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ENERGY SECURITY OF POLAND IN THE FACE OF DOMESTIC AND GLOBAL THREATS: CURRENT SITUATION, CHALLENGES AND FUTURE PROSPECTS IN THE CONTEXT OF THE RUSSIAN-UKRAINIAN WAR

BEZPIECZEŃSTWO ENERGETYCZNE POLSKI W OBLICZU ZAGROŻEŃ KRAJOWYCH I GLOBALNYCH: OBECNA SYTUACJA, WYZWANIA ORAZ PERSPEKTYWY NA PRZYSZŁOŚĆ W KONTEKŚCIE WOJNY ROSYJSKO-UKRAIŃSKIEJ

Abstract: Energy security is a key element in the stability of states, and its importance has become particularly apparent in the context of the crisis caused by the Russian-Ukrainian conflict. This article examines the challenges facing Poland in ensuring stable and secure energy supplies, particularly natural gas, in the face of the changing geopolitical situation. It also analyses energy transition processes, including the shift from hydrocarbons to renewable energy sources (RES), which are part of Poland's and the European Union's commitments to reduce greenhouse gas emissions. The article also outlines the impact of key international players, such as the European Union, the US and Russia, on the Polish energy sector. The aim is to understand how these policies affect the country's energy security and what challenges are posed by the decarbonisation of the energy sector. The study, based on case study, forecasting and comparison methods, shows that a full consideration of all factors influencing the energy market is necessary to ensure Poland's energy security. The

Russian-Ukrainian war has significantly affected Poland's energy security, forcing the urgent need to diversify energy sources, become independent of energy resources from Russia and accelerate the transition to renewable energy sources. Adequate literature on the subject from specialised journals of recognised Polish and foreign authors was used to conduct the study.

Zarys treści: Bezpieczeństwo energetyczne jest kluczowym elementem stabilności państw, a znaczenie tego bezpieczeństwa stało się szczególnie widoczne w kontekście kryzysu wywołanego konfliktem rosyjsko-ukraińskim. Niniejszy artykuł bada wyzwania stojące przed Polską – wyzwania w zakresie zapewnienia stabilnych i bezpiecznych dostaw energii, szczególnie gazu ziemnego, w obliczu zmieniającej się sytuacji geopolitycznej. Analizowane są również procesy transformacji energetycznej, w tym przejście od węglowodorów do odnawialnych źródeł energii (OZE). Procesy te są częścią zobowiązań Polski i Unii Europejskiej związanych z obniżeniem emisji gazów cieplarnianych. W artykule przedstawiono również wpływ kluczowych graczy międzynarodowych, takich jak Unia Europejska, USA czy Rosja, na polski sektor energetyczny. Celem jest zrozumienie, w jaki sposób polityki te wpływają na bezpieczeństwo energetyczne kraju oraz jakie wyzwania wiążą się z dekarbonizacją sektora energetycznego. Badanie porównawcze, oparte na metodach analizy przypadków, prognozowania oraz porównań, pokazuje, że pełne uwzględnienie wszystkich czynników wpływających na rynek energetyczny jest niezbędne, aby zapewnić bezpieczeństwo energetyczne Polski. Wojna rosyjsko-ukraińska znacząco wpłynęła na bezpieczeństwo energetyczne Polski i wykreowała pilną potrzebę dywersyfikacji źródeł energii, uniezależnienia się od surowców energetycznych z Rosji oraz przyspieszenia przejścia na odnawialne źródła energii. Do przeprowadzenia badań wykorzystano adekwatną literaturę przedmiotu pochodzącą z wyspecjalizowanych czasopism i stworzoną przez uznanych autorów polskich i zagranicznych.

Keywords: energy security, energy transition, Russian-Ukrainian conflict, energy challenges.

Słowa kluczowe: bezpieczeństwo energetyczne, zmiany energetyczne, konflikt rosyjsko-ukraiński, wyzwania energetyczne.

Introduction

Throughout almost the entire 20th century and the first decades of the 21st century, energy security was one of the main strategic objectives of states. Decision-makers in charge of energy policy used both domestic raw material resources and energy generation technologies to ensure state sovereignty. Lack of access to or acquisition of stable sources of raw materials led to problems with the functioning of state infrastructure, weakening their position internationally and domestically. Throughout the history of the 20th and beginning of the 21st centuries, there have been instances where states have used energy resources as a political tool to obtain concessions from weaker countries. An example is the policy of the Arab states after the 1973 Yom Kippur War, when, following the defeat of Egypt and Syria, the Arab states imposed an embargo on oil supplies to Western countries, which triggered an oil crisis. In the face of today's challenges, the Polish authorities need to develop and implement an energy security policy. For many years, Poland was dependent on a single supplier of oil and natural gas, which posed a threat to the stability of its economy. In addition, the country has become dependent on imported hard coal, mainly due to a lack of investment in the coal sector and rising production costs. The decarbonisation process, aimed at protecting the environment from the effects of climate change, is also an important factor in this context. Energy raw materials, such as gas and oil, were supplied to Poland as early as the 1970s from the USSR and after 1989 from the Russian Federation. Poland, lacking sufficient energy raw material resources, was not able to achieve full self-sufficiency. Although in the 1960s more than half of the gas for consumption came from domestic deposits, this figure has now fallen to 25%, and forecasts indicate that production is unlikely to increase significantly, despite political announcements. Poland's energy security also includes an effectively functioning heat and power infrastructure. For many years this was based mainly on hard coal and lignite. Over time, new developments have emerged, allowing the production of energy from renewable energy sources (RES) and from gas, which has become a raw material used for heat, electricity and also as a vehicle fuel. However, the transformation of the energy sector has not yet progressed enough to significantly reduce the share of hydrocarbons in energy production. Although the commitments made by many countries in this regard are becoming more

and more realistic, they still remain a challenge that will have to be met in the near future, compared to the situation in the 1990s.[1]

The current state of research in security sciences and energy security

The goal of any authority, at all levels and in almost every institution, is to provide security to a degree that meets public expectations. These expectations are both objective and subjective in nature. In the case of the objective aspect, authorities and institutions can more easily identify problems and take corrective action using the tools and mechanisms available. In the subjective context, on the other hand, it becomes crucial to manage image, to present phenomena and events appropriately and to work on changing public perception and awareness over the long term. Such tasks can sometimes be more difficult, as they often conflict with local traditions and conditions that may go beyond existing legal norms. In some developed countries, there are still places where customary law, elements of feudalism or local traditions are more important than legal norms and generally accepted rules of conduct, which are obvious to elites but not necessarily to people from further afield. Despite the passage of time, the development of technology and changes in consciousness, society, identity and civilisation, the two foundations – state and authority – are still an important element in the creation of new definitions and models of security.[2] In an era in which respect for human rights and the protection of the environment are becoming priorities for many states, security theorists increasingly refer to the theory that the most important element of security is the pursuit of individual, societal or state survival at the expense of others. This theory was first formulated by T. Hobbes, who expressed it with the famous statement: 'man is a wolf to man', which is still relevant today. Expanding on this thought, it is worth pointing out that, both in the past and in the present, there is a constant struggle to ensure survival, which takes various forms. Often it is a competition regulated by legal and moral norms, but there is also no shortage of violent conflicts for survival in which rules are broken or do not exist at all. In ancient Rome, the word 'securitas' was the equivalent of the modern concept of security. It was derived from the expression 'sine

[1] *Paliwo przyszłości*, CIRE.pl, https://www.cire.pl/artykuly/materialy-problemowe/183793-paliwo-przyszlosci, (accessed 4.02.2025).

[2] N. Machiavelli, *Książę. Rozważania nad pierwszym dziesięcioksięgiem historii Rzymu Liwiusza*, Unia Wydawnicza „Verum", Warszawa 2008, p. 23.

cura', which meant 'without care.' 'Custody', on the other hand, was associated with terms such as care, control and supervision. When talking about the care of someone or something, it meant exercising control over them. Cicero, a well-known speaker and philosopher, played an important role in the consideration of war and peace. He addressed the nature of peace and the atrocities associated with war, advocating peaceful solutions based on compromise and consensus. At the time, security was linked to the dilemmas of war and peace, and in the Middle Ages mystical and religious elements were added to these considerations. The ethos of the knight – the defender of virtue – also emerged. Learned monks, when writing about war, often referred to the fourth commandment of the Ten Commandments – 'thou shalt not kill.' Niccolò Machiavelli argued that each individual possessed the energy and will to act, which could only be harnessed in a state that upheld the social order and had the means to ensure individual and societal happiness, freedom and security. He emphasised the importance of the economy, legislation and fair and balanced internal relations in the state. Thomas Morus and Thomas Campanella, on the other hand, focused on the problem of property, which they considered to be a source of armed conflict. They proposed a solution to this problem through the state, which, except in exceptional situations, should be the possessor of property to the fullest extent possible. The 1990s represented a breakthrough in the understanding of security issues, especially after the end of the Cold War. During this period, a number of new theories and analyses emerged from a broad scientific approach. The Copenhagen Peace Research Institute expanded the definition of security, linked to the end of totalitarian rule in many countries and their transition to democratic or authoritarian systems. In response to these developments, the focus began to shift more towards the individual and society, taking into account the subjective dimension of security. The concept of societal security was introduced. Copenhagen researchers pointed out that security issues cannot be analysed solely at the level of the individual, but must first be considered in the context of social subsystems.[3] According to Roman Kuźniar, a Polish international relations theorist and government advisor, security is a basic existential need of both individuals and social groups, as well as of states.[4] Security can be classified according to its specific nature, which helps to answer the question of what security actually is. It also defines the areas of interest for both researchers and policy-makers who implement

[3] A. Gdula, *Wybrane historyczne i współczesne koncepcje bezpieczeństwa*, "Doctrina. Studia Społeczno-polityczne" 2011, vol. 8, no. 8, pp. 65–66.

[4] R. Kuźniar, *Po pierwsze bezpieczeństwo*, "Rzeczpospolita", 9.01.1996.

the theories in practice. The scope of these areas is broad and may expand further over time, as in the case of strategic culture, which encompasses a broader context than security, but has its roots in the latter. No one would have guessed that the research would address the strategic culture of organisations like ISIS or al-Qaeda, and in the future may also include the activities of multinational corporations, which would require adapting the tools and indicators used to analyse the strategic culture of states.[5]

In the 18th century, natural gas began to be used for street lighting in large cities. In contrast, the massive use of oil in the 20th century revolutionised the energy transition, replacing coal with a more efficient resource. In the early 20th century, coal-powered cars set speed records, but a few years later, engines powered by oil and petrol became the basis for the development of the modern economy. Countries with access to energy resources developed much faster and had a stronger position on the international stage than those that had to rely on imports. Despite technological advances that may affect these principles, this situation is not expected to change dramatically by the end of the third decade of the 21st century. Consequently, energy security, still largely based on hydrocarbons, is an important part of the strategic culture not only of states, but also of transnational corporations whose budgets exceed those of many medium-sized European states.[6] Energy security belongs to the category of public goods, which are characterised by the fact that they serve the whole of society or a particular local community. The consumption of such goods is egalitarian and the use of these goods by one person does not restrict access to them by others. The benefits of such goods are shared and indivisible. The responsibility for ensuring energy security lies with the state authorities, which can use various mechanisms and tools. These authorities may also delegate some responsibilities to the private sector, but this does not relieve the state of its responsibility

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[5] C. Drozd, *Kultura strategiczna – geneza, definicja i praktyczne zastosowanie*, "Roczniki Studenckie Akademii Wojsk Lądowych" 2017, no. 1; A. I. Johnston, *Thinking about Strategic Culture*, "International Security" 1995, no. 4, pp. 36–43; J. Glenn, *Realism versus Strategic Culture: Competition and Collaboration*, "International Studies Review" 2009, vol. 11, no. 3, pp. 530–531.

[6] See J. de Vries, *The Industrious Revolution: Consumer Behaviour and the Household Economy – 1650 to the Present*, Cambridge University Press, Cambridge 2008, pp. 40–90; C. A. Bayly, *The Birth of the Modern World, 1780–1914: Global Connections and Comparisons*, Blackwell Publishing, Malden 2004, pp. 23–59; R. C. Alen, *The British Industrial Revolution in Global Perspective*, Cambridge University Press, Cambridge 2019, pp. 340.

for the proper functioning of the energy sector.[7] To define energy security, it is useful to refer to legal acts. According to the Energy Law, 'energy security' is such a state of the economy that ensures that the future demand of consumers for fuels and energy is met in a manner that is both technically and economically justified.[8]

Poland's energy resources

Poland belongs to the group of countries representing the Old Continent that lack strategic energy resources. Excluding the United Kingdom, which until recently was self-sufficient in oil and gas production, there is currently no country in the EU that is able to cover its own needs in terms of the necessity to use hydrocarbons. It is no different for the Polish energy sector. The exception in this regard is the depleting deposits of hard coal, which as an energy resource is slowly being replaced by RES, nuclear energy and, as part of the transition period declared by the EU necessary for the full modernisation of the energy sector, by gas. Poland has small deposits of natural gas and oil, which is not being exploited, but only the discovery of the deposit on geodetic maps. This is due to the geological location of the deposits and the cost-effectiveness of production. The situation is much better on the previously mentioned hard coal market, although in this case too, in recent years, serious problems have arisen related to the difficulties of exploiting deep deposits and, consequently, the costs of extraction, which are too high in relation to the price on world markets.

Poland's natural gas and oil sector comprises an extensive and cyclically upgraded transmission infrastructure. Two key gas pipelines and one oil transport pipeline run through the territory of Poland, which until now made our country an important transit hub for Russian energy resources. However, as a result of the Russian-Ukrainian conflict, operations on the Yamal gas pipeline have been suspended and on the Druzhba gas pipeline have been significantly reduced. Oil supplies are currently being delivered by tanker as a result of the sanctions imposed by the European Union on Russia. Work is also underway to introduce a price cap on Russian oil, which would apply to EU and G7 countries. In this

[7] J. Braun, *Bezpieczeństwo energetyczne jako dobro publiczne. Miary i czynniki wpływające na jego poziom*, "Studia Ekonomiczne. Zeszyty Naukowe Uniwersytetu Ekonomicznego w Katowicach" 2018, no. 358, p. 14.

[8] W. Bojarski, *Bezpieczeństwo energetyczne*, "Wokół Energetyki" 2004, vol. 7, no. 3.

context, it can be said with a high degree of probability that Poland is ceasing to act as a transit state for oil and gas. This is a conscious political decision, taken even before the outbreak of the armed conflict in Ukraine. Decisions concerning the diversification of supply sources were taken relatively recently, but it is worth noting that they have been implemented by all previous governments, which have tried to implement the goals contained in the energy strategy developed back in the 1990s. Thanks to the steps taken, the Polish energy sector gained a terminal for receiving LNG, which significantly increased our independence from Russian supplies. As a result of the modernisation works carried out and the expansion of the gas terminal, the capacity to obtain gas has increased to 6.8 bcm per year. A further capacity increase of 0.7 bcm is planned for the future. In addition, there are plans to build a new gas port on the Baltic Sea and to lease or purchase a floating terminal with a capacity of 2.5 bcm to 3.5 bcm of gas per year. Since the 1970s, an oil transmission infrastructure has been developing, initially built back in the communist era. This makes it possible to obtain oil by sea via the Baltic Sea. Poland also has an extensive network of refineries, including two of the largest in Płock and Gdańsk. Their capacity, once domestic demand has been met, allows the export of surplus crude oil and petroleum products. Over the past three decades, both oil terminals and refining plants have been modernised several times. The oil processing base has been significantly expanded and the fuel distribution network has been extended to cover not only the domestic market, but also the foreign market, especially in Central and Eastern Europe.[9] From the perspective of rationalising processes in the energy sector, it will be crucial to include natural gas deposits in land-use planning, which will enable their exploitation in the future, if not immediately. This belief stems from the progressive improvement in gas extraction technology, making previously unprofitable deposits profitable. Unfortunately, the implementation of these plans will mean that gas production in Poland will not significantly exceed 4.5 bcm per year in 2030. Due to the limited availability of deposits, the country is unable to achieve a higher output, and forecasts do not predict a change in this trend in the near future.[10]

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[9] W. Stelmach, *Gazociąg Baltic Pipe osiągnął pełną przepustowość*, RMF24, https://www.rmf24.pl/fakty/polska/news-gazociag-baltic-pipe-osiagnal-pelna-przepustowosc,-nId,6444029, (accessed 5.08.2025); Ośrodek Studiów Wschodnich, *Azerski gaz dla ukraińskiego gazoportu*, OSW, https://www.osw.waw.pl/pl/publikacje/analizy/2011-02-02/azerski-gaz-dla-ukrainskiego-gazoportu, (accessed 3.02.2025).

[10] P. Janusz, *Zasoby gazu ziemnego w Polsce jako czynnik poprawiający bezpieczeństwo*

Energy sources of the future: current situation, work on their implementation and prospects

In response to the growing problems associated with the use of fossil fuels, many innovative solutions have emerged, some of which have already been experimentally implemented. A common feature of fuels of the future is their minimal or even zero emissions, as well as their much higher energy efficiency compared to traditional fossil fuels. One such fuel that is already partly being used in industry is Helium 3. Qatar, Russia and the United States have the largest reserves of this element. Poland is one of six countries which are both possessors and producers of Helium 3. We produce approximately 800 tonnes of this raw material annually, of which we sell almost 600 tonnes.[11] In the future, perhaps not for a long time, Helium 3, a rare element, will be used in the energy industry. Resources of this element on Earth are limited, but much larger amounts are found on the Moon, where samples have already been experimentally collected. The exploitation of Helium 3 from the Moon is becoming more and more realistic. To illustrate the potential, 500 kg of Helium 3 is enough to power a city the size of Berlin, inhabited by 3.5 million people, for a year. Helium 3 is a much more efficient energy source than other fuels, and its energy output exceeds that of crude oil by 1,400%. Thanks to its one neutron instead of two, Helium 3 has a wide range of applications not only in energy, but also in medicine and aviation. The most important thing, however, is that it can be used as fuel in thermonuclear fusion reactions, which allows the production of clean energy. Moreover, the process is zero-emission, and the only by-products are Helium-4 and hydrogen, with no carbon dioxide emissions or radioactive waste.[12] Difficulties related to the limited resources of Helium 3 on Earth could be solved by developing technology to transport this element from the Moon. There are stocks of Helium 3 on the Moon that could meet our planet's energy needs for about 250 years.

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energetyczne na tle wybranych państw UE, "Polityka Energetyczna" 2010, iss. 1, pp. 36–37.

[11] I. Trusewicz, *Gazprom stawia na Hel*, Rzeczpospolita, https://energia.rp.pl/gaz/art18011791-gazprom-stawia-na-hel, (accessed 3.02.2025).

[12] *Izotop z księżyca wywoła rewolucję w energetyce?*, Energetyka 24, https://energetyka24.com/atom/izotop-z-ksiezyca-wywola-rewolucje-w-energetyce, (accessed 4.02.2025).

The impact of the external environment and the situation of the energy sector

The global network of economic connections, which is gaining strength every year, is increasingly influencing political strategies, including those related to energy security. These strategies cannot be implemented in isolation from the broader political and economic context. The COVID-19 pandemic has highlighted how disruptions in supply chains or the absence of one important entity in international circulation can have a significant impact on the situation of other countries, although the effects of this impact vary. Therefore, a correct analysis of a given country's energy policy must take into account external factors that often have a dominant influence. Politicians, forced to respond to these changes, are adapting their strategies, building them from scratch. Many factors are crucial, while others have a more transitory impact, but they are virtually impossible to ignore in energy policy, both at global and regional levels. More and more new entities in international relations are gaining greater influence on the global economy, including the energy sector, at the expense of traditional powers. Countries that export energy resources use their dominant position to obtain political and economic concessions from countries that must import raw materials. Therefore, their energy policy is not limited only to the sale of raw materials, and there are no signs that this trend will change in the near future.[13]

Membership in regional and international organisations means that countries no longer have full control over the situation on national or transnational markets for energy raw materials. An example of this phenomenon is the situation of the European Union, which is assessed both in terms of institutional and national interests. Problems related to energy security were ignored for many years, which led to the outbreak of an armed conflict that spread to the eastern part of Europe and affected all European countries politically and economically. This mainly affected the natural gas and oil sectors, although in the case of oil, the impact was smaller due to better transport options. Financial mechanisms used in contracts and transfers are also an important factor shaping the situation on the global energy raw materials market, including the European market. An example may be the impact of sanctions on the Russian energy sector, which on the one hand slowed down the growth of export earnings, but on the other hand were

[13] A. Grabowska, *Dylematy energetyczne Federacji Rosyjskiej*, "Przegląd Bezpieczeństwa Wewnętrznego" 2009, no. 1, pp. 78–88.

used by Russia to "newly open" the international raw materials market. After 1989, the key goal of Polish foreign policy was joining the European Union and NATO. This choice resulted from a deep sense of threat posed to Poland by Russia, which continued tsarist and Soviet traditions. Russian influence on Polish politics, economic and social affairs has been dominant since 1717, when Tsar Peter I introduced significant changes to the Polish political system which resulted in Poles being deprived of the right to vote. This domination lasted until the interwar period and until 1989, with some interruptions. One of the significant threats to Poland's security was its dependence on energy resources imported directly from Russia or transported via the Russian transmission infrastructure.

The concept of developing the energy raw materials market in Europe, developed by the European Union institutions, differed significantly from the vision of the energy sector presented by the Polish authorities since its accession to the EU. There was a clear division between Western European countries and the countries of Central and Eastern Europe, especially the Visegrad Group countries and the Baltic states, which were former members of the USSR. In Western Europe, especially in Germany, France, Italy and Austria, there was a belief in the need to maintain close energy relations with Russia, which resulted from attractive natural gas prices and effective lobbying by Russian companies for its sale. This energy policy was intended to create competition for the economic policies of the US and China, which were based on higher prices of hydrocarbon raw materials than Russian prices.

When analysing changes in the European Union's energy security strategy, which are also of key importance for Poland, other factors that affect the global energy raw materials market, in which Europe plays an important role, should also be taken into account. Despite the ongoing transformation towards renewable energy sources, hydrocarbons remain the foundation of the economic power of states and international institutions and are strongly linked to the interests of individual countries. Unfortunately, the depletion of natural gas and crude oil resources and the abandonment of Russian energy resources, or at least their significant reduction, may lead to greater dependence on the USA, which is becoming a key supplier of hydrocarbons to Europe. It is important to note that while the US is a strategic security partner, in the economic sphere it acts as a competitor to the European Union, both on a general scale and in the context of national interests. Temporary agreements on the import of American LNG to Europe, resulting from the current situation on the Russian-Ukrainian front, may turn out to be unfavourable not only for the European energy sector, but also for the

entire EU economy. Currently, settlements for American LNG are made via the American stock exchange and not based on global trends, which may lead to unfavourable changes in the structure of trade in energy raw materials.

For almost three decades, after regaining full sovereignty, Poland was dependent on Russian supplies of natural gas and crude oil, which played a dominant role in the Polish energy sector. Over the years, as the infrastructure was expanded, this dependence began to decrease, and after the outbreak of the Russian-Ukrainian conflict, it gradually disappeared. Although we have stopped importing natural gas directly from Russia since 2022, we still obtain crude oil, which Polish refineries process at a high profit. However, also in this case we are observing a noticeable decline in the amount of oil imported from Russia. After 2014, the conflict between Russia and Ukraine, which was initially frozen, turned into a full-scale war in February 2022, continuing with varying intensity, depending on the losses of both sides, the availability of weapons and weather conditions. This conflict has caused significant changes in international geopolitics and in the energy sector, especially in the field of raw materials. It has also accelerated the process of abandoning Russian gas and oil in favour of other sources of hydrocarbons, which has worsened the economic situation of many European Union countries. As a result, the price structure is changing and Urals oil has become cheaper than Brent oil, leading to an increase in illegal transactions. The armed conflict between Russia and Ukraine also affected the import of hard coal from Russia, which negatively affected Poland. As a result of the imposed sanctions, Poland limited its possibilities of obtaining this raw material, especially high-calorific coal, which was competitively priced compared to other suppliers. Poland has started an intensive search for new contractors who could replace Russia in the supply of this key raw material for the energy sector. Even though producers were found to fill the supply gaps, it became obvious that it would be necessary to accelerate the process of abandoning hard coal as the main raw material for the production of heat and electricity.

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Summary

After 1989, Poland underwent a significant transformation in the field of energy security, which was based on the diversification of sources of energy raw materials and the development of gas infrastructure. Despite limited domestic extraction of raw materials, a key step towards increasing energy independence was accession to the European Union, which enabled the development of gas connections with neighbours, including Germany, Ukraine, and the construction of the LNG terminal in Świnoujście and the Baltic Pipe project. Despite this, Poland still struggles with a gas balance deficit, and dependence on imported gas remains a challenge. It is important to remember and continue to take into account that changes should also be undertaken through well-led participation and dialogue.[14]

In parallel, the country has made efforts to decarbonize the energy sector, developing renewable sources and planning to introduce nuclear energy. However, this process is hampered by the high costs of transformation and the need to reduce dependence on imported raw materials. Changes in the diversification of crude oil sources, especially thanks to the expansion of the infrastructure at Naftoport, help reduce the risk in this area. As a result of the Russian-Ukrainian war, Poland is in a position to achieve greater energy security through the development of energy infrastructure, international cooperation and investment in alternative energy sources, which will simultaneously reduce CO_2 emissions and increase the country's economic stability.

Poland currently faces the challenge of completing the decarbonization process, which involves significant financial and social costs. Despite the development of infrastructure and the diversification of supply sources, there is still a need for further investments and international cooperation to ensure the country's energy stability. The conclusions from the analysis indicate the need to continue activities to develop technology, diversify sources of raw materials and adapt to changing geopolitical and economic realities, which will allow Poland to maintain energy security in the long term. The Russian-Ukrainian conflict has had a significant impact on Poland's energy security, accelerating the need to diversify sources of energy raw materials and building alternative gas supply routes. Disruptions in gas supplies from Russia, which was one of the key energy sources, forced Poland to accelerate the development of LNG infrastructure and projects such as the Baltic Pipe. Consequently, the Ukrainian war highlighted the need to further energy transformation, increase energy independence and strengthen cooperation with international partners to ensure energy stability.

[14] K. Jurek, *Dialog i partycypacja obywatelska na poziomie lokalnym na przykładzie miasta Krakowa*, "Zeszyty Naukowe Collegium Witelona" 2023, no. 49(4), pp. 49–59, https://doi.org/10.5604/01.3001.0054.5169.