Energy Policy Studies

2(6) / 2020

IGNACY LUKASIEWICZ
ENERGY
POLICY
INSTITUTE

Cover design: Aku Studio

Typesetting: Lidia Mazurkiewicz, MSc, Eng.

Publisher: Ignacy Lukasiewicz Energy Policy Institute
Technological Incubator 4
Jasionka 954E
PL 36-002 Jasionka

eps@instytutpe.pl
http://www.instytutpe.pl/en/eps-en/

e-ISSN: 2545-0859

The electronic version of the journal is the original version.

Rzeszow 2020

Implications of LNG import on the European Union's energy security

Łukasz Kordowina

Abstract: Due to insufficient level of domestic natural gas production, the European Union countries are forced to import this key energy resource from the third countries. This involves political and economic as well as physical risks. In order to ensure energy security, it is necessary to mitigate the threats that in the case of natural gas supplies are primarily related to various types of dependencies. The dependency grows in the situation of low diversification of energy sources and resources suppliers. The aim of this paper is to analyze the impact of LNG imports on the European Union's energy security, which would not be possible without showing the structure of the regional natural gas market. Implications of LNG trade will be shown in comparison with pipeline gas supplies, which are dominant on this market.

Key words: LNG, natural gas, energy security, European Union

Introduction

Natural gas is the second most important source of energy in the European Union. Due to systematically decreasing European Union's[1] gas production, member states are forced to import this fossil fuel from outside of the bloc. Ensuring uninterrupted and cost-effective supplies of energy resources is the key element of energy security in the event of insufficient own resources. The energy security is – according to the classic definition – the state of availability of sufficient supplies at affordable prices (Yergin 2006: 70-71). The article examines the importance of LNG supplies in ensuring the European Union's energy security in the situation of growing dependence on natural gas imports. The paper begins with showing the significance of natural gas for ensuring the energy security and then discusses the state and capabilities of the EU imports of LNG. A key part of this article analyses the effects of receiving natural gas in a liquefied form by tankers in comparison to the most common form of pipeline deliveries, regarding the risks associated with both methods of supply. At the end, the article discusses differences that are visible in the impact of LNG on particular EU regions.

To maintain natural gas security, countries must deal with threats to their supplies. Jonathan Stern lists three types of import dependence, which are considered as a risk to natural gas security: source dependence, transit dependence and facility dependence (Stern 2002: 12). The dependence means a situation where one actor has an advantage over its partner. Usually, the consumer is the weaker party, especially when it is one-sidedly dependent on the producer in

[1] For the purpose of this paper, the EU will be defined as the bloc of 28 countries, including the United Kingdom because of its important position on the European gas market and the availability of data.

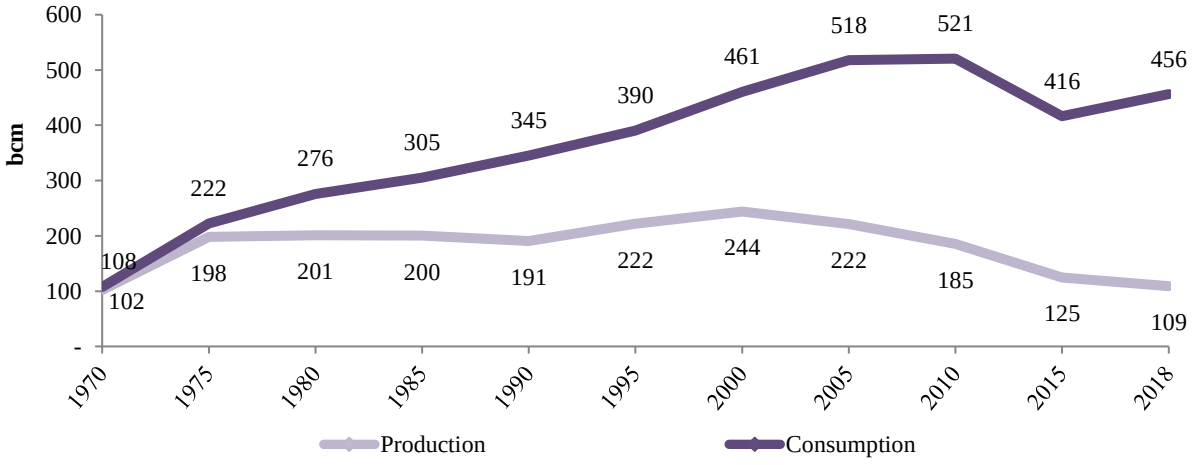
a situation of monopoly and the lack of substitutes (Nyga-Łukaszewska 2019: 15-16). Source dependence rises in the situation of a small number of natural resources suppliers and means of transport, unstable geopolitical situation and will to disrupt supplies among exporters (Ritter 2011: 8-9). The second type of aforementioned import dependence occurs when natural gas is transmitted indirectly, passing through the territory of another state. In the situation of transit risk, the interests of another state or states are becoming important. The risk rises in the situation of conflict between the transit country and one of the trade partners (Ritter 2011: 9). One cannot also ignore the facility risk, which means the danger of physical damage to extraction plants, gas storages, pipelines and other infrastructure located in the territory of exporter, importer or transit country (Stern 2002: 14-15).

The natural gas market of the European Union

Since the end of the 1960s, countries forming today's European Union and the United Kingdom, have been consuming more natural gas, than they produce. Even the Dutch giant gas field Groningen and the new British discoveries in the North Sea could not satisfy rapidly growing demand. The import from outside of the block was indispensable.

The liquefied natural gas (LNG) has been used in this trade since 1964 (earlier LNG transport on *Methane Spirit* from the USA to Great Britain in 1959 was on a non-commercial scale), when the first LNG tanker arrived from Algeria to Great Britain and France (Jensen 2004: 7-8). Before LNG trade could well develop in Europe, pipeline transport of natural gas (traditionally used in trade between members of the Community) from third countries had surpassed the volumes arriving by the ships. In 1968 Austria signed a contract on pipeline trade from the Soviet Union. European connections to Siberian gas have been developed further and in 1973 resources from the East flood to the Federal Republic of Germany and in the next year to Italy. After the discovery of new gas fields, Norway became the second pipeline gas exporter to the European Community, with its first transport to Germany in 1977. The culmination of gas connections network to Europe was at that time the TransMed pipeline from Algeria to Italy which became operational in 1983.

Chart 1. Production and consumption of natural gas [bcm] in the European Union (EU28) from 1970 to 2018



Source: Own elaboration based on Eurostat, https://ec.europa.eu/ and BP Statistical Review of World Energy 2019, https://www.bp.com/.

The Soviet Union and its legal successor – Russian Federation, became the main natural gas supplier to the European Union. As can be seen in Table 1., resources from this country dominated the market with the deliveries of 150.5 bcm or 33% of total EU gas import in 2018. The second biggest exporter of natural gas to the EU became Norway, after an incremental increase in exported volumes, that reached 103.1 (23% share in total EU imports) in 2018, followed by Algeria (42.2 bcm, 9% share) which natural gas trade with the Old Continent was partially halted after the terrorist attacks on its natural gas facilities in 2013 (U.S. Energy Information Administration 2019: 3).

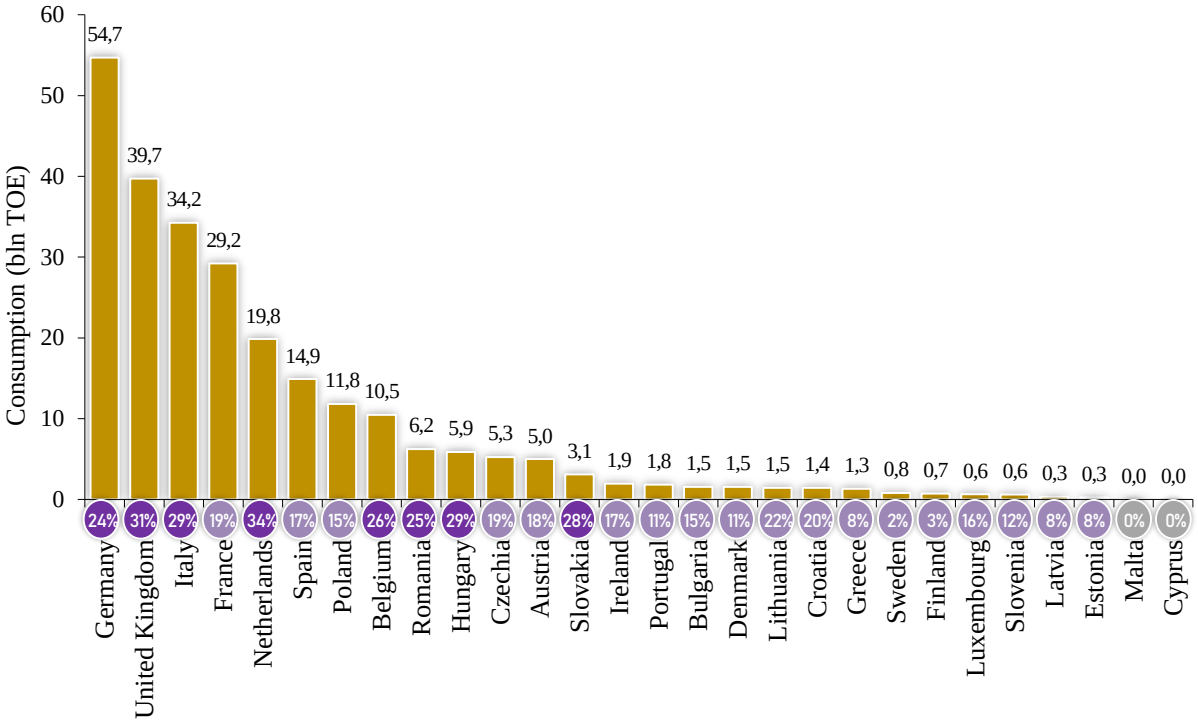
Table 1. Natural gas import sources of the European Union (EU28) from 1990 to 2018 [bcm]

Exporter	1990	1995	2000	2005	2010	2015	2018
Russia	111.7	112.1	120.7	136.3	119.7	124.3	150.5
Norway	25.3	29.0	47.9	79.3	102.7	105.3	103.1
Algeria	26.6	33.6	55.5	57.0	50.4	34.2	42.2
Qatar	-	-	0.3	4.9	35.0	24.7	19.5
Nigeria	-	-	4.4	10.6	14.0	6.2	10.5
Libya	1.0	1.4	0.8	5.4	10.0	7.1	4.5
Trinidad and Tobago	-	-	0.9	0.8	5.1	1.9	3.6
USA	-	-	-	-	-	-	3.1
Rest of the world	35.3	44.2	64.0	96.0	104.3	111.0	114.6

Source: Own elaboration based on Eurostat, https://ec.europa.eu/.

Within the bloc of 28 countries, natural gas is the second (after crude oil) most important energy source. In 2018 this fossil fuel represented 26% of total EU primary energy consumption (BP 2019). The biggest part of natural gas in EU is consumed by Germany - 54.7 bln tons of oil equivalent (TOE). It represents 24% of the total energy resources consumption of this country. The highest share of gas in domestic energy resources consumption was recorded at this time in the Netherlands (34%), and in the United Kingdom, Italy, Hungary, Slovakia, Belgium and Romania it is also higher than EU average of 22%. On the opposite side stands Cyprus and Malta, where the usage of this hydrocarbon is at a negligible level.

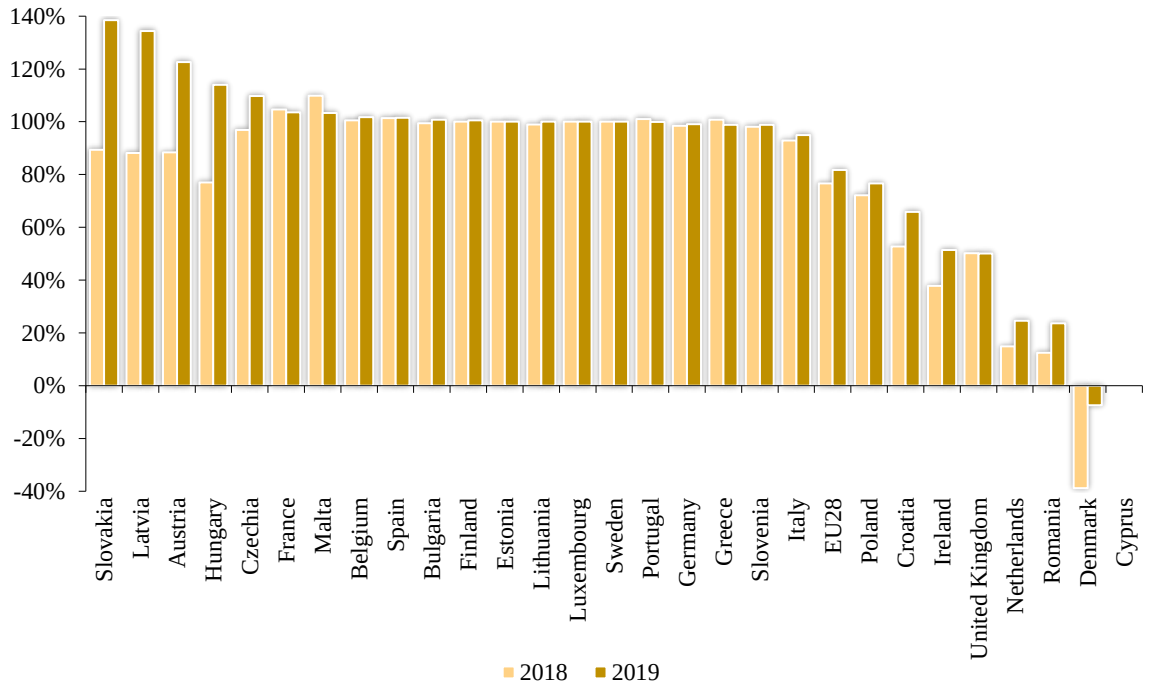
Chart 2. Consumption of natural gas [bln TOE] in the EU member states in 2018 and share [%] of natural gas in total energy sources consumption



Source: Own elaboration based on Eurostat, https://ec.europa.eu/.

Nearly all EU members need to import natural gas. The import dependency rate, calculated as net imports, divided by total domestic consumption, shows how high the level of dependence on external supplies is. As can be seen in Chart 3., the only significant producers are the United Kingdom and the Netherlands, but even they need to import natural gas to meet their demand. Only Denmark exports more natural gas than it imports. All the other EU members are net importers of this fossil fuel (except Cyprus, which does not consume any statistically measurable volumes of natural gas).

Chart 3. Import dependency level of the European Union (EU28) and its members in 2018 and 2019

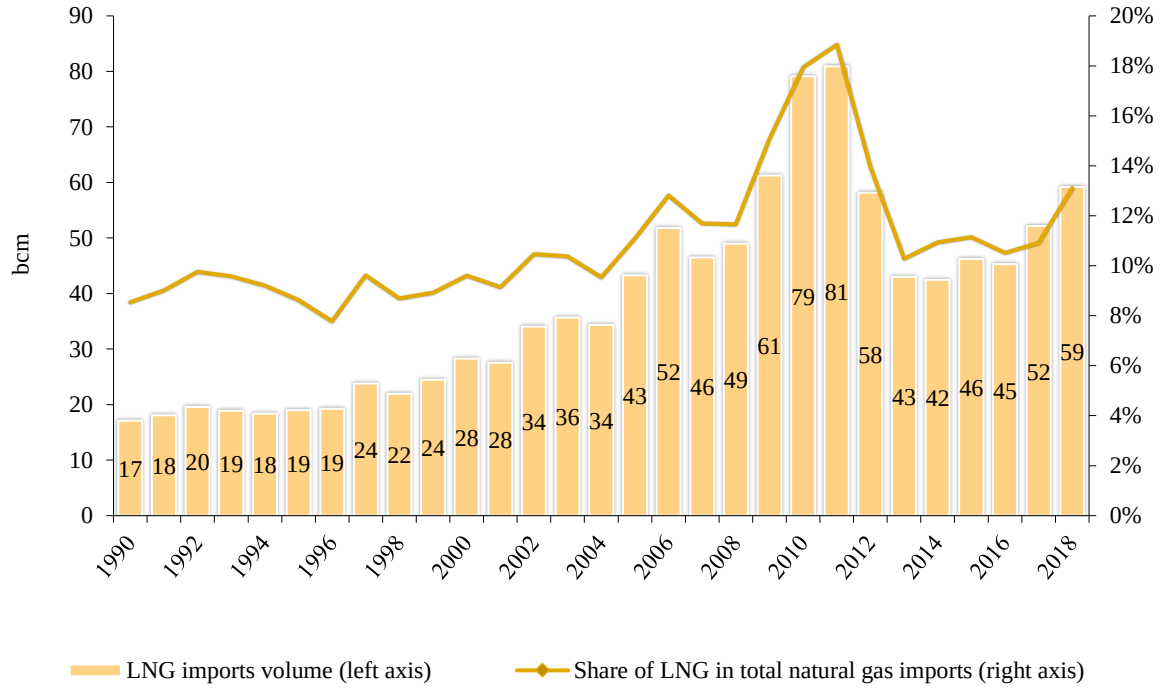


Source: Own elaboration based on Eurostat, https://ec.europa.eu/.

LNG on the EU gas market

Europe as a continent is the second, largest recipient of liquefied natural gas, after Asia. The volume of LNG imports by the countries that make up the European Union grew for many decades, until 2012, when increased demand and higher prices in Asia caused the supply to shift to this market (European Commission 2013: 1). On average, in the period 1990-2018 presented in Chart 4., gas transported in liquefied form accounted for 11% of natural gas imports to the EU. This means that almost nine out of ten cubic meters of this hydrocarbon is imported via pipelines.

Chart 4. LNG import volume [bcm] and its share in total natural gas imports to the European Union (EU28)

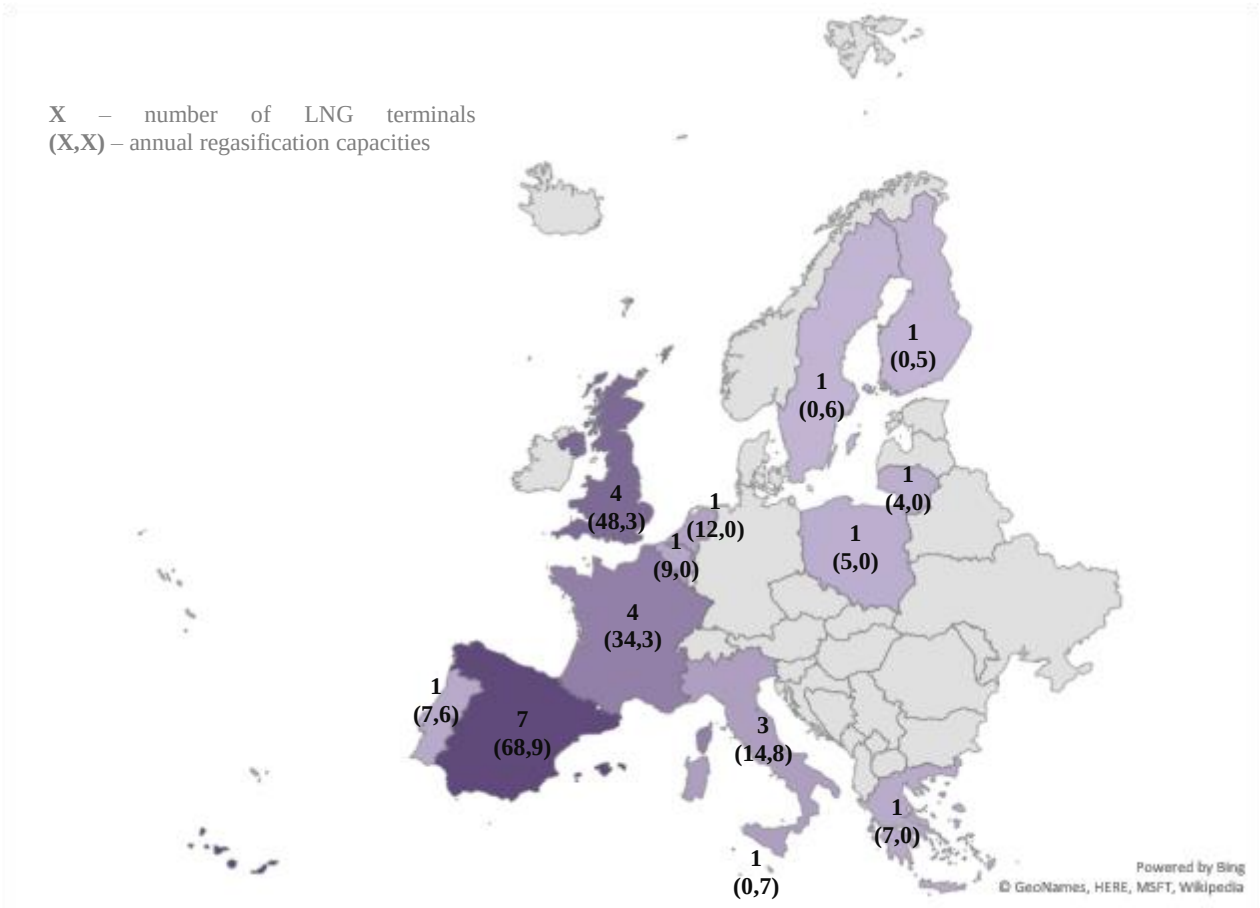


Source: Own elaboration based on Eurostat, https://ec.europa.eu/.

The LNG infrastructure in Europe is improving every year. At the time of writing this paper, there are 29 LNG terminals operational in EU countries. Not all member states have installations of this type. Spain is the leader with seven terminals, four each are in France and Great Britain, three in Italy, two each in Finland and Sweden, and one each in Belgium, Greece, the Netherlands, Poland, Portugal, Lithuania and Malta. Another six projects are under construction and 18 are in the planning stage (Gas Infrastructure Europe 2019).

The entire regasification infrastructure located in the EU is currently able to receive 212 bcm of natural gas (volume after regasification) per annum, which means that it can cover almost half of the demand for this raw material in this way. The terminals are also used to store this strategic resource in liquefied form. Their capacities in this respect amount to 10 mcm (after regasification) of gas stored in liquefied form (Gas Infrastructure Europe 2019).

Map 1. Number of LNG terminals and countries regasification capacities [bcm] per annum in the European Union countries in 2019



Source: Own elaboration based on Gas Infrastructure Europe, https://www.gie.eu/.

LNG imports to the EU are more diversified than import via gas pipelines. As shown in Table 2., 19,5 bcm or one-third of the liquefied gas supplied to member states in 2018 came from Qatar, but Nigeria, Norway and Algeria are also significant trading partners, accounting for 18%, 13% and 12% of the EU LNG imports respectively. Trinidad and Tobago, Russia, the United States and Peru had a share of several percent each. The most important partners are located on four different continents. Within the European Union, the biggest recipient was Spain, which has the best developed infrastructure in this area. In 2018, 25% of the total of 59 bcm of LNG imported by member states (after regasification) was transported there.

Table 2. European Union's (EU28) LNG import sources in 1990-2018 [bcm]

Exporter	1990	1995	2000	2005	2010	2015	2018
Qatar	-	-	0,3	4,9	35,0	24,7	19,5
Nigeria	-	-	4,4	10,6	14,0	6,2	10,5
Norway	-	-	-	-	3,4	3,4	7,5
Algeria	16,0	16,5	21,1	18,9	14,8	8,8	7,4
Trinidad and Tobago	-	-	0,9	0,8	5,1	1,9	3,6
Russia	-	-	-	-	0,0	0,0	3,4
USA	-	-	-	-	-	-	3,1
Peru	-	-	-	-	0,1	1,0	1,9
Rest of the world	1,0	2,5	1,6	8,2	6,6	0,1	2,4

Source: Own elaboration based on Eurostat, https://ec.europa.eu/.

LNG versus pipeline transport of natural gas

With high dependence on two major natural gas suppliers, LNG is one of the few ways to ensure supplies from different directions for the EU. As Mariusz Ruszel (2014) points out, the possession of LNG terminals has a positive effect on the improvement of state's energy security. This type of infrastructure is another entry point to the internal gas system and increases the number of available delivery routes. This makes the internal gas market more resistant to supply disruptions (Ruszel 2014: 52-53). The International Energy Agency (IEA) created a model for assessing the short-term energy security of countries, where – apart from dependence on imports which is largely independent of the will of the states – one of the basic factors is the level of suppliers diversification, expressed by the Herfindahl-Hirschman Index (HHI) (Jewell 2011: 25-28). The HHI is calculated as a sum of the squares of individual exporters market share:

Formula 1. Herfindahl-Hirschman Index

$$HHI = s_1^2 + s_2^2 + \cdots + s_n^2$$

where:

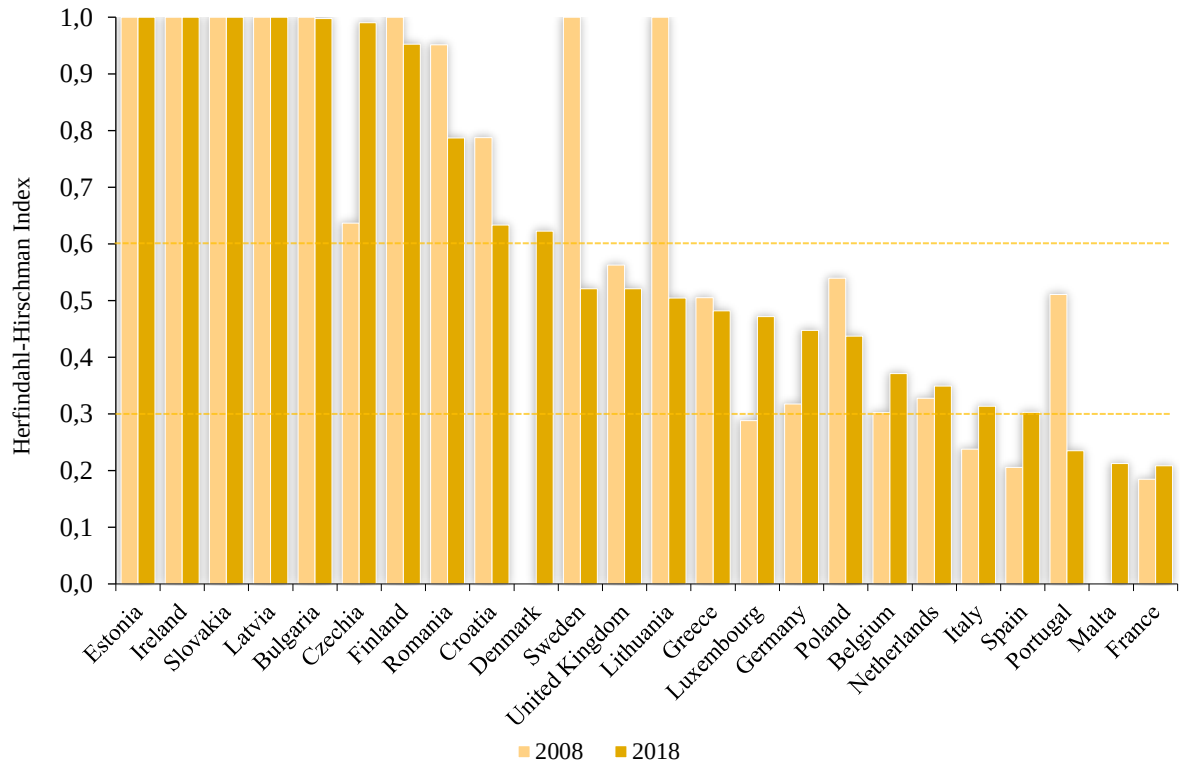
S – market share of a single supplier,
n – number of the last supplier.

According to this model, a high level of security of natural gas supply can be ensured with an indicator of fewer than 0.3 point. Higher HHI means moderate (0.3-0.6 point) or low (>0.6 point) security of gas supply. Among the member states importing natural gas, only three achieved a high level of security in terms of supplier diversification in 2018, as shown in the chart 5. All of them (France, Malta and Portugal) have LNG terminals, as does Spain, which only slightly exceeded the 0.3 level. Finland is the only country using liquefied natural gas that is highly dependent on a single supply route, but its LNG infrastructure is still very small in scale. The largest decrease in the concentration of suppliers can be observed in the case of Lithuania and Sweden, which between 2008 and 2018 reduced their dependence on a single supplier (Russia and Denmark, respectively) from the situation of monopoly to a moderate concentration level, opening their first LNG terminals in 2011-2014. The comparison of changes

in the HHI in Poland and Germany is worth noting. During this ten-year period, both countries made major investments and commissioned new import infrastructure - the LNG terminal in Świnoujście and Nord Stream gas pipeline. It is clearly visible that the HHI level in Germany has increased since 2008 from a level close to 0.3 point, to more than 0.4 point a decade later. Poland, unlike its western neighbor, decreased its supplier concentration by 0.1 point on the index. It should also be noted that in Poland gas consumption increased at this time, while in the compared country it slightly decreased.

The calculations show that among the EU countries with the lowest level of dependence on single suppliers, there are those that use LNG on a large scale. The flagship example of diversification is Malta, which started to import gas only in 2017 - entirely in liquefied form. A year later, its small demand was met by maritime deliveries from as many as six producers on five different continents (GIIGNL 2019: 28-29). Other large markets that, apart from gas pipeline supplies, also use LNG to meet their demand, are characterized by a significant diversification of the directions of supplies, literally: France, Spain and Italy. Ireland can be placed at the opposite side of the spectrum. As an island, the country has the potential to build infrastructure for receiving liquefied resources, however, Dublin has opted to fill all its import via a gas pipeline from only one direction – the United Kingdom.

Chart 5. Herfindahl-Hirschman Index of natural gas trade partners diversification in the European Union countries in 2008 and 2018*



Source: Own elaboration based on IEA Natural Gas Information Statistics 2020, IEA. *Due to some small non-classified volumes of import in several countries, the real HHI might have deviations of no more than 0.02 point. Austria, Slovenia and Hungary are not included as there was no calculable data available, and Cyprus was not importing natural gas at this time.

Table 3. Herfindahl-Hirschman Index of natural gas trade partners diversification in the European Union countries in 2008 and 2018*

Country	2008	2018	Country cont.	2008	2018
Estonia	1,00	1,00	**Lithuania**	1,00	0,50
Ireland	1,00	1,00	**Greece**	0,50	0,48
Slovakia	1,00	1,00	**Luxembourg**	0,29	0,47
Latvia	1,00	1,00	**Germany**	0,32	0,45
Bulgaria	1,00	1,00	**Poland**	0,54	0,44
Czechia	0,64	0,99	**Belgium**	0,30	0,37
Finland	1,00	0,95	**Netherlands**	0,33	0,35
Romania	0,95	0,79	**Italy**	0,24	0,31
Croatia	0,79	0,63	**Spain**	0,21	0,30
Denmark	-	0,62	**Portugal**	0,51	0,24
Sweden	1,00	0,52	**Malta**	-	0,21
United Kingdom	0,56	0,52	**France**	0,18	0,21

Source: Own elaboration based on IEA Natural Gas Information Statistics 2020, IEA. *Due to some small non-classified volumes of import in several countries, the real HHI might have deviations of no more than 0.02 point. Austria, Slovenia and Hungary are not included as there was no calculable data available, and Cyprus was not importing natural gas at this time.

In its recent history, Europe has already experienced the dangers of a too high concentration of natural gas suppliers. While the Soviet Union did not cut off gas supplies to the European Community at any time throughout the Cold War (Kaczmarski 2010: 64), politicians and researchers have been pointing to such a threat from its legal heir, the Russian Federation, for years. In January 2006, as a result of a dispute over the supply and transit of gas through the territory of Ukraine, Russia limited the transmission of gas through this transit country for four days. Nine EU countries experienced a temporary reduction in the volume of Russian gas supplies by up to 40% (Zadorozhna 2012: 6). The most significant, however, was the repetition of this conflict in 2009. At that time, gas supplies through Ukraine to EU were suspended or limited for more than two weeks. The EU Gas Coordination Group reported that Russian gas supplies for 12 member states were limited. The conflict between Kyiv and Moscow had the greatest impact on Bulgaria and Slovakia, completely dependent on imports from the East, which lost respectively 100% and 97% of their gas supplies for several days. The third largest cut-off, at the level of 80%, was experienced by Greece, which was diversifying Russian supplies only by LNG. In response, Greece ordered additional shipments by sea within a few days (Zadorozhna 2012: 6). In its assessment of the gas crisis in early 2009, the European Commission (EC) identified the country's increase in LNG imports as one of the examples of effective assurance of security of natural gas supply. LNG terminals, together with interconnectors, were presented as the effective elements of diversification of suppliers (European Commission 2009: 8-15).

A few years later, the Arab Spring showed that the supply direction from the Middle East and North Africa (MENA) region is also exposed to political destabilization (Ruszel 2014: 55). The revolutions in the countries south of Europe also affected partners of EU in natural gas trade – both in traditional and liquified form. Among the EU members, the civil war in Libya of 2011 affected Italy most significantly. The country had been receiving most of its gas exports

from this direction. For about six months, gas production and transmission in the country ruled by Muamammar al-Gaddafi were largely stopped. This resulted in a reduction of pipeline gas supplies to Italy from the level of 9.4 bcm in 2010, to 2.3 bcm in 2011 (Statista 2020). The events in the region also stopped the developing LNG exports from Egypt and Yemen. The production and transmission of natural gas have not been stopped at the most important EU partners in trade in natural gas - Algeria and Qatar (Simonet 2013: 191). However, unrests in Algeria and the terrorist attack on one of its gas production facilities grew awareness in European partners (De Micco: 35-37).

In the 2016 LNG strategy (European Commission 2016), the European Commission noted that the regasification capacity of the terminals located in the EU is large, but their distribution between individual areas of the bloc leaves much to be desired. The aforementioned disruptions of natural gas supplies had a smaller impact on the situation of the countries of southern part of the continent than on the countries in central and eastern parts of the bloc. Italy reacted to the limited supplies from North Africa and Russia by increasing gas pipeline supplies from other countries (Darbouche 2011: 30). Spain, in response to the unstable situation in Algeria, reduced the volumes received from this direction and increased LNG supplies from the United States and Russia, which quickly exceeded the volumes supplied via pipelines from Spain's most important partner so far (Kasraoui 2020). Cutting off the eastern EU from supplies of Russian gas forced the shutdown of some factories in countries such as Romania and Bulgaria, or even the introduction of a state of emergency in Slovakia (Zadorozhna 2012: 8). This was mainly due to the small number of interconnections, low storage capacity and the lack of LNG infrastructure. Most of the countries in this part of Europe were unable to replace Russian supplies. The 2014 endurance test for interruptions in Russian gas supplies indicated that LNG has the greatest potential to replace the missing volumes. European Network of Transmission System Operators for Gas, who carried out the study for the EC, stated that the global LNG market is large enough and can offer a quick redirection of short-term deliveries. According to the developed scenario, liquefied gas would fill the largest part (33%) of the lost gas volumes. According to ENTSOG, gas supplies from Norway would be able to increase only enough to fill 13% of the gap, and gas pipelines from the MENA region are already fully exploited and would not provide support in this situation (European Commission 2014: 12).

An additional benefit of LNG imports is the elimination of the transit risk that occurs in gas pipeline transport. Maritime trade eliminates the need to contract with third countries and the necessity to share the profit in the form of transit fees. As the recent history of transit through the territory of Ukraine has shown, it may also pose a threat of disruptions to supplies due to political instability or conflict between the two partners. The transit risk is also visible in the case of an intermediary country that is Belarus. In 2010, President Aleksandr Lukashenka threatened to cut off Russian gas supplies to the West as a result of a dispute with Gazprom (Le Coq, Paltseva 2011: 2). Eventually, the flow was temporarily limited only to Lithuania, but the EU energy commissioner saw it as "*an attack against the whole European Union*" (Schwirtz 2010). In the case of LNG maritime trade, the passage through the seas and oceans is guaranteed by the 1982 Convention on the Law of the Sea, which gives all merchant ships the right of transit passage (Hartwig 2019).

When discussing security issues, one cannot ignore the aspect of the physical security of infrastructure. LNG terminals, as well as gas pipelines, belong to the states' critical infrastructure, and within the European Union, international projects constitute the so-called European Critical Infrastructure. Member states are responsible for its protection and in the case of infrastructure the destruction of which would affect more than one country, countries should cooperate in maintaining its security (OJ EU 2008 L 345/75). So far, there have been no cases of terrorist attacks on LNG terminals in the world (Parfomak, Fritelli 2007: 20). To date, the only recorded case of terrorism targeting a methane carrier has been a failed 2016 bomb attack attempt from Yemen, territory targeting cargo from Qatar to Egypt (Saul 2016). Pirate incidents aimed at stealing a ship, cargo or taking a ransom are slightly more common. The International Maritime Organization informed that in 2018 and 2019 each there were two events of pirate attacks on LNG carriers. However, all of them were aimed at stealing equipment and crew supplies or obtaining a ransom - not the cargo (International Maritime Bureau 2020). Opinions on the threat of LNG infrastructure by terrorism are divided. Some national security experts point out the potential great damage such an attack could cause. The methane carriers are compared to oil tankers, which have already been the victim of successful terrorist attacks. Other researchers point out, that currently used tank protection systems make them well protected, and there are easier and more attractive targets for terrorist groups (Parfomak, Fritelli 2007: 20-22). Nevertheless, it should be noted that gas pipeline transport is also threatened by terrorism, and due to the access to the installations (most of them are located above the ground), it is relatively easy to disrupt. Numerous damages to the gas pipelines were noted during various conflicts in the Middle East (Steinhäusler et al. 2008: 2). In 2014, the Ukrainian government reported a similar terrorist attack when the part of the Trans-Siberian Gas Pipeline – through which gas is supplied to EU countries – exploded (Euractiv 2014). The circumstances of this incident remain unclear.

The role of LNG in European Union regions

The development of LNG infrastructure is supported at the EU level. In its 2010 communication on an action plan for an integrated European energy network (European Commission 2010), the European Commission identified LNG infrastructure as one of the building blocks for a better-connected EU gas system. In a communication of February 16, 2016 (European Commission 2016), EC confirmed the importance of LNG infrastructure for the diversification of gas supplies, increasing competitiveness on the internal market and limiting the negative impact on the environment by replacing it with more emitting energy sources. Allowing all member states (directly or through other members) to access the international LNG market has been included as one of the goals of the EU's liquefied natural gas strategy (Łoskot-Strachota 2016). Such investment projects may apply for loans and co-financing from EU funds, including the European Regional Development Fund, the European Fund for Strategic Investments, or the Connecting Europe Facility (formerly TEN-E mechanism).

Such financial support was granted to the former Eastern Bloc countries – most strongly dependent on a single supplier. One of the key elements of increasing the integration of this region was the creation of a gas corridor between the terminal in Świnoujście and a facility on the Krk island. Thanks to the network of interconnectors, it was supposed to provide access to

overseas gas supplies for the Czech Republic, Slovakia and Hungary, which do not have coastlines (Kochanek 2019: 32). The Polish regasification plant was put into operation in 2016, and the Croatian LNG infrastructure shall become operational January 1, 2021. As Agata Łoskot-Strachota points out, the mere construction of LNG terminals in this region may favor the further development of infrastructure and the creation of local gas hubs or connection with the neighboring ones (Łoskot-Strachota 2016: 4). Lithuania has already proved earlier that other member states can benefit from having an LNG receiving infrastructure by one country. Lithuanian, on a small scale, re-export the gas received in their terminal to neighboring Latvia, as well as to Estonia and Poland (Łoskot-Strachota 2016: 4). In 2015, the European Commission recognized that Latvia, due to access to gas from the Lithuanian terminal in Klaipeda, ceased to be an "energy island" – the status that formerly allowed it to refrain from applying the liberalization provisions of the Third Energy Package (Prontera 2017: 159). Further LNG projects are at the planning stage in all Baltic states, and for several years small-scale terminals have also been operating in Finland.

In this part of Europe, due to the high dependence on a single supplier, the negotiating position of importers is particularly low. The possibility for a state with an LNG terminal to use other import sources exerts a price pressure on the dominant suppliers (Sikora, Sikora 2018: 10). This is exactly the approach taken by Lithuania, for which Gazprom was the only gas supplier until the construction of the country's first LNG terminal in 2014. President Dalia Grybauskaitė said at this time that Lithuania "can very seriously consider the option of not having any agreements" with Gazprom after the expiry of the gas contract, but added that Lithuania does not "strictly reject Russian gas, especially if it comes at a cheaper and competitive price" (Seputyte 2014). The Lithuanian energy minister announced later, that his country was paying for gas one of the highest prices in Europe and after Lithuania started buying Norwegian LNG, it negotiated a 23% discount from Gazprom to the current contract (Seputyte 2014).

A similar role to regasification plants in the Baltic Sea may play the LNG terminal in Greece for the region of south-eastern Europe. Bulgaria makes the most of the third-party access law to which the Revithoussa plant is subject and in 2019 purchased gas supplies directly from the USA and Trinidad and Tobago. After regasification at the Greek terminal, the gas is piped to the Bulgarian market. In addition, the gas operator from Sofia purchased 20% of shares in the second LNG terminal in Greece, which should be built by 2023. For Bulgaria, the ability to import LNG, was one of the arguments in negotiations with Gazprom, which resulted in 40% cut in gas prices from Russia (Reuters 2020). The EC financially supports both the creation of a new terminal and the planned network of interconnectors, which would allow access to the resources delivered to Greece also to other countries of south-eastern Europe (Skarżyński 2018: 91).

At the western end of the Mediterranean, the situation is different. In the 1990s, Spain imported more than half of the gas it consumed only from Algeria. Given the great distance from Norway and even greater distance from Russia, the development of LNG infrastructure was considered the most advantageous diversification option (Prontera 2017: 163-164). Spain – similarly to neighboring Portugal – has the capacity to absorb more than twice as much LNG volumes as it needs (Kaya Caner et al. 2018: 12). Madrid uses some of its methane carriers as supplementary gas storage facilities, capable of quickly replenishing demand in the event of sudden increases or interruptions in supply (Dančák et al. 2010: 67). In recent years, however,

imports have exceeded the demand so significantly that Spain was forced to sell gas at cost to other EU countries, via an interconnector with France (Kravtsova 2019). Nevertheless, the Iberian Peninsula is still very poorly connected with the gas markets of other member states (Heather 2019: 3). M. Ruszel puts forward the thesis, that countries equipped with the ability to satisfy a large part of the demand with LNG imports, show less incentive to integrate with neighboring markets (Ruszel 2014: 54).

In the most mature gas markets in north-western Europe, LNG is primarily a supplementary energy source. The issues of the impact of LNG on the security of supply are of less importance here, with economic issues in the foreground. Member states in this area have a relatively well-developed network of interconnections, as well as access to their own resources (especially Great Britain, the Netherlands and Denmark). This part of Europe is well connected with various external gas suppliers, including Norway, which is considered to be a more stable and safer exporter than Russia for member states in the east or Algeria for southern countries. Thanks to this, the countries of south-western Europe can send the imported fossil fuel to the east after regasification. Nevertheless, the limitation is still the insufficient number of interconnections, so that a large part of the regasification capacity of the terminals in this region remains unfilled (Corbeau 2017: 175).

Conclusions

The European Union's LNG market is growing with the development of regasification infrastructure. Connection with maritime natural gas supplies has been recognized by the European Commission as one of its key strategies for ensuring energy security of the bloc. Construction and expansion of existing regasification terminals is supported with EU funds as these are projects that have the potential to give access to the global market through interconnectors even to landlocked member states.

The possession of LNG infrastructure gives access to the growing global market, where new exporters are appearing with the time. For the European Union, which is dependent on supplies from outside, it gives the opportunity to achieve a greater level of diversification. Although LNG trade and transport presents a number of risks, as does gas pipeline supply, it is another entry point to the gas system and provides an alternative. The transport of natural gas by methane carries in practice eliminates the threat related to the transmission through a transit state. Moreover, having access to more suppliers, give countries a better negotiating position with exporters. In the case of European Union countries, this means, first of all, the ability to choose suppliers more freely and to limit the monopoly of largest suppliers: Russia, Norway and Algeria.

Bibliography

1. BP, *BP Statistical Review of World Energy 2019*, 2019.
2. Corbeau A., *Global LNG Market Outlook and Repercussions for Europe*, [w:] *The European gas markets: Challenges and opportunities*, Hafner M., Tagliapietra S., Palgrave Macmillan, Cham 2017.
3. Council Directive 2008/114/EC of 8 December 2008 on the identification and designation of European critical infrastructures and the assessment of the need to improve their (OJ EU L 345/75).

4. Dančák B. et al., *The LNG option: re-thinking EUs gas supplies?*, [w:] "International Issues & Slovak Foreign Policy Affairs" nr 19(2010).
5. Darbouche H., Fattouh B., *The Implications of the Arab Uprisings for Oil and Gas Markets*, Oxford Institute for Energy Studies, Oxford 2011.
6. De Micco P., *A cold winter to come? The EU seeks alternatives to Russian gas*, European Parliament, 2014.
7. Euractiv, *Ukraine suspects Russian foul play behind pipeline blast*, June 2014, https://www.euractiv.com/section/energy/news/ukraine-suspects-russian-foul-play-behind-pipeline-blast/ (access: 06.09.2020).
8. European Commission *Quarterly Report on European Gas Markets. Fourth quarter 2012*, 2013.
9. European Commission, *Commission staff working document - Accompanying document to the Proposal for a Regulation of the European Parliament and of the Council concerning measures to safeguard security of gas supply and repealing Directive 2004/67/EC – The january 2009 gas supply disruption to the EU: an assessment COM(2009) 363*, 2009.
10. European Commission, *Communication from the Commission to the European Parliament and the Council on the short term resilience of the European gas system Preparedness for a possible disruption of supplies from the East during the fall and winter of 2014/2015 COM(2014) 654*, 2014.
11. European Commission, *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on an EU strategy for liquefied natural gas and gas storage COM(2016) 49*, 2016.
12. European Commission, *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions Energy, Infrastructure priorities for 2020 and beyond - A Blueprint for an integrated European energy network COM(2010) 677*, 2010.
13. Gas Infrastructure Europe, *LNG Database*, 2019, https://www.gie.eu/ (access: 28.08.2020).
14. GIIGNL, *The LNG Industry: GIIGNL 2019 Annual Report*, 2019.
15. Hartwig M., *Tanker Games – The Law Behind the Action*, EJIL Talk, August 2019, https://www.ejiltalk.org/tanker-games-the-law-behind-the-action/ (access: 05.09.2020).
16. Heather P., *A Hub for Europe: The Iberian promise?*, Oxford Institute for Energy Studies, Oxford 2019.
17. International Maritime Bureau, *ICC IMB Piracy and Armed Robbery Against Ships – 2019 Annual Report*, London 2020.
18. Jensen J.T., *The Development of a Global LNG Market*, Oxford Institute for Energy Studies, Oxford 2004.
19. Jewell J., *The IEA Model of Short-term Energy Security (MOSES)*, International Energy Agency, Paris 2011.
20. Kaczmarski M., *Bezpieczeństwo energetyczne Unii Europejskiej*, Wydawnictwa Akademickie i Profesjonalne, Warszawa 2010.
21. Kasraoui S., *Algeria Loses Status as Spain's Main Gas Supplier*, Morocco World News, May 2020, https://www.moroccoworldnews.com/ (access 30.08.2020).
22. Kaya Caner B. et al., *Gas infrastructure map of the Mediterranean region*, MEDREG, Mediolan 2018.

23. Kochanek E., *Regional cooperation on gas security in Central Europe*, [w:] "Polityka Energetyczna – Energy Policy Journal" nr 22(2019).
24. Kravtsova E., *Spain becomes Europe's cheapest gas market on flood of low-cost LNG*, Reuters, November 2019, https://www.reuters.com/ (access: 18.09.2020).
25. Le Coq C., Paltseva E., *Assessing gas transit risks: Russia vs. the EU*, Stockholm Institute of Transition Economics, Stockholm 2011.
26. Reuters, *UPDATE 2-Bulgaria agrees deal to cut price of Russian gas imports by 40%*, March 2020, https://www.reuters.com/article/idUSL8N2AW22T (access: 15.12.2020).
27. Łoskot-Strachota A., *Great expectations: LNG on the European gas market*, Ośrodek Studiów Wschodnich, Warszawa 2016.
28. M. Schwirtz, *Europe Blames Belarus for Cut in Gas Flows*, The New York Times, June 2010, https://www.nytimes.com/2010/06/24/world/europe/24belarus.html (access: 5.09.2020).
29. Nyga-Łukaszewska H., *Bezpieczeństwo energetyczne na międzynarodowym rynku gazu ziemnego*, Oficyna Wydawnicza SGH, Warszawa 2019.
30. Parfomak P.W., Fritelli J., *Maritime Security: Potential Terrorist Attacks and Protection Priorities*, Congressional Research Service, 2007.
31. Prontera A., *The New Politics of Energy Security in the European Union and Beyond: States, Markets, Institutions*, Routledge, London-New York 2017.
32. Ritter A., *The EU's Gas Security of Supply: Risk Analysis and Management*, College of Europe, Bruges 2011.
33. Ruszel M., *Znaczenie terminali LNG na wspólnym rynku energii UE*, [w:] „Polityka i Społeczeństwo" nr 12(2014).
34. Saul J., *Boat that attacked gas tanker off Yemen carried explosives: shipowner*, Reuters, November 2016, https://www.reuters.com/article/us-yemen-shipping-attack/boat-that-attacked-gas-tanker-off-yemen-carried-explosives-shipowner-idUSKBN12Y2L3 (access: 06.09.2020).
35. Seputyte M., *Lithuania Grabs LNG in Effort to Curb Russian Dominance*, September 2014, Bloomberg, https://www.bloomberg.com/news/articles/2014-10-27/lithuania-grabs-lng-in-effort-to-curb-russian-dominance (access: 11.09.2020).
36. Sikora A., Sikora M., *Nowa Era w Światowym Rynku LNG*, [w:] „Zeszyty Naukowe Instytutu Gospodarki Surowcami Mineralnymi Polskiej Akademii Nauk" nr 105(2018).
37. Simonet L., *Le Printemps arabe et la nouvelle donne de l'énergie*, [w:] "Géoéconomie" nr 66(2013).
38. Skarżyński M., *Greckie terminale LNG w polityce energetycznej państw południowo-wschodniej Europy*, [w:] „Środkowoeuropejskie Studia Polityczne" nr 2 (2008).
39. Statista, *Volume of natural gas imported from Libya to Italy 2010-2018*, 2020, https://www.statista.com/statistics/807120/volumes-of-natural-gas-imported-from-libya-to-italy/ (access: 30.08.2020).
40. Steinhäusler F. et al., *Security Risks to the Oil and Gas Industry: Terrorist Capabilities Strategic Insights*, [w:] "Strategic Insights" nr 7(2008).
41. Stern J., *Security of European natural gas* supplies: *The impact of import dependence and liberalization*, Royal Institute of International Affairs, London 2002.

42. U.S. Energy Information Administration, *Country Analysis Executive Summary: Algeria*, 2019, https://www.eia.gov/international/content/analysis/countries_long/Algeria/algeria_CAXS.pdf (access 26.08.2020).
43. Yergin D., *Ensuring Energy Security*, [w:] "Foreign Affairs" nr 85(2006).
44. Zadorozhna O., *How much do the neighbors pay? Economic costs of international gas disputes*, IEFE-Bocconi, Mediolan 2012.

Łukasz Kordowina, Master of International Relations, graduate of the Faculty of Political Science and International Studies at the University of Warsaw, currently a student of Law and Economics at the Warsaw School of Economics. His scientific interests focus on energy security and international trade in energy resources.
ORCID: 0000-0002-4111-1992

ISSN: **2545-0859**