95–120; Paniuszkin, Zygar, 2008; Ostant, 2009, pp. 1–7; Donaj, 2010, pp. 171–195; Kałążna, Rosicki, 2010, pp.165–214; Söderbergh, Jakobsson, Aleklett, 2010, pp. 7827–7843; Donaj, Kucenko, 2011, pp. 335–350; Smith Stegen, 2011, pp. 6505–6513; Mareš, Laryš, 2012, pp. 436–448; Ostant, 2012, pp. 154–173; Rosicki, Rosicki, 2012, pp. 139–156; Kratochvíl, Tichý, 2013, pp. 391–406; Austvik, 2016, pp. 372–382; Mitrova, Boersma, Galkina, 2016, pp.19–28; Motowidlak, Motowidlak, 2016; Vatansever, 2017, pp. 1–11).

Reports on the energy policies pursued by individual member states, as presented by the International Energy Agency (IEA), may serve here as an example illustrating attempts at distinguishing between the categories of energy policy and energy security for analytical purposes. In selected reports, an energy policy is understood as established energy structures, energy production, structures of energy import and export, a condition of energy efficiency and action undertaken for the sake of it, the structures and workings of energy markets, institutions and legal regulations concerned with the energy sector. As regards energy security, it is reduced to the level of deposits of energy resources, the structure of energy diversification (import dependence, the geographical diversification of energy import and the level of internal energy diversification), the energy in-

frastructure and emergency response mechanisms with regard to energy supply disruptions.[1]

A synthetic approach to the category of energy security is presented by Aleh Cherp and Jessica Jewell in the text entitled *The three perspectives on energy security: intellectual history, disciplinary roots and the potential for integration*, which in itself is a research program geared towards the integration of knowledge acquired by way of several different research perspectives.[2] According to the authors, the three main research perspectives on energy security should include the findings of the political, life, technical and economic sciences. To each one of these disciplines Cherp and Jewell attribute particular paradigms of research on energy security. In the case of the political sciences *sensu lato*, sovereignty is the research paradigm. As regards the life and technical sciences, the paradigm focuses on the reliability and stability of energy supply from the technical viewpoint, as well as the viewpoint concerned with access to the deposits of energy resources. As for the latter case, that is the economic sciences, the paradigm is chiefly about flexibility and resilience to energy market crises. To each one of the above-mentioned research perspectives one can ascribe historical landmarks denoting the beginning of the discussion of a particular approach to energy security in the individual disciplines. And thus we have: the oil crisis of the 1970s (sovereignty), breaches of the energy infrastructure, power supply failures and diminishing resources (the reliability and stability of the energy supply, and access to resources), liberalisation of energy markets (flexibility and resilience of energy systems) (Cherp, Jewell, 2011, pp. 202–212).[3]

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[1] Statements based on the analysis of selected reports on energy policies pursued by individual IEA member states in 2010–2019.

[2] An elaborate version of this concept can be found in chapter five of the extensive research paper entitled *Global Energy Assessment: Toward a More Sustainable Future* (Gomez-Echeverri, Johansson, Nakićenović, Patwardhan, 2012).

[3] However, it must be pointed out that, contrary to the propositions by Cherp and Jewell, it is not specific political problems that gave rise to the three perspectives on energy security, but individual disciplines themselves narrowed the issues of energy security down to the three perspectives, or research fields, which as a matter of fact the authors in question do for their own use. These processes are connected with the very essence of the development of science at the level of institutions and individual research communities. As for the former, it is noteworthy that the research scope of a discipline is most often delineated with the aid of organisational, educational and practical criteria, unlike entire fields of science, which are demarcated with the aid of methodological and logical criteria. Hence, the demarcation of, *inter alia*, the study of security and study

A similar logic of the synthesis of knowledge of energy security actuated the consolidation of knowledge of energy transitions, which was performed by Cherp and Jewell along with Vinichenka, Brutschin and Sovacool. By and large, one can recognise that the synthesis of theoretical findings about the study of transformation constitutes an extension of the issue concerned with the category of energy security in a processual approach. These authors took into consideration three kinds of changes in their analysis: (1) energy transfer in the energy production and consumption system, (2) the use of technology in energy production (material mining, energy conversion and use), and (3) decision-making processes in politics. Individual changes were linked with three kinds of systems: (1) a techno-economic system, (2) a socio-economic system, and (3) a political system. Identifying the three main systems also results in a presentation of the three main theoretical trends. The first one is a techno-economic trend; the second – socio-economic, and the third – political. These trends in the research into energy processes and changes were associated by Cherp, Jewell and their colleagues with specific scientific disciplines. Therefore, one can recognise that the consolidation of knowledge of both the research into energy security and energy transitions presents the same kind of methodological aesthetics (Cherp et al., 2018, pp. 175–190).

Irrespective of the willingness to integrate the study of energy security and to create a meta-theoretical framework for the analysis of energy transitions shown by Cherp and Jewell and other members of their team, it should be pointed out that political action in the field of various challenges to energy security was undertaken regardless of the existence of three or more research perspectives. This results from the fact that in the practice of decision-making processes all the emphasised spheres of chal-

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of international relations is more of an instrumental and pragmatic character. A possible effect may take the form of research conducted within institutionally locked-in disciplines. This process may be termed *purification*, to abuse Latour’s category. As for the latter, it is appropriate to refer to Fleck’s concept whereby he pointed to the existence of a special kind of style of thinking pursued within research communities. On the one hand, the thought styles found in research communities socialise their members by imposing specified normative-methodological systems; on the other hand, they exclude and depreciate competitive thought styles. As for the study of energy security, individual research perspectives may primarily follow from the educational background of individual researchers (e.g. humanities, social, technical or life sciences) (see: Woleński, 1975, pp. 32–57; Woleński, 1981, pp. 3–11; Fleck, 1986; Klementewicz, 1992, pp. 95–106; Klementewicz, 1994, pp. 73–82; Woleński, 2009, pp. 163–175; Latour, 2011; Afeltowicz, 2012, pp. 47–68; Wegmarshaus, 2013, pp. 40–51).

lenges to energy security intertwine and problems related to them necessitate effective and comprehensive solutions, of course while taking into account the conditions and possibilities afforded in a given period.

Undoubtedly, security of energy supply provides a foundation for the definition of energy security. In the political sciences, security of energy supply is associated with the issues of energy sovereignty. Presenting the oil crisis in the 1970s as a watershed moment in the discussion of the subject is debatable. It appears that the right thing to do is to extend the historical research in this scope, because historical examples concerned with reflection on the subject of supply security and threats related to the depletion of energy resources abound. Of great significance here are early publications on military and territorial conflicts concerned with energy resources. Oil appears to be a good example, because it became a geostrategic resource during the First World War, and its military significance rose in the 1930s. At this point it is worth mentioning an 1865 publication by W. S. Jevons entitled *The Coal Question; An Inquiry Concerning the Progress of the Nation, and the Probable Exhaustion of Our Coal-Mines*, and a reporter’s study by A. Zischka entitled *Der Kampf um die Weltmacht Öl* (1934), *Wissenschaft bricht Monopole. Der Forscherkampf um neue Rohstoffe und neuen Lebensraum* (1936), and *Ölkrieg – Wandlung der Weltmacht Öl* (1939). Among the same publications reckoned can be *The Oil War* (1926) by A. Mohr and *Oil Imperialism: The International Struggle for Petroleum* (1927) by L. Fische; this selection is, however, subjective (see: Jevons, 1865; Maunsell, 1897, pp. 528–532; Sykes, 1921, pp. 101–116; Slade, 1923, pp. 251–258; Ise, 1926; Mohr, 1926; Fische, 1927; Zischka, 1934; Zischka, 1936; Zischka, 1939; Denovo, 1956, pp. 854–876; Jensen, 1968, pp. 538–554; Mejcher, 1972, pp. 377–391; Kent, 1976; Anderson, 1981; Stivers, 1981, pp. 517–540; Stivers, 1982; Reguer, 1982, pp. 134–138; Venn, 1986; Clark, 1987; Fitzgerald, 1994, pp. 697–725; Madureira, 2010, pp. 75–94; Gibson, 2012).

Security of supply was linked with a simple conception of meeting energy needs, but it quickly turned out that this way of thinking was too narrow, as it referred to the category of state only. Such a conception of security was arguably greatly affected by the essence of the so-called industrial wars, where during periods of military threat political and military entities administered individual economic sectors as part of comprehensive wartime economy. A natural consequence of the threat of war is the militarisation of other sectors, e.g. the transport and energy sectors, because they make wartime logistics effective.

As more and more spheres of social life became securitised, the problem of the security of energy supply came to be considered in terms of individual entities too. Securing the energy supply for (state, social, economic and individual) entities became an immanent part of the definition of energy security. It is to be posited that energy security is about securing – for the common good and effective working of the economy – physically uninterrupted access to a variety of energy sources (resources, processed products, electricity, heat, etc.) at prices affordable for the end users. Further securitisation processes gave rise to more profound reflection on natural environment protection, and that is why the above-mentioned securing of the energy supply should be effected while taking into account the condition of the natural environment, the ecological system and the principles of sustainable development. Taking into account individual end users in the whole chain of energy security directed attention to the phenomena of energy poverty and energy justice (cf. Chester, 2010, pp. 887–895; Kałążna, Rosicki, 2010, pp. 14–29, 129–164; Sovacool, Mukherjee, 2011, pp. 5343–5355; Rewizorski, Rosicki, Ostant, 2013, pp. 17–92; Sovacool, Dworkin, 2015, pp. 435–444.; Jenkins et al., 2016, pp. 174–182; Zha, 2016, pp. 134–153; Pesch et al., 2017, pp. 825–834; Gryz, 2018, pp. 21–45; Podraza, 2018, pp. 46–68).

By holding loosely onto the concept of energy security and energy transitions by Cherp, Jewell and their colleagues, one can point to the main elements of gas security in the European Union (Cherp, Jewell, 2011, pp. 202–212; Cherp et al., 2018, pp. 175–190). The institutionalisation of energy policy within the European Union (or its institutional predecessors) involves – albeit not without difficulty – overcoming of the paradigm of the energy sovereignty of the individual member states, maintenance of the reliability and stability of energy supply as well as access to new energy sources, and development of flexibility and resilience of the gas market. The manifestation of these political and economic processes in the European Union took the form of the construction of an energy union, that is, a common energy market, including a gas market. In other words, mechanisms for the working of a transparent and competitive gas market are being developed. In this context it must be assumed that the common gas market should be based on competitiveness; a competitive market cannot exist without a uniform market; a market characterised by such features cannot be created without the proper infrastructure. Still, it must be borne in mind that the continued socio-economic development of the European Union leads to an increased demand for energy, which

in turn requires demand management and increased energy efficiency, including efficiency of gas use. This also means that gas is becoming an “energy” of the *backstop resource* type (*backstop technology*). Compared with coal and other hydrocarbons, gas is becoming a resource facilitating a transition towards a future increase in the significance of renewable energy sources. At the same time, from the perspective of the paradigm of energy sovereignty, a lack of substantial gas resources in the European Union contributes to an internal threat (egoisms or national interests of member states) and an external threat (a geopolitical threat to the whole of the European Union or its individual member states).

1.2. The concept of geopolitical conditions

Geopolitical conditions are recognised as factors influencing decision-making processes within the energy policy in the European Union and the individual member states. The significance of the geopolitical factors results from adopting the presupposition of the relationship between particular geographical conditions and the decision-making processes engaged in by political, economic and social entities. Identifying those geographical conditions that have direct or indirect relevance for decision making as part of energy policy *sensu lato* is a moot point. Still, one can point to the most recognisable and widely accepted geographical conditions which include location, atmospheric conditions, natural resources (organic and inorganic, renewable and non-renewable ones) and populations (cf. Agnew, 1998; Czajowski, 1998, pp. 97–111; Gołębski 2003, pp. 157–171; Jean, 2003, pp. 31–59; Parker, 2008, pp. 3–23; Radcliffe et al., 2010, pp. 98–116; Sykulski, 2014, pp. 11–51).

Assuming that geographical conditions have an effect on decision-making processes as a part of policies, including energy policy, is not tantamount to the position of classical geographical determinism, where geographical factors are of an ultimate and autotelic character. This stipulation results from the awareness of the existing distinction between an interrelation and a direct causal relation. This stipulation is also relevant on account of various theoretical perspectives which have been adopted on the grounds of the studies of space, e.g. social constructivism. Undoubtedly, it was the racial-anthropological current, or more generally Eurocentrism in socio-political thought that contributed to the unfavourable reception of geographical determinism. Therefore, it is to be assumed

that the geopolitical conditions addressed in the text do not constitute a straightforward function between space, technology and policy. Space, technology and policy are rather extensive sets composed of smaller elements, and – what is more – they are all subject to continual processes of translation and social production. At the same time, they are a way of imposing a model of reality perception, and in this case – a model of geopolitical conditions (Davis, 1906, pp. 145–160; Peet, 1978, pp. 360–364; Peet, 1985, pp. 309–333; Jałowiecki, 1988; Lefebvre, 1991; Bassin, 1992, pp. 3–22; Driver, 1992, pp. 23–40; Frenkel, 1992, pp. 143–153; Sluyter, 2003, pp. 813–817; Peet, Watts, 2004; Bassin, 2007, pp. 351–374; Radcliffe et al., 2010, pp. 98–116; Meyer, Guss, 2017).

Spatial conditions and the potential of resources are of the greatest significance for the analysis addressed in the text. This results from the fact that spatial conditions, understood as a set of limiting or enabling factors, come to be reflected in the decision-making process as part of the energy policy *sensu lato* of the European Union and its individual member states. It appears that the recognition of the existing relation between the potential of energy resources in one’s possession and the decisions as to the energy policy is not a matter open to any doubt. For instance, if the European Union, when compared to other regions, does not possess large energy resources, then this objective state of affairs will naturally result in some remedial measures being sought, e.g. investments made in search of new deposits, the development of the infrastructure providing supplies from other regions, the development of new energy technologies, raising environmental awareness, etc. Large quantities of energy resources make for stability of supply security, but as certain countries become dependent on solid fuels (which is the case of Poland), such a state of affairs may give rise to problems concerned with a flexible transformation of the energy system because of a number of negative factors resulting in a lock-in on the path of technological development.

In addition, one may point out that specific geographical conditions, such as a small territory, no access to sea, insular location, etc., influence infrastructural solutions, e.g. the development of transmission infrastructure, LNG terminals and RES infrastructure. A specific location or other geographical conditions in connection with a lack of energy resources result in a high level of imported energy resources, but also in a susceptibility to all manner of threats to the supply logistics and security.

It is also worth drawing attention to the interaction between political factors as well as factors concerned with a specific geographical situation,

and by extension geographical conditions. This can be exemplified by the consequences of the Polish-Russian relations which influenced the construction of the Nord Stream I and II gas pipelines. Other examples can be furnished by the Silesian Wars 1740–1763, the oil crises of the 1970s and 1980s, the Falklands War of 1982, the Iraqi-Kuwaiti conflict of 1990, or the Russian-Ukrainian gas conflicts (cf. Henderson, 1958; Hochedlinger, 2013; Middlebrook, 1986; Klare, 2006; Barnett, 2012; Middlebrook, 2012; Szabo, 2013; Gędek et al., 2015, pp. 65–80).

2. Gas security in the European Union

As mentioned before, in the present analysis the greatest significance in the assessment of the geographical conditions determining decision-making processes in the energy policy pursued by the European Union and its member states is associated with spatial conditions and the potential of resources. In this context, the spatial conditions determine the logistics of gas supply, because the transmission, distribution, storage and generation infrastructure depends on them. Therefore, specific spatial conditions may thus become factors that either limit or consolidate gas supply security. A lack of domestic gas resources determines gas import or the use of other sources of energy with a view to securing energy supply. And thus individual decision-making processes in the energy policy of the European Union and its member states result from independent factors – in this case, geographical conditions – but also from those of a dependent character. As for the latter, dependent variables include processes resulting from the action of political and social entities, the outcome of which is the energy policy of the European Union and its individual member states. A good example of the intertwining of the thus defined independent and dependent variables is the problem of the construction of Nord Stream I and II. These projects result from both geographical and political conditions that can be found in the individual member states and the European Union.

According to the BP methodology, in 2018 the EU member states had a 0.6 per cent per cent share in the global natural gas proven reserves. By comparison, in the same period Russia had a share of almost 20 per cent of the proven global natural gas reserves. According to the statistical index of reserve adequacy, the EU gas reserves would be exhausted in 10–15 years. At this point it is also noteworthy that the EU-28 is not

the largest gas consumer in the world; the Middle East and the US account for larger consumption, while Russia consumes more or less the same amount as the EU-28 (*BP Statistical Review of World Energy*, 2019, pp. 30–41).

Since the beginning of the 1990s, and thus for over two consecutive decades, the import of gas to the European Union has risen, allowing for temporary drops and rises in import. Undoubtedly, development of new technologies and gas transmission infrastructure has great relevance for the changes in the structure of gas import. The development of LNG and CNG technologies will be coupled with the diversification of directions and sources of gas supply to the European Union. Compared with 1995, in 2015 gas import to the European Union was higher by more than 82 per cent, and the intra-Union import was higher by 124 per cent. As we compare the import from outside the European Union in 2015 with the import in 2000, one can see an increase of more than 35 per cent, and the intra-Union import increased by more than 68 per cent. A comparison between the mid-1990s and the mid-2010s shows a marked drop in the percentage share of the import structure from the Russian direction – from 61.2 per cent to 37 per cent. At the same time there is an observable increase in the significance of gas import from the northern direction. Still, a comparison of the scale of the import of Russian gas in 2015 with the import in 2000 shows an increase of a mere 2 per cent. At the same time, the import from Norway increased by almost 114 per cent, and from Algeria by almost 7733 per cent.[4]

The top ten largest importers of gas to the EU-28 in 2015 included only two countries from Central Europe – the Czech Republic and Poland. In descending order, Germany, Italy, France, the UK and Spain had the largest shares in the EU import. All the listed countries had a share of 70.7 per cent in the overall structure of import to the EU-28. A comparison between the import structure in 2015 and the one in the mid-1990s shows that the order of the first countries has not changed. In that period a significant increase was registered by the UK – by 36.1 Mtoe, Germany – by 30.6 Mtoe, the Netherlands – by 24.4 Mtoe, Italy – by 21.6 Mtoe, Spain – by 20.7 Mtoe, and France – by 11.4 Mtoe.

[4] The percentage calculations have been made by the author on the basis of Eurostat actual data. While performing the analysis it is also worth paying attention to the large scale of unverified (in the Eurostat statistics) directions of gas supply – in 2015 supplies of this type accounted for a 6.3 per cent share in the overall structure of import directions.

Thanks to the analysis of the upward trend in gas consumption in the individual member states of the European Union, one might conclude that this fuel is becoming an instrument of substitution for solid fuels and nuclear energy, as well as a mechanism of support for a low-emission energy transformation.[5]

Both the Central European countries and other countries are typically characterised by a high index of import dependence with regard to petroleum and petroleum products, as well as gas. Therefore, this points to a high level of dependence on hydrocarbons in the EU-28. Still, there are countries with a negative value of the index of gas import dependence – Denmark and the Netherlands. Even though such cases are not to be found in the group of Central European countries, the index value of Romania – as a country belonging to the group – remains the lowest (1.8 per cent). A characteristic feature of the Central European countries is also a high level of dependence on supplies from Russia. As we consider the level of import dependence on hydrocarbons from Russia in the individual European Union member states in four brackets (0–25 per cent, 25–50 per cent, 50–75 per cent and 75–100 per cent), one can conclude that among the eleven Central European countries as many as nine are dependent on import from Russia in the 75–100 per cent bracket. This means that when compared to the others, the Central European countries are significantly dependent on import from the Russian direction. The other group includes two cases like this – Austria and Finland. The situation of these countries results from a number of factors, *inter alia*, their geographical location and a policy of cooperation with Russia. The Central European countries are also largely dependent as regards import of petroleum and petroleum products, which comes to be expressed in the fact that in the case of three countries, the share of the Russian direction was above 75 per cent (Bulgaria, Estonia and Slovakia), and in the case of four countries – in the 50–75 per cent bracket. A different situation is to be found in the group of Scandinavian countries, Benelux countries, small insular countries, Southern European countries and the other Western European countries – except for Finland all these countries have a share of 0–25 per cent (Dickel et al., 2014, pp. 1–75; *Energy Policies of IEA Countries: European Union...*, 2014, pp. 175–176; *Europe increasingly dependent on oil imports...*, 2016; Shiryaevskaya, Krukowska, 2018; *EU imports of energy products*, 2019).

[5] The analysis is based on Eurostat data.

With the benefit of the above-mentioned data set, one can note a general regularity whereby the more distant from Russia a given country is, the lower the country’s share in the import of hydrocarbons is. Latvia is an exception here, because the Russian share in the country’s import of petroleum and petroleum products remains below 25 per cent. The dominance can also be seen in the case of companies supplying hydrocarbons to the EU-28 – the group of ten petroleum suppliers includes three Russian economic entities, i.e. Rosneft, Lukoil and Gazprom (*Europe increasingly dependent on oil imports...*, 2016; Shiryaevskaya, Krukowska, 2018; *EU imports of energy products*, 2019).

The import dependence should be distinguished from the quantitative scale of the import of gas to the European Union, and its distribution by individual countries. With this perspective in mind, one can see that in 2017 the largest gas importers – in this respect dependent on Russia – were the following countries not belonging to Central Europe: Germany (67.1bn m^3), the UK (29.1bn m^3), Italy (23.7bn m^3), France (13.3bn m^3) and Austria (9.8bn m^3). As for Central Europe, Poland (10.5bn m^3) and Hungary (7bn m^3) were the largest importers. It can clearly be seen that the division is inversely correlated with the division by the value of the indexes of gas import dependence (*Gazprom Annual Report*, 2017; *Gazprom in Figures 2013–2017*, 2017).

Despite the development of LNG and CNG technology and infrastructure in the European Union, the transmission infrastructure used for trading in and importing gas from countries outside the European Union continues to play the dominant role. For instance, according to BP data, the volume of gas traded over the EU gas pipelines reached approx. 420bn m^3, 40 per cent of the gas being imported from Russia and 27.2 per cent from Norway. As for gas traded over the pipelines throughout the European Union, the single greatest end user was Germany (with a share of 24 per cent), then Italy (13.4 per cent) and the UK (10.2 per cent). As regards the EU percentage share in the structure of gas trading with Russia over the gas pipelines, Germany accounted for 33 per cent and Italy – 15 per cent. The percentage share of these two countries would be smaller if we considered this type of import from Russia as part of the entire trading structure in the European Union. Still, all this demonstrates strong dependence on the gas transmission infrastructure and an upward trend with regard to dependence on gas supplies from the eastern direction.[6]

[6] The percentage calculations are based on actual BP data.

3. Security of gas supply

As indicated in the analysis of the issues concerned with theoretical studies of energy security, irrespective of the adopted research perspective (techno-economic, socio-economic or political), supply security will continue to be indispensable to this security. And so it is worth analysing potential threats to the disruption of gas supply from the direction which in the discourse of the European Union and the Central European countries is the dominant one, namely the eastern direction. Given the meagre energy resources, inadequate storage capacity, lack of transmission infrastructure, lack of gas substitution, lack of cooperation, etc., the consequence of a disruption of the gas supply chain is an emergency situation that breaches energy security. In 2014, the European Commission presented the results of the tests concerned with the short-term resilience of the European gas system in the event of a possible disruption of gas supplies from Russia. The analysis covered disruptions of supplies from the Russian direction and all other transmissions from Russia to Europe. The test covered two main scenarios of the development of the situation where the supply disruption would last six months, and allow for two variants. The first scenario was termed *cooperative*, while the second one – *non-cooperative*. The scenarios of the disruption of gas supply to the European Union were also analysed by ENTSO-G. In 2017 it identified individual groups of risk countries the territories of which overlapped the main routes of gas supply to the European Union, that is the northern, eastern, southern and south-eastern routes (*Preparedness for a possible disruption of supplies...*, 2014; *ENTSOG Union-Wide Security of Supply...*, 2017, pp. 5–59).

According to the European Commission analyses of 2014, in the event of a gas supply disruption lasting six months, even with a change in the supply structure, system shortages to the amount of 5–9bn m^3 were demonstrated. By and large, the only mechanism for covering the lack of such a quantity of gas is provided by other import sources and directions. Other mechanisms employed in an emergency are storage capacities and limiting consumption by individual end users of gas. It is estimated that around 61 per cent of the shortage from the Russian direction can be substituted for by LNG systems and underground gas storage facilities. The supplies from the Russian direction accounting for the 35 per cent shortage can be substituted for by the import of gas from Norway and North Africa (*Preparedness for a possible disruption of supplies...*, 2014).

The first variant of developments in the scenario of gas supply disruptions provides that the individual member states of the EU-28 undertake to cooperate with a view to resolving the emergency. Cooperation consists in adopting relatively equal burdens. Such conduct corresponds to the principle of solidarity which should bind the member states of the European Union, and as such reflects the treaty-based principle of energy solidarity. The second variant of developments provides for action consisting in limiting or stopping the internal export of gas to member states. The conducted tests allowed for the necessity to provide gas supplies to Ukraine and Moldova in the event that the two countries should be cut off from gas supplies from the Russian direction.

Should there be no cooperation, over a summer period of six months there would be severe shortages in the gas systems of Bulgaria, Romania and western Balkan countries (Bosnia and Herzegovina, Serbia and Macedonia). This area is highly threatened in the event of both gas transmission over the Ukrainian infrastructure being halted and gas supplies from Russia being entirely cut off. A similar level of shortages will be the case in the event that the supplies of Russian gas to the Baltic countries, i.e. Estonia, Lithuania as well as Finland, were to be cut off. In the case of Poland and Hungary, the shortages will amount to 20 per cent and 30 per cent respectively. Optimal cooperation between the European Union member states may serve to minimise the threats. Still, despite this solution, a part of south-eastern Europe, as well as the Baltic countries are threatened with a gas shortage of 20–60 per cent; the worst predicament would befall Finland, where a gas shortage is estimated to reach 80–100 per cent (*Preparedness for a possible disruption of supplies...*, 2014; Gędek et al., 2015, pp. 131–134).

The development of transmission infrastructure is a possible solution to the problem, but such a goal would be time-consuming and incur high expenditure. The Baltic countries might also adopt a solution that would strengthen their independence – the development of LNG infrastructure and conversion to other energy carriers. A problematic thing about these countries is also the possible influence exerted by the Russian power system on their energy security. In this case, the development of the transmission infrastructure from Poland and the Scandinavian countries as part of the so-called Baltic Ring, or the development of generating capacities on the basis of one’s own nuclear energy and renewable resources might provide a solution. A similar situation would be encountered in Finland, but gas threats should be assessed through the prism of the flexibility of the infrastructure

of generating units and its capacity to shift to a different fuel. The significance of storage infrastructure can be seen in the case of Ukraine, which, despite drastic gas shut-offs, thanks to its storage capacities is doing much better than other countries in this part of Europe. However, this does not mean the threat has been entirely eliminated in the event that the Russian gas supplies are cut off. The operation of Nord Stream II will certainly pose a threat to Ukraine, because it will enable Russia to strengthen its transit independence, while decreasing Ukraine’s gas security.

The assessment of the gas security of the EU-28 is less favourable in the scenario which provides for cutting off supplies of Russian gas in winter. Even in the variant providing for cooperation it is to be presupposed that there will be problems with gas supplies to parts of Western European countries, Central European countries, western Balkan countries and Scandinavian countries. Furthermore, in the event of cooperation, the threat will affect parts of Western European countries, and in the event of non-cooperation, shutdowns will affect parts of Central European countries, western Balkan countries and Scandinavian countries (*Preparedness for a possible disruption of supplies...*, 2014).

In the event of cooperation, in the wintertime scenario, the great significance of such countries as Austria, Germany and Italy should be emphasised with regard to the stabilisation of gas security in Central Europe. This interpretation remains outside the mainstream of the internal political narrative in such countries as Poland. This existing relation indicates the necessity to strengthen the transmission infrastructure between Western and Central Europe. The occurrence of shortages in the event of cooperation may seem strange, but such a state results from the fact that in a variant like this, transmissions with a view to stabilising the gas systems are effected from countries with lesser shortages to countries with greater shortages. In a general characterisation of the countries not classified as belonging to Central Europe and Central European countries, one should note that the former are more resistant to the threats concerned with gas cuts from the Russian direction. As regards the Central European countries, a great risk is to be observed with regard to gas security on account of supply cuts. In a number of variants, western Balkan countries, the Baltic countries, the Scandinavian countries, as well as Poland, Romania and Hungary are exposed to the greatest threat (*Preparedness for a possible disruption of supplies...*, 2014).

The relevance of the Ukrainian transmission and storage infrastructure for the gas security in the Central European region and western Balkan

countries in winter is stressed by the ENTSO-G report as well. Depending on the period in which the demand volume is verified, in the wintertime scenario the destabilization of gas security may concern its varying degrees and the varying numbers of countries affected by it. In the variant of the longest increased demand for gas in the wintertime scenario, the resource supply curtailment will concern Bulgaria and Romania. Eliminating the shortage of supply to these countries will be hindered even if we take into account cooperation with neighbouring countries. In the variants of shorter periods of increased demand in winter, gas supply shortages will concern Bulgaria, Croatia, Greece, Hungary and Romania. One of the mechanisms to be employed while solving the problem of gas supply shortage is the management of the distribution of supplies from other countries – Austria, the Czech Republic, Germany, Italy, Luxembourg, Poland and Slovakia (*ENTSOG Union-Wide Security of Supply...*, 2017, pp. 25–28).

Therefore, even though one might put forward a debatable proposition whereby the construction of Nord Stream II is *de facto* a diversification of gas supply to the EU-28, the proposition does not allow for the geopolitical goals pursued by Russia (cf. Schmidt-Felzmann, 2019, pp. 142–161). Laying more gas pipelines on the Baltic Sea floor will diminish or eliminate gas transit over the Ukrainian route; Nord Stream I has already decreased the use of the Slovak transmission infrastructure by approximately 25 per cent. It appears that in order to eliminate the threats concerned with gas supply cuts, the development of the gas infrastructure in Central and south-eastern Europe should be continued, allowing for inter-system connections and physical reverse flows of gas between the countries in the region (cf. *Energy Policies of IEA Countries: Czech Republic...*, 2016. pp. 121–136; *Energy Policies of IEA Countries: Greece...*, 2017, pp. 43–59; *Energy Policies of IEA Countries: Hungary...*, 2017, pp. 123–140; *Energy Policies of IEA Countries: Slovak Republic...*, 2018, pp. 43–55).

According to ENTSO-G, among the threats to the gas supply from the eastern direction one should also reckon the shortages of supply provided via the Yamal-Europe pipeline (the so-called Belarusian route). It must be assumed that during a period of short-term increased demand for gas in the wintertime scenario, the supply shortage will affect Estonia, Lithuania and Latvia. However, the scenario envisages an uninterrupted gas supply via Nord Stream I and with the aid of mutual Polish-German transmission infrastructure. A completely different situation would be one

involving the destabilisation of supply on all the routes of the eastern direction (Ukrainian, Belarusian and Baltic). Undoubtedly, with the eastern direction deliveries being totally cut off, depending on the volume, shortages of varying degrees will affect Estonia, Lithuania and Latvia, with the plight of Finland being the worst. Factors strengthening the gas security of the Baltic countries would include, *inter alia*, GIPL (*Gas Interconnection Poland–Lithuania*) as part of a broader regional transmission infrastructure and a larger number of LNG terminals in the Baltic Sea region (*Energy Policies of IEA Countries: Estonia*, 2013, pp. 57–68; *ENTSOG Union-Wide Security of Supply...*, 2017, pp. 35–36; *Energy Policies of IEA Countries: Finland*..., 2018, pp. 151–153; *Nacionalinė energetinės*..., 2018, p. 45).

Conclusion

The main objective of the text is to present a selection of terminological, categorial and theoretical problems encountered in the study of energy security (and to a lesser degree in the study of energy transitions), as well as to link them with such issues as import dependence, diversification and scenarios of gas supply disruptions. The analysis makes use of the category of geopolitical conditions which are understood as the interrelation or direct causal relation between geographical conditions and decision-making processes concerned with energy security and, more broadly, energy policy. Given the need to elaborate the research problem, the text features two research questions related to the following conclusions:

(1) To what extent do geographical conditions determine decision-making processes concerned with the energy policy in the European Union and its member states?

It is to be assumed that specific geographical conditions and the availability of resources in the EU-28 as well as in the individual member states determine specific decision-making processes concerned with energy policy *sensu lato*. In addition, it must be emphasised that the very political conditions that result from specific geographical and historical conditions may determine the directions of decision-making processes concerned with energy policy. A limited quantity of gas reserves in the EU-28 territory results in an increased level of import dependence. In

turn, specified geographical but also political conditions may determine ways of diversifying the sources and directions of gas supply. This can be exemplified by the political discourse and specific action concerned with gas import to Poland and Germany (these two perspectives are frequently generalised and take the form of a dispute between the “old” and “new” members of the EU-28). Undoubtedly, a lack of energy resources and potential threats to gas supply on account of the level of import dependence necessitate action in various spheres of energy policy, e.g. with regard to energy efficiency, renewable energy sources or generally new energy technologies.

Geographical conditions constitute one of the main factors limiting the establishment of a common energy market in the EU-28 territory. A large area, various energy structures, and a special kind of geographical situation, are factors slowing down effective solutions concerned with gas security. There is no doubt that on account of the variety of barriers to entry into domestic markets of this kind, account should be taken of the specificity of the energy sector as well as difficulty in constructing a uniform gas market. In this context it must be assumed that the common gas market should be based on competitiveness; a competitive market cannot exist without a uniform market; a market characterised by such features cannot be created without proper infrastructure. Therefore, the gas transmission and storage infrastructure, as well as the LNG technology, determine the capacity for overcoming the limitations resulting from the existence of limited geographical conditions of the EU-28 and the individual member states.

As regards hydrocarbons, one should consider speeding up an energy transformation in which this energy source will be playing a transitory role in support of the maintenance of distributed energy resources. This solution may eliminate the relation between the geographical situation and energy security. Certainly, it will fundamentally eliminate the influence of political factors resulting from a special geographical and historical situation.

(2) To what extent do geographical conditions determine threats to the security of the gas supply to the European Union and its member states?

It should be pointed out that specific geographical conditions determine a variety of problems which can be exemplified by import dependence and its attendant possibility of gas supply disruptions. The issues concerned with gas security in this scope can be summarised with the

generalisation of quantitative data, in terms of a geographical division into countries not considered to be Central European and Central European countries as part of the EU-28.

In the case of import dependence, the countries not considered to belong to Central Europe are characterised by a higher mean of gas import scale than the Central European countries. Among the former, the group of Western European countries, with some exceptions, is characterised by the largest scale of gas import. As for the Central European countries, the Czech Republic, Poland and Hungary have the largest scale of import. If we were to consider import dependence on gas from Russia, then it is noteworthy that the countries not considered to belong to Central Europe are characterised by a lower degree of dependence, whereas the Central European countries are characterised by a higher one. As for the former group, Austria and Finland have a high degree of dependence, and quantitatively Germany, the UK, Italy, France and Austria are the largest importers. As for the latter group, 9 out of 11 Central European countries are dependent on gas imported from Russia in the 75–100 per cent bracket. Quantitatively, the largest importers of Russian gas in the latter group are Poland and Hungary. Therefore, one may point to a general regularity whereby the more distant from Russia a given country is, the lesser the country’s share in the import of hydrocarbons is.

The issues concerned with geopolitical, geographical and infrastructural conditions significantly influence potential disruptions of gas supplies to the EU-28, its regions and member states. In various variants of disruption of gas supplies from the Russian direction, the countries exposed to the greatest threat include the western Balkan countries, the Baltic countries and Finland, as well as Poland, Romania and Hungary. As for countries outside the EU-28 that are threatened with the negative consequences of gas cuts, these include Ukraine, Moldova and the former Yugoslavian republics. In the case of the destabilisation of gas supplies in the above-mentioned EU-28 countries, the stabilising role for gas supply is performed by western European countries, e.g. Austria, Germany and Italy. Still, this interpretation does not envisage gas supplies in three simultaneous directions – the Baltic, Belarusian and Ukrainian one. The presented division in terms of geopolitical conditions also serves as a reflection of the division in the discourse concerned with threats to energy security that has been engaged in by the “new” and “old” members of the EU-28, that is the Central European countries and countries not considered to belong to Central Europe.

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The text does not analyse all the geographical conditions that might affect gas security in the European Union and individual member states. In further analyses it will be worthwhile investigating such aspects of gas supply security as the economic security of Russia itself. This results from the fact that the increase in the transmission capacity of gas pipelines, as well as of LNG, in an obvious manner limits Russia’s capacity to use gas blackmail, but on the other hand makes Russia economically dependent on the revenues from gas sold to the EU-28.

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Bezpieczeństwo gazowe Unii Europejskiej w wymiarze geopolitycznym

Streszczenie

Zakres przedmiotowy analizy w tekście obejmuje bezpieczeństwo energetyczne Unii Europejskiej i państw członkowskich z uwzględnieniem perspektywy warunków geopolitycznych. Przez warunki geopolityczne przyjęto rozumieć występowanie różnego rodzaju zależności między warunkami geograficznymi i procesami podejmowania decyzji w zakresie bezpieczeństwa energetycznego. Głównym celem tekstu jest prezentacja wybranych problemów teoretycznych w studiach nad bezpieczeństwem energetycznym i powiązanie ich z takimi zagadnieniami jak zależność importowa od gazu i ryzyko w przerwaniu dostaw gazu – głównie na kierunku rosyjskim. W celu uszczegółowienia zakresu przedmiotowego analizy zaprezentowano następujące pytania badawcze: (1) W jakim stopniu warunki geograficzne determinują procesy decyzyjne w polityce energetycznej Unii Europejskiej i państw członkowskich?, (2) W ja-

kim stopniu warunki geograficzne determinują zagrożenia dla bezpieczeństwa dostaw gazu do Unii Europejskiej i państw członkowskich? Praca ma głównie charakter poglądowy, jednakże w części teoretycznej w swobodny sposób wykorzystano założenia programu badawczego integracji wiedzy w ramach studiów nad bezpieczeństwem energetycznym i tranzycją energetyczną prezentowane przez E. Brutschinę, A. Cherpa, J. Jewell, B. K. Sovacoola i V. Vinichenkę. Ponadto dokonano syntezy wiedzy zawartej w literaturze dotyczącej problematyki bezpieczeństwa energetycznego i gazowego, którą wzbogacono o krytyczne ujęcie, własne oceny i wnioski.

Słowa kluczowe: polityka energetyczna, bezpieczeństwo energetyczne, bezpieczeństwo gazowe, bezpieczeństwo dostaw gazu, Unia Europejska

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