CAN THE SEA HELP?

The Baltic Sea and Poland's energy security

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OPPORTUNITY
Institute for Foreign Affairs

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Abstract

In the face of changes in global energy markets, modifications to the transport routes of energy resources and the tense geopolitical situation (including Russia's military aggression against Ukraine), **Poland still faces the challenge of ensuring energy security.**
The report "Can the sea help? The Baltic Sea and Poland's energy security" **emphasizes the growing importance of the Baltic Sea in the implementation of Poland's energy policy goals.** In the report, the authors discuss the opportunities and challenges related to the development of energy infrastructure in the Baltic Sea and the Polish coast (including offshore wind farms, import terminals and a nuclear power plant) and seek an answer to the question of **whether the concentration of generation capacity and import infrastructure in the north of the country increases Polish energy security?**

- Thanks to its extensive access to the Baltic Sea, **Poland occupies a privileged position** compared to other countries in the Central and Eastern European region.
- Ensuring **freedom of navigation in the Baltic Sea** is essential for trade and energy security of Poland and the region.
- **Ports are becoming guarantors** of access to the resources of the global market, energy carriers, components and raw materials.
- Ports in Gdańsk, Gdynia, Szczecin and Świnoujście generate **revenues of PLN 58 billion** for the Polish budget an amount slightly below the total contributions of all legally employed individuals in the country.
- After the start of Russia's full-scale aggression against Ukraine, the energy infrastructure in the Baltic Sea and on the coast, which had been developed for years, as well as the strategic interest of the state implemented by state-owned companies, **allowed for the diversification of energy and raw material supplies to Poland.**
- **Poland's energy dependence on the Baltic Sea,** understood as the ratio of imports of main energy raw materials and energy carriers to their total consumption in the country, **currently amounts to 48%, and may increase to 61% by 2040.**
- Poland's existing political documents emphasize the importance of building individual energy installations at sea or on the Polish coast for generating the required electricity and diversifying supply routes, but **are devoid of a broader, updated strategic vision.**
- Although Baltic energy investments create the independence of the state, their location in the marine environment **creates certain vulnerabilities to threats.**
- Referring to the Baltic Sea as a "NATO lake" may lead to **the false impression** of full control of the strategic situation and the Alliance's overall dominance over the Russian Federation, mainly in the context of conventional naval forces.
- The Baltic Sea continues to play an important role in **Russia's policy, which is actively seeking asymmetric and hybrid measures** to compensate for its unfavorable situation.
- It is of fundamental importance to ensure the **protection of strategic energy infrastructure** located in the Baltic Sea region, as well as to expand the naval fleet capable of controlling key geographical areas.
- Multi-level security and increased **resilience in the northern vector** within the economic dimension of Poland's foreign policy are also becoming crucial.
- It is in the interest of Poland and the countries of the region to build such political relations and develop energy infrastructure that will enable the continuity of supplies based on **alternative routes** in a crisis situation in the Baltic Sea basin.

Magdalena Maj

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Table of contents

Baltic Sea in Winter

Can the sea help?

The mission of The Opportunity Institute for Foreign Affairs is to notice hidden potential and point out non-obvious possibilities. We also draw attention to events and trends that may directly or indirectly affect the political and strategic choices of Poland and our region.

In the face of changes in global markets and major trade routes, Russia's military aggression against Ukraine and related economic sanctions, as well as the European Union's aspirations to continue the green transformation while building the continent's resilience to various threats - it is extremely important to shed new light on the issue of ensuring Poland's energy security. In this context, one of the most important threads has become Poland's growing dependence on supplies of raw materials and energy transported by sea or produced in the Baltic Sea area. Is the sea really the solution to Poland's energy security problems?

"It is extremely important **to shed new light** on the issue of ensuring Poland's energy security."

Although the Baltic Sea itself does not supply Poland with sufficient amounts of energy resources, it plays a fundamental economic role as a transport and trade route, and will soon become one of the most important centers of electricity production in Poland. The diversification of oil and gas supply routes caused by the departure from Russian energy resources, the construction of offshore wind farms motivated by the energy transformation, and the construction of a nuclear power plant in the north of the country justified by the need for stable and low-emission generation – all these elements lead to the concentration of energy activity in a very limited, militarily sensitive Baltic area.

A number of further questions arise. Can Poland become excessively dependent on the Baltic route for energy? Do the growing geopolitical tensions in the region pose a threat to the strategic plans for the development of Polish energy on the coast? Can Poland, by taking advantage of its coastal location, still become a leader in regional energy cooperation?

We decided to seek answers to these questions together with the Ignacy Łukasiewicz Energy Policy Institute and the best Polish experts in the field of energy security and maritime economy. Our goal was to draw the attention of decision-makers, the analytical community and public opinion to the issue of the increasing dependence of Polish energy sector on the Baltic Sea, as well as to place this issue in a broader political, economic and military context.

"**Do the growing geopolitical tensions in the region pose a threat** to the strategic plans for the development of Polish energy on the coast?"

In the first chapter, Paweł Turowski argues that thanks to its geographical location and access to the Baltic Sea, Poland can achieve a privileged position in the architecture of global and regional trade, and integration in the meridional system (characteristic of the Three Seas Initiative, among others) generates significant economic advantages for Poland. In the second chapter, dr Konrad Popławski, PhD, points out that in the face of numerous crises, seaports are guarantors of Poland's access to security and economic stability. Given the development of strategic energy infrastructure at sea (requiring the construction of an appropriate base on land), as well as the growing number of coal, gas or oil transshipments, Polish seaports may become true energy hubs in the future. The third chapter of the report, authored by Zuzanna Nowak and Magdalena Maj, is devoted to an overview of Baltic energy investments in the context of Poland's international and domestic policy. Although the national strategic and political documents

Storm on the Baltic Sea seen from Kołobrzeg

currently in force emphasize the importance of projects implemented in the Baltic region for diversification and increasing the country's energy security, they require urgent revision, multi-level coordination and a broader context for realizing Poland's interests. The chapter shows to what extent Poland is currently dependent on the Baltic Sea for energy and how – in accordance with the assumptions of the current energy policy – this dependence may change leading up to 2040. Although independence from Russia and redirecting some imports to the Baltic route have led to increased energy security for Poland in recent years, the significant concentration of energy activity in the Baltic Sea may raise concerns in the future. The analysis of the security and technical conditions of Baltic energy infrastructure, included in the fourth chapter and prepared by Captain Rafał Miętkiewicz, indicates that these investments further the independence of the Polish state, but their location in the maritime environment creates vulnerabilities to threats, including from Russia. Hence, it is crucial to build the security of critical infrastructure facilities, both at the national level and within regional and NATO cooperation. In the last chapter, dr hab. Mariusz Ruszel, Professor of the Rzeszow University of Technology, emphasizing the key role of the Baltic Sea for the energy security of Poland and other countries of Central and Eastern Europe, simultaneously postulates the need to build solid, alternative ways of ensuring the continuity of supplies of energy resources and fuels. It also draws attention to the vulnerability of Polish energy companies to various threats, including those related to human resources management.

We hope that this report will become a valuable source of information for you and will shed new light on the issue of Polish energy security.

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1. Access to the sea as a strategic goal for Poland – Paweł Turowski

Central Europe is located in a crucial place – it allows control over trade flows between Asia and Europe. Halford Mackinder, the father of geopolitics, claimed that whoever controls this part of Europe controls Eurasia and thus controls the world. If we were to look for a key element that forms the foundation of the Central European region, it is undoubtedly the Baltic Sea. This body of water is an essential link for all cooperation formats – both economic, such as the Three Seas Initiative, and security – such as NATO's Eastern Flank and the Bucharest Nine. In this approach, freedom of navigation in the Baltic Sea creates, on one hand, a basis for building economic competition, creating new trade routes that allow for faster catching up on economic backwardness, and on the other – it is an essential link for military security, without which no economic or political order can function effectively.

Railway leading to the Gdańsk Shipyard

It is worth recalling when, for the first time since the restoration of democracy in Poland after 1989, the role and significance of the Baltic Sea were included in the geostrategic interests of the state and, more broadly, in the interests of the Central European region. This took place in 2016 in Croatia during the Summit initiating cooperation in the Three Seas region. Then, events unfolded rapidly: a few months later, in 2017, at the Royal Castle in Warsaw, in the presence of US President D. Trump, documents initiating cooperation between the

countries located between the three bodies of water: the Baltic Sea, the Black Sea and the Adriatic were signed. In this way, the three seas gained a new status – irreplaceable and indispensable links for a new format of international cooperation. It was emphasized that the countries located between the seas would strengthen cooperation and European integration in the meridional system. EU community funds are to be used to saturate the region with the necessary infrastructure investments. To conclude, the process of connecting the region with new land transport routes has been launched, from the seaports of the Polish Baltic Sea coast to the ports of the Black Sea and the Adriatic Sea. One may ask: has the idea of using the strategic advantages that Poland gains through access to the Baltic Sea been reflected in state strategic documents? The Baltic Sea, in various approaches and contexts, has been included many times in the National Security Strategy (NSS) of 2020 — the highest-level strategic document from which sectoral strategies derive. Notably, the Baltic Sea is even explicitly emphasized in the NSS. This is how it is recommended to develop regional cooperation in the Baltic Sea basin, and this is associated with the Three Seas Initiative[1]. It is postulated to use the potential of Poland's coastal location and the country's transit location. It is indicated that for Poland's strategic interests, the construction of a meridional axis with access to the Baltic Sea is more important than a latitudinal route from East to West[2]. Therefore, the next recommendation concerns the expansion of seaports, both large (included in the list of strategic EU transport routes) and smaller of a regional nature. These directions

The fundamental importance of the Baltic Sea for Polish trade and security defined in the National Security Strategy

Entrance to the sea port in Ustka

"For Poland's strategic interests, **the construction of a meridional axis with access to the Baltic Sea** is more important than a latitudinal route from East to West."

of action were combined with the recommendation to expand the network of motorways and railways for Central Europe and the Balkans (including Via Carpathia) in the meridional system. In turn, on a national security level, a strategic goal was set, which is to bring Finland and Sweden into NATO, taking into account the role of these countries for the security of Poland and the Baltic Sea region[3]. The National Security Strategy adopted in 2020 defines key actions to enable full use of the opportunities and advantages generated by Poland's access to the Baltic Sea in the commercial and economic dimension, as well as military security.

Why is the importance of the meridional system growing, with the key role of the Baltic Sea?

The answer is clear – in economic terms, the main reason lies in the weakening of the current development model, based on the latitudinal system and the resulting need to support it with a new growth engine. Since trade flows in the latitudinal system from the West to the East create a core system based on the countries of Western Europe – primarily Germany and France, the Polish state naturally complements this core. This should also be seen in a broader perspective – if the center of the world was in the Atlantic space, between the United States and the West of the Continent, then somewhere in the Central and Eastern part of Europe there are organic semi-peripheries and peripheries[4]. In this approach, the latitudinal system creates an objective difficulty for areas distant from the core in attempts to change their position. The distance from the center-core determines the key structural dependence influencing changes. In connection with this, one of the most important civilizational challenges, which is to continue maintaining the pace of economic growth, higher than in Western countries, becomes a significantly more difficult challenge. Due to the described structural arrangement, the core countries export to the adjacent regions (semi-peripheries and peripheries) those parts of the production chains that generate lower value and smaller margins, leaving the most profitable ones for themselves. This is a kind of ABC of the free flow system and this is how all mature economies of the world operate, with the United States at the forefront.

Since in the previous model, the countries located in Central Europe were the "subject of history", strengthening the power of the largest economies of the Atlantic system, the meridional project based on the Baltic Sea naturally generates an alternative status called the "object of history" - in which the Polish state gains structural advantages, enabling it to aspire to the position of a regional core area .

Graphics 1.
Latitudinal system – Poland outside the core area

Source: own elaboration, P. Turowski.

The process of changing position in the global peloton is easier for Poland to achieve, primarily due to changes in the political, trade, economic and security environment on a global level. The growing role of the Far East countries in global production and economic exchange over the past dozen or so years has triggered the construction of an alternate center of world trade, resulting in, among others, the growing importance of the Central European region. In the new architecture of world trade, achieving a privileged position is becoming possible thanks to the use of the geographical position of the Polish state, which ensures, on one hand, direct communication with the centers of world trade via the ports of the Baltic Sea, and on the other hand, the status of an indispensable transit link for goods and commodities to the Central European landlocked countries.

> "In the new architecture of world trade, achieving **a privileged position is becoming possible**."

Graphics 2.
Meridional system – the key role of the Baltic Sea for Poland's core position in the Central European region

Source: own elaboration, P. Turowski.

Such an arrangement constitutes the international format of the Three Seas Initiative. In this perspective, EU development policies, subsidies for the construction of North-South transport routes, to ports on the Baltic, Black Sea and Adriatic are instruments facilitating multidirectional trade. Are they competition for the existing routes and economic relations? Certainly. But economic competition, the construction of a competitive market is the core of European integration. From this perspective, the construction of new transport routes based on the Baltic Sea gateway promotes trade and leads to levelling the standard of living of citizens in this part of the continent.

How the Baltic Sea generates economic advantages. Ports pay as much to the budget as all legally employed workers in Poland

It is therefore worth checking specific data whether the described meridian model with the pivotal role of the Baltic Sea and the regional - core position of the Polish state generates economic advantages. The data indicates that in total the four largest centers: Gdańsk, Gdynia, Świnoujście and Szczecin, transshipped 145.7 million tons of goods in 2023. This is an increase of 10% year on year. The Port of Gdańsk is the most dynamically developing European port: over the last decade, transshipment increased by as much as 167%. Large flows of goods translate into huge revenues for the state budget. In 2022, revenues from taxes, customs and excise duties on goods unloaded in ports reached PLN 58 billion[5]. If the state budget received PLN 61.8 billion from payroll tax, it means that seaports earned 94% of the budget revenues from PIT[6]. Payroll tax is paid by all employees in Poland, i.e. over 15 million people. This shows that the three port complexes generate revenues for the state budget that are slightly lower than those generated by all legally employed workers. It would be hard to find a more striking example of the benefits brought about by a combination of factors: the process of building another world trade center in the Far East, import of goods via Baltic ports to Poland and Central European countries, an increase in the wealth of the population and participation in the single market of the European Union. It should be emphasized that obtaining high revenues from customs and excise duty would not be possible without regulations that allow the first country of the Community to take over part of the levies for introducing goods to the common market.

> "Obtaining high revenues from customs and excise duty **would not be possible without regulations.**"

Can the revenues from imports carried out by Polish ports be higher? After the completion of the construction of the external container port in Świnoujście with a target unloading capacity of 1.5 million TEU (20-foot containers), the external port in Gdynia (2.5 billion TEU)[7] and the port in Gdańsk (an increase of 1.7 million TEU)[8], budget revenues will significantly exceed the revenues from personal income tax.

The key importance of the Baltic Sea for the security of Poland and the region

The growing importance of Poland, the Baltic Sea region, Central Europe and the Balkans has also been due to the change in Russia's political stance, which has been using military aggression, military operations and actions below the threshold of open war since 2013 to change the political order in Europe and the world. These factors are leading to an accelerated evolution of the position of the Central European region as an important and necessary space for containing threats to peace and the political order of democratic states. Are we witnessing the formation of new threats for many years to come?

> "**The rent of peace** has been exhausted and will not return (...)"

Russian political scientists from the Valdai Club, the intellectual base of the Russian state leadership, argue that the war in Ukraine has triggered a new process in international relations[9]. They predict that the dominant form of conflict between the great powers will be a new type of proxy wars. This makes the hypothesis that the rent of peace has been exhausted and will not return more likely, and that in the near future we may be dealing with, among others, in the Baltic Sea, various types of incidents where attribution will be difficult, if not impossible to identify (finding the state perpetrator).
Is the evolution of the system already visible? It is difficult to answer unequivocally, but it is difficult to deny that a negative process has been initiated. To illustrate, let us cite incidents from the last two years in the Baltic Sea, those where the perpetrators could not be fo-

und. These were: the destruction of two lines of the Nord Stream submarine gas pipeline, damage to the ESTLink 2 submarine power cable (Sweden-Estonia)[10], sabotage of the gas pipeline to the floating LNG terminal in Brunsbuettel, Germany[11]. If we add to this the damage to the Balticconnector submarine gas pipeline between Finland and Estonia by the anchor of a Chinese freighter[12], the alarm from the Swedish media that Russian ships are preparing to sabotage submarine gas pipelines and power cables in the Baltic Sea and the North Sea[13], and increased security for the floating LNG terminal in Lithuania due to the threat of sabotage[14], it is hard to doubt that we are dealing with a sudden deterioration in security in the Baltic Sea region.

Independent import terminal in Klaipeda

Let us consider what significance this has for the Polish state? If all gas imported to Poland is delivered by sea on gas carrier ships and the Baltic Pipe submarine gas pipeline, and several dozen million tons of oil are also imported by sea for the production of fuels in Orlen's refineries in Gdańsk and Płock, as well as several million tons of gasoline and diesel oil to the ports of Gdynia and Świnoujście, then it can be stated without a shadow of a doubt that the energy security of the Polish state in the fuel and gas sector depends on maintaining uninterrupted navigation on the Baltic Sea. If we add to this almost 150 million tons of goods transshipped in ports both for the needs of the Polish economy and the countries of the Central European and Three Seas regions (which constitutes approx. 10% of its state budget revenues), then we will quickly realize the scale of the crisis in the economy and finances of the state in the event of even a short-term disruption of navigation on the Baltic Sea.

> "The energy security of the Polish state in the fuel and gas sector depends on maintaining **uninterrupted navigation on** the Baltic Sea."

If we accept the thesis that the future will probably be less stable in Europe than in the last three decades, and that security will depend, among others, on the ability to ensure a long-term material advantage over the opposing side, then from this perspective the Baltic Sea should be perceived as a strategic depth – Hinterland, i.e. the space of the material base for the front area of NATO's Eastern Flank expanded to include Sweden and Finland. In this approach, the role of the Baltic Sea fits into the concept of the American strategist Nicolas Spykman, who indicated that the key to containing the Heartland – the great block of Eurasia (covering a large part of Russian lands) is the bordering Rimland – based on the coastline of oceans and seas[15]. It is worth mentioning that Spykman's concepts, shortly after the end of World War II, provided the basis for formulating the containment strategy, which forms the pillar of the North Atlantic Treaty Organization's operations

When did the Republic of Poland operate in the meridional system?

While the last three hundred years of Polish history have been shaped by the West–East (latitudinal) axis, in earlier centuries — from the 14th to the early 18th century — the Polish state expanded along a North–South (meridional) axis, stretching from the Baltic to the Black Sea. This created a transmission system to the center of wealth of the world at that time, i.e. the Byzantine Empire and its capital – Constantinople.

The most important trade routes, leading from the Far East – China and India to Europe, intersected there. In this perspective, today's Western Europe was located far from the core area of the world, even on the periphery. The Kingdom of Poland correctly oriented its territory towards the most important center of trade in the world. This can explain the south-eastern vector of Polish policy. It resulted in drawing the Principality of Moldavia into the orbit of the Kingdom of Poland. In 1387, Hospodar Bogdan I paid homage to the ruler of Poland, less than twenty years after the creation of this state. It is worth mentioning that Moldavia at that time had direct access to the Black Sea through the port of Cetatea Alba, later called Bilhorod, located on the Dniester estuary. There was a direct sea trade route from Constantinople to the Moldavian port

The Principality of Moldavia was a fief of the Crown for one hundred and ten years until 1497, when Hospodar Stefan the Great began a pro-Turkish policy. The Polish King John Albert intervened militarily in 1497, which ended in the defeat of the Polish forces. The well-known Polish saying: "The nobility perished under King Albert", has its source in the defeat inflicted on the Poles by the Moldavian army.

After the discovery of America in 1492, the center of world trade flows slowly shifted from the junction of the Black Sea with the Mediterranean to the Atlantic. This led to a spectacular weakening of the importance of the Republic of Venice, which ceased to play the role of the commercial and financial center of the world at that time. The fall of Constantinople and the discovery of both Americas led to the transfer of the center of international trade to the North Sea[17], while gold and silver imported from America were used in financial circulation by merchants from Antwerp, later from Amsterdam and London[18].

Although it was not until the mid-1630s that the Republic of Poland came to terms with the impossibility of building strong political ties with the strategically located Principality of Moldavia, the vector of political relations in the meridional system constituted Polish strategic thinking in both the 16th and 17th centuries.

Graphics 3.
Constantinople – The Center of Gravity of the Medieval World's Trade Routes in the Central European region

Source: Ian Wright, "Martinjanmansson", "An Incredibly Detailed Map Of Medieval Trade Routes"[16].

This was the context of the offering of the royal crown to Sigismund III Vasa, because the creation of a Polish-Swedish state controlling most of the Baltic Sea basin was planned through the formula of personal union. It seems that the latitudinal system permanently replaced the meridional one only at the beginning of the 18th century, with the establishment of the Kingdom of Prussia in 1701. The following centuries were a time of strengthening this direction of trade, political and military relations.

Graphics 4.
The meridional orientation of the Kingdom of Poland in the 14th and 15th centuries

Source: Educational materials Włącz Polskę!, Polska i Litwa w XIV–XV w. [Poland and Lithuania in the 14th and 15th centuries][19]

The Baltic Sea is the core of the Eastern Barrier and the Sanitary Cordon

In the years 1919–1925, for the first time in the 20th century, the Polish state and its southern neighbor – Czechoslovakia, inspired by France, the world's great political and military power at the time, joined in the construction of a military and economic meridional system, with the pivotal role of the Baltic Sea. The political concept of the so-called cordon sanitaire, interchangeably called barrière de l'est, as described by French Prime Minister Georges Clemenceau, aimed to: "entangle Russia with barbed wire, to prevent it from creating problems beyond its borders and to stop Germany from establishing relations with Russia"[20]. While the obverse of this geopolitical concept was to separate aggressive, communist Russia from the rest of Europe, the reverse of the project was the isolation of the German Reich, which had not come to terms with defeat in World War I and the new balance of power in Europe. It seems that the then leadership of the German state treated peace exclusively in terms of a strategic pause. Hence the statement repeated many times by the

French Prime Minister that "it would be a great mistake if we did not allow Poland to stop the Russian flood and ensure control over Germany"[21]. From the French perspective, the Polish state was seen as the main and irreplaceable element of the concept of the so-called barbed wire fence[22].

It is worth emphasizing that the French project of the eastern barrier assumed that, based on the Baltic Sea and alliances with Poland and Czechoslovakia, a strip would be built based on the Baltic coast on one side, and on the northern slopes of the Sudetes and the Carpathian chain on the other. The meridional system separating communist Russia from the rest of the continent was to guarantee security and peace in Europe[23]. It was supplemented by its extension, from the Carpathians to the Black Sea and the Adriatic Sea with the participation of Romania and Yugoslavia. These countries established a system of military alliances between themselves and Czechoslovakia called the Little Entente[24]. In this way, in geostrategic terms, a meridional system was built covering the strip of countries in Central Europe and the Balkans, connected by sea transport routes - in the north via the Baltic Sea, and in the south - by the Black Sea and the Adriatic.

Although the impetus for implementing the land meridional system was provided by French diplomacy, Great Britain was actively involved in its support. A division of responsibility was carried out. While France and its navy undertook to ensure freedom of navigation to the Romanian port of Constanța, the Royal Navy focused on the Baltic. The British saw the new arrangement more broadly, actively supporting the independence of Estonia, Latvia, and Lithuania. The involvement of their navies was unprecedented – while in the first half of 1919 the Royal Navy had 30 warships in the Baltic, in the second half – it was as many as 90 units. For comparison: the French navy operated 26 ships, the American navy – four, and the Italian navy – only two units[25]. The activity of the fleets illustrates the commitment of the victorious military powers to building a new order in the Baltic in order to push the Soviets as far east as possible.

Graphics 5.
Europe after 1919 – The Eastern Barrier and Cordon Sanitary Bloc

Source: own elaboration, P. Turowski.

The project respected the basic assumptions of the realist school, which indicated that demographic and territorial potential were among the most important sources of power. The number of citizens living in the countries of Central Europe and the Balkans reached 68 million. The territorial area of France's allies was also large: over a million square kilometers. One of the founders of geopolitics, the English scholar Halford Mackinder, perceived Poland, Czechoslovakia, Romania and Yugoslavia, due to their geographical location between Asia and Europe, as an instrument of control over the sensitive region by the Entente powers. "Who rules East Europe commands the Heartland; who rules the Heartland commands the World-Island; who rules the World-Island commands the world." Briefly, concisely, and pithy - in this approach, Central and Southern Europe were seen as a lever for control over the entire world at that time.

> "**The meridional system** separating communist Russia from the rest of the continent was to guarantee security and peace in Europe."

A research question can be asked – was the geopolitical and military concept of the meridional system based on the Baltic Sea implemented in the first half of the 1920s reflected in the economic and transport projects of the Polish state? The answer is positive. A logical connection can be found between the meridional vector created by the concept of the eastern barrier and the sanitary cordon, and the decision to build a port in Gdynia located on Polish territory and a large coal main connecting this port on the Baltic Sea with the coal mining and steel production center in Upper Silesia. It is worth mentioning that the construction of the railway line was carried out with the involvement of French capital[26].

When was the geopolitical project of the meridional system initiated, with the pivotal position of the Baltic Sea, and the key role of Poland and Czechoslovakia? It took place during the Franco-British conference in London in December 1919. For six years, Parisian diplomacy supported its implementation. However, the format of cooperation began to wither after the signing of an agreement in 1925 in the Swiss spa town of Locarno, in which the German Reich guaranteed the inviolability of the border with France and Belgium. The earlier agreement carried out at the initiative of Germany, which tore Soviet Russia from political and economic isolation was also of significant importance. The agreement was signed in April 1922 in the Italian spa town of Rapallo, located on the Mediterranean Sea, a dozen or so kilometers south of Genoa[27]. The Rapallo Agreement, in conjunction with the Locarno Treaty, determined the dysfunctionality of the strategic project of the eastern barrier and the sanitary cordon promoted by Prime Minister Clemencau.

Conclusions: The Baltic Sea as a trade center?

- The changes taking place on a global and regional level have triggered a process of spectacular growth in the importance of the Baltic Sea. This was influenced by the creation of a new center of world trade in the Far East, leading to a change in the poles of world power. In this way, the latitudinal system was supplemented with relations on the North-South axis.
- The growing threat from Russia to the security of the World and Europe and the democratic order builds the geostrategic importance of the NATO's Eastern Flank countries supplemented by Sweden and Finland. In terms of military security, sea areas, including the Baltic Sea, are becoming essential →

links of strategic depth, constituting a base in the military domain. From this perspective, the expansion of the Navy becomes a critical challenge for ensuring the functioning of the Polish state.

- Ensuring freedom of navigation in the Baltic, Black and Adriatic Seas is essential for the military and energy security of the Central European and Balkan regions as well as for trade with the world.

- Thanks to its wide access to the Baltic Sea, Poland occupies a privileged position compared to other Central European countries. It can advance to a core position in the region. By expanding its seaports and building land routes from the North to the South, it is becoming an indispensable transit link for goods for the region. This translates into measurable budget revenues and an increase in the political significance of the Polish state.

- Projects to build a meridian system are historically nothing new. They have been implemented many times over the last few hundred years. The geographical layout of the Kingdom of Poland, visible since the 14th century – from the Northwest to the Southeast – indicates that the chancellery correctly oriented the Polish state towards the world center of wealth and trade.

All concepts and views contained in the article are solely the author's own thoughts and should not be associated with the author's workplace.

2. The Baltic Sea as a window to the world – dr Konrad Popławski, PhD

The recent years of returning to geopolitics and rejecting the concept of the "end of history" have re-insigated thinking about trade routes in the perspective of security and economic stability. In this new context of a much less stable architecture of international relations, ports play a key role. They no longer generate only the opportunity to improve connectivity - the intensity of transport connections with the world. In the case of various crises, which we are increasingly dealing with, they are strategic gateways, becoming guarantors of access to security and stability. Without them, there can be no uninterrupted access to the wealth of the global market, energy carriers, components or raw materials.

The return of geopolitics

The last decade has seen an increasing number of events that challenge the current model of globalization without limits. For many years, the world economy lived in the illusion that it was enough to pursue the highest possible profits, regardless of geographical or political conditions. As a result, production was concentrated in areas that were optimal from an economic point of view or in places where production was subsidized, while the security aspect and the risk of supply disruptions were completely ignored. This led to the development od extremely internationalized, but also eqially complex and sensitive to pollitical risks supply chains, on which today's economy is based.

The indicated processes were conducive to the development of maritime trade. The progressive containerization of trade, innovations (such as progress in the transport of LNG), and the formation of large alliances of shipowners with large capital resources led to the creation of significant benefits in terms of scale and a decrease in the costs of transporting goods by sea. The big players had enormous resources to invest in technological progress and build fleets of large container ships. To outline the advantages of this type of transport, it is enough to cite the following example. While one driver can transport one container by truck, one engine-driver can transport 40 containers, the crew of a ship can transport up to 25,000 containers. In recent years, transporting goods by sea from China to Europe has often cost less than transporting them over a longer distance on Polish roads. With lower labor costs in many Asian countries and nonexistent safety criteria, efficient transport has encouraged the relocation of production outside Europe.

"In this new context of a **much less stable** architecture of international relations, **ports play a key role.**"

Baltic Container Terminal in Gdynia

Initially, the pandemic, and then the Russian invasion of Ukraine, were a kind of test for the globalization model outlined earlier. First, in 2020-2021, it turned out that in the event of sudden fluctuations in demand, disruptions in supply chains and desynchronization of business cycles (even due to pandemic restrictions), the global economy begins to shake at its foundations. The scale of unpreparedness for unforeseen events was exposed by heavy congestion in ports, which caused goods to reach customers with a significant delay. This situation was complained about by, among others, Czech companies, which had to wait longer for ordered components in order to fulfill an order due to the lack of diversification of supply routes and dependence on North Sea ports (Rotterdam, Antwerp and Hamburg).

A no lesser shock for the global transport system was the Russian invasion of Ukraine in 2022. The sharp increase in demand in the EU for energy resources delivered by sea as a result of the reduction in supplies of Russian energy carriers forced European ports to adapt dynamically. Many of them were forced to suddenly, albeit briefly, return to importing significant quantities of coal in order to protect consumers from shortages of this raw material. This caused congestion again due to the inadaptability of ports and linear infrastructure to the increased volume of such cargo. But that's not the end of it. One of the unforeseen consequences of the outbreak of another conflict – the war between Israel and Palestine – was the increased activity of the Iranian-backed Houthi rebels in the Red Sea. As a result, the world's key transport route, the Suez Canal, through which 12% of world trade and 30% of container transport flowed until the crisis, was blocked. This situation forced global shipowners to sail around

> "While one driver can transport one container by truck, one engine-driver can transport 40 containers, **the crew of a ship can transport up to 25,000 containers.**"

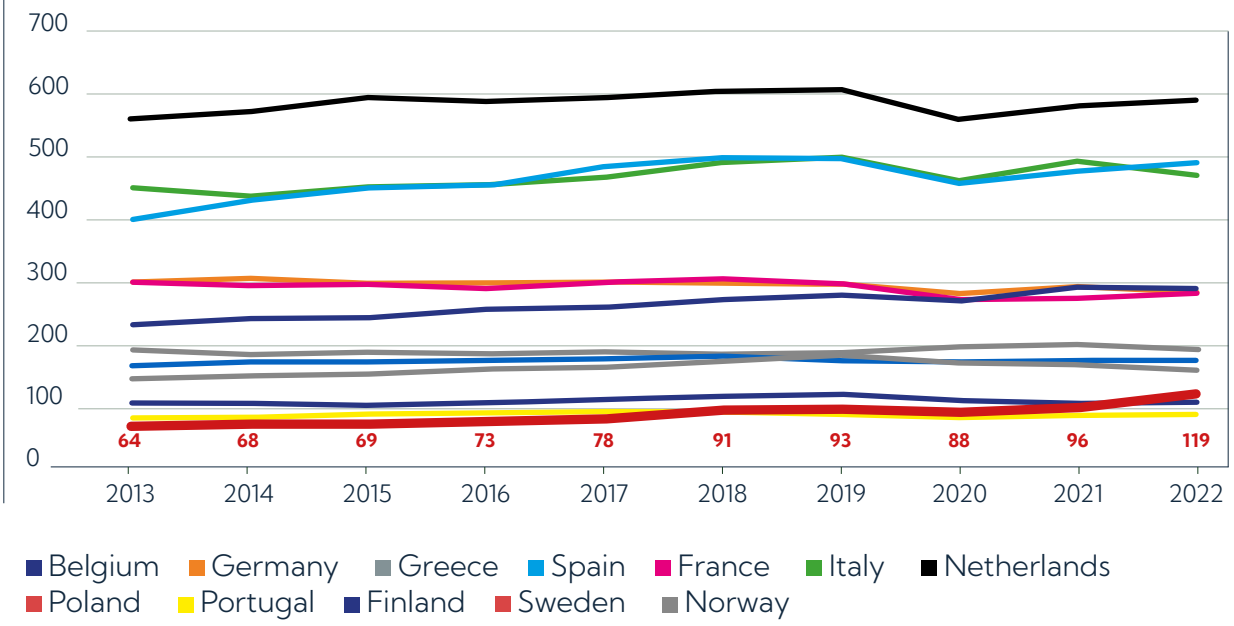
Africa, which extended the transport time between Europe and Asia by 18–20 days, significantly increasing costs. At the turn of 2023 and 2024, transport rates increased by 160%, but in recent weeks they have gradually begun to decline, although they still remain at a level several dozen percent higher than before the crisis.

Suez Canal, a key transport route

Specializations of Polish ports

Various crises in the world do not stop the expansion of Polish ports, but rather seem to drive it. Only in recent years has it become increasingly clear what a benefit wide access to the sea is for the country.Based on the analysis of Graphics 6, it can be concluded that the results of Polish ports corresponded with the strong growth of the Polish economy. In the years 2013–2022, transshipments almost doubled from 64 million tons to 119 million tons. Thanks to such dynamic growth, Poland moved from thirteenth to eleventh place in the classification of EU countries with the largest port turnover – within a decade it overtook Portugal and Finland, and if favorable economic conditions continue, there is a chance to overtake Sweden, Norway or Greece in the near future. During this period, the largest Polish ports: Gdańsk, Gdynia or Szczecin–Świnoujście, intensively reclaimed the Polish market from foreign competitors, and also outlined increasingly ambitious plans to expand their hinterland to foreign markets, such as: East Germany, the Czech Republic, Slovakia or Hungary. Significant investments are planned and implemented in Poland to expand the

Graphics 6.
Port transshipment in the most important EU countries in this respect (in million tons)

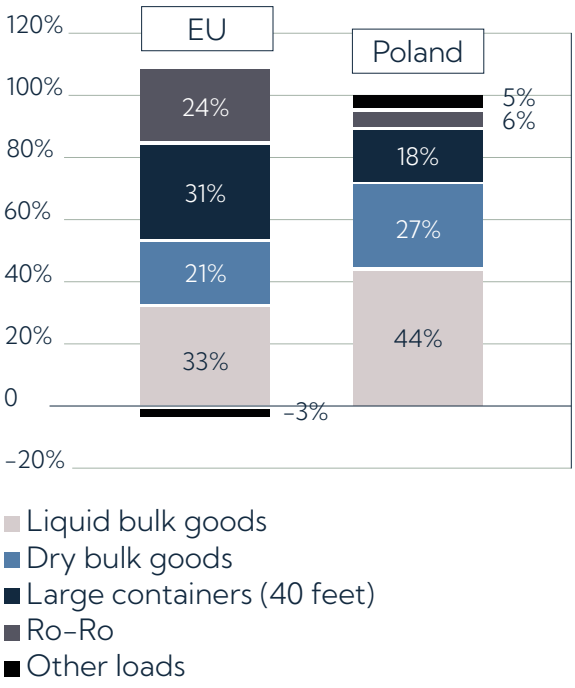


Source: own elaboration, K. Popławski, based on Eurostat[28].

The industrial area of the Szczecin shipyard

potential for transshipment of bulk goods, containers, crude oil and LNG. Graphics 7 reflects the main drivers of growth in transshipments in Polish ports compared to the European Union. In the EU, the growth structure was balanced and almost evenly distributed between the four categories of goods. Liquid bulk goods, mainly fuels were responsible for the largest part of the growth – 33%. Second place – with a share of 31% – is occupied by containers, in which goods for various uses are transported for businesses and consumers. The third largest group, generating 24% of the growth in transshipments, were ro-ro goods, i.e. those that can move on their own wheels – in practice, cars, tractors or semi-trailers. The smallest category, with a percentage of 21%, were dry bulk goods, such as: fertilizers, construction materials, grain or coal.

Graphics 7.
Share of individual categories of goods in the growth of transshipments between 2014 and 2022

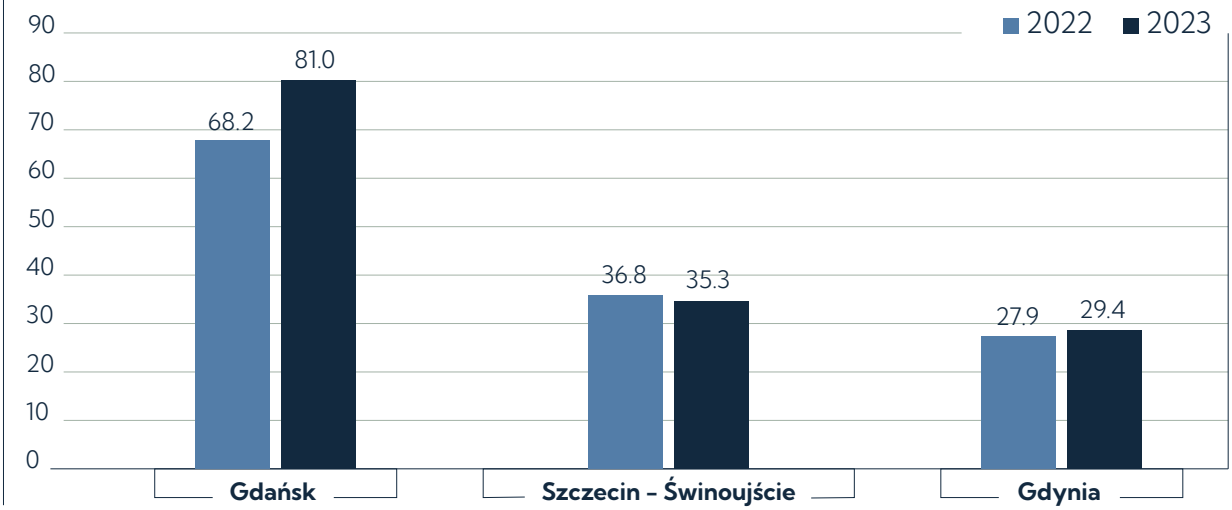


Source: own elaboration, K. Popławski, based on Eurostat.

The structure in Polish ports was different. Their main driving force, accounting for almost half of the growth, or more precisely 44%, was liquid bulk goods, followed by dry bulk goods with a percentage of 27%. Containers generated 18% of the growth, ro-ro cargo – 6%, and other goods – 5%. On this basis, two interesting conclusions can be drawn. First, the structure of transshipments corresponded to the characteristics of the Polish economy. Bulk goods, which were processed in domestic factories into more advanced components and products for the needs of the Polish market, but also Western Europe, reached Polish ports much more often than in the case of the EU average. Fewer processed goods, such as cars or semi-trailers or products in containers, reached Poland.

The second interesting observation is that the growth in Polish ports was largely due to the state's significant investments in energy policy. The development of oil and gas ports was not only a significant source of profit for the ports, but also an effective safeguard against Russia's energy blackmail, which it tried to use against Poland after the invasion of Ukraine. Poland was, along with Bulgaria, the first country to which Russia restricted gas supplies[29]. As can be concluded from Graphics 8, 2023 was also quite a good year for ports. In the case of the largest of them – Gdańsk – the level of transshipments increased by as much as 18.8%,

Graphics 8.
Results of the three largest Polish ports in 2022–2023 (in million tons)

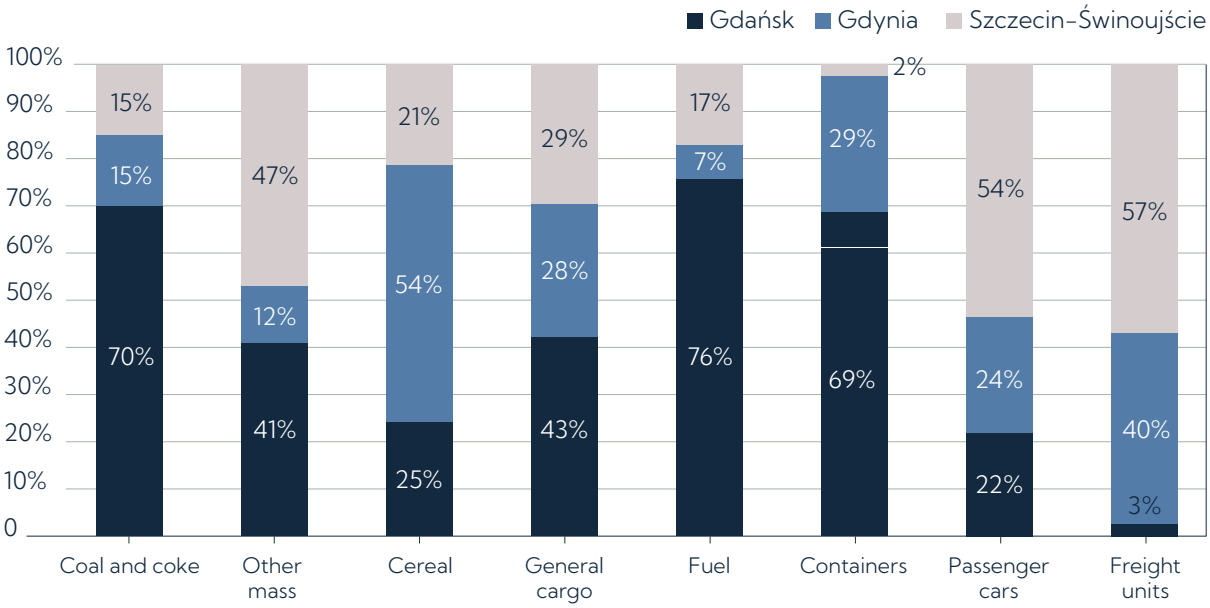


Source: own elaboration, K. Popławski, based on „Wyniki działalności polskich portów morskich w 2023 roku" [Results of operations of Polish seaports in 2023] – Polski Portal Morski.[30]

mainly due to a 48% increase in fuel handling and a 60% increase in grain handling. A slightly worse situation occurred in the Szczecin-Świnoujście complex, where there was a 4.1% decrease. Grain transshipments increased by 60%, while coal and coke dropped by 32% and general cargo[31] by 10%. In Gdynia, on the other hand, the 5.3% increase resulted from a 42% increase in grain transshipments and a 57% increase in fuel transshipments, while the results were negatively affected by a 17% decrease in coal and coke handling and a 29% decrease in other bulk goods. The data therefore indicates that after a sudden jump in energy carrier imports due to the cutting off of supplies from Russia in 2022, a certain normalization occurred last year. The demand for coal and coke imports has been limited, while the significant increase in fuel imports has been maintained, which is not only due to the need to meet demand on the Polish market, but is also a consequence of enabling the transit of these goods to Ukraine.Based on Graphics 9, it can be seen that a certain division of labor has been formed in Polish ports. Gdańsk remains by far the largest of them, being responsible for 70% of coal and coke transshipments, 76% of fuels, and 43% of general cargo. However, it was only in second place in terms of handling grain (25%) and other bulk goods (41%). Gdynia, on the other hand, was the leader in grain transshipments with a share of around 54% and basically handled a similar part of the general cargo market (28%) and coal and coke (15%) as Szczecin–Świnoujście (29% and 15% respectively). On the other hand, the latter port dominated in terms of transshipments of other bulk goods (47%), such as fertilizers and crude iron. In the container category, Gdańsk was the leader with a share of around 69%, Gdynia was second with a percentage of 29%, and the role of Szczecin–Świnoujście was marginal. In turn, the transport of passenger vehicles and freight units (mainly tractor units with semi-trailers) on ferries is the domain of the latter port with shares of 54% and 57%, respectively, while second place was occupied by Gdynia (25% and 40%, respectively).

The ports' performance should improve further in the coming years. Considerable investments are planned to increase throughput. The new Polish government has announced the continuation of plans for further expansion of the ports. A new crude oil transshipment berth is to be launched in Gdańsk, and the construction of the T3 deepwater terminal[33] will be completed by 2025, which will increase the port's container handling capacity from 3 million to 4.5 million TEU (TEU is a unit with a volume the size of a 20-foot container, which measures the size of the container stream). The port is also holding a tender for the construction of the T5 installation terminal for offshore wind farms, which is planned to open in 2026. In addition, conceptual work is underway on the construction of the

Graphics 9.
Transshipment structure of the three largest Polish ports in 2023 (in % and in million tons)



Source: own elaboration, K. Popławski, based on „Wyniki działalności polskich portów morskich w 2023 roku" – Polski Portal Morski.[32]

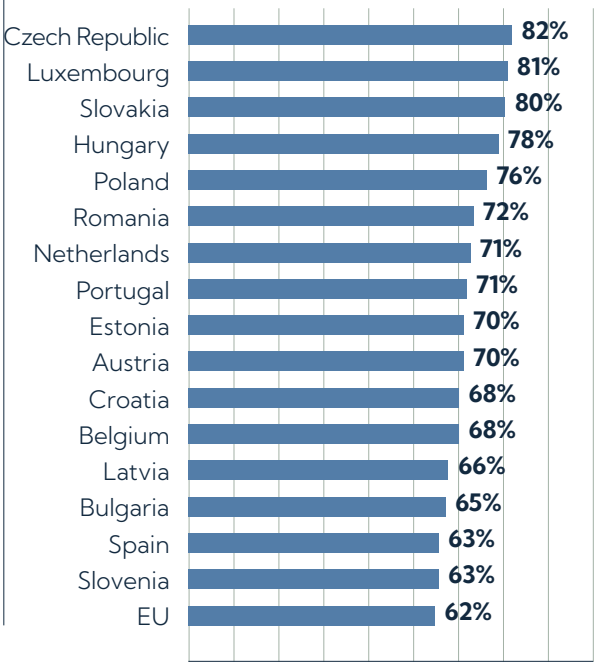
central port. The first of the planned nine terminals could be put into operation in 2029. In turn, in Gdynia, a project is being developed to build an external port, the first components of which could start operating in 2028–2029. As part of these assumptions, it is planned to, among others, build a container terminal with a capacity of 2.5 million TEU, which would increase the port's transshipment potential by 250%. In the Szczecin–Świnoujście complex, work is underway on the construction of a deep-water container terminal with a capacity of 2 million TEU, with the current transshipment at a level of almost 70 thousand TEU (potentially an almost 30-fold increase), as well as an installation terminal for wind farms, which is scheduled to be launched at the turn of 2024 and 2025. It is therefore clear that Polish ports do not intend to rest on the laurels of their current successes and are investing heavily in further development.

Potential for expansion abroad

The role of ports will be essential in the trade diversification of Central Europe. In recent years, there has been a visible problem of slowing economic growth dynamics in relation to the largest competitors, e.g. the United States. The largest EU economy, which for years was the engine of growth in the EU, i.e. Germany, has been stagnating since the outbreak of the pandemic and the energy crisis, weakening the economic situation throughout entire Central Europe. The consequence of this process is the search for new non-European sales markets by Polish exporters. For example, in February 2024, Polish exports to Germany fell by 9.7% (year on year), while they increased outside the EU: to North and South America combined by 5.1%, and to Asia by 6.2%[34].

The extent of dependence on the economic situation in the EU is clearly visible in Graphics 10. Out of the 6 countries most dependent on exports to the EU market, five are located in Central Europe: the Czech Republic, Slovakia, Hungary, Poland and Romania. This situation results from the specificity of the development model adopted. The region has been developing for the last three decades, attracting investments from Western corporations, thanks to which factories producing for the needs of the EU market were established. It will not be possible to maintain this model any longer, because the countries in the region have much greater ambitions than to remain only sub-suppliers for Western

Graphics 10.
Dependence of countries' exports on the EU market (in % and in million tons)



Source: own elaboration, K. Popławski, based on Eurostat.

corporations, which would most likely involve the need to permanently maintain lower wages.

The countries most dependent on the EU market are within the range of influence of Polish ports. In addition, the Czech Republic, Slovakia and Hungary in particular are in a specific situation as they lack access to the sea. Polish ports serving these countries can not only achieve large profits, but can also support the diversification of their foreign trade, offering them cost-effective connections with markets outside the EU. To prove how beneficial this can be for the Polish economy, it is enough to mention the tax benefits that the Polish state already gains from the development of Polish ports. According to data from the National Revenue Administration, in 2022 the total tax revenues from their activities from VAT, customs and excise duties amounted to PLN 58 billion, having increased by 241% since 2015[35].The main challenge for Polish ports will be the construction of access infrastructure, rail connections and the expansion of their hinterland to the markets of Central European countries and Ukraine. While road connections are sufficient to compete for the Polish market, the only competitive option is rail if larger quantities of goods need to be transported over longer

Graphics 11.
Rail Freight Corridor No. 5

Source: RFC5.[36]

distances. For this reason, it is necessary to accelerate work on rail infrastructure along the north-south line. As can be seen from the above map illustrating the course of the planned EU rail freight corridor No. 5, the appropriate connections are already in the plans and could indeed effectively connect the region with Poland.

It should be noted that the competition will not idly stand by and watch. Adriatic ports, such as Koper in Slovenia, Rijeka in Croatia or Trieste in Italy, are also intensively expanding their transshipment capacities and have great ambitions related to expansion in Central Europe[37], although their development has recently been weakened by the blockade of the Suez Canal. At the same time, the pressure from German ports may temporarily ease, as they will be facing congestion over the next decade due to the modernization of rail infrastructure in Germany.

"Challenge for Polish ports will be the **construction of access infrastructure, rail connections** and the expansion of their hinterland to the markets of Central European countries and Ukraine."

In the case of Ukrainian transit through Polish ports, rail is also necessary, but the challenge will be to expand the standard gauge track (1435 mm, characteristic of the dominant part of EU countries) to replace the existing broad gauge (1520 mm, used in post-Soviet countries) in this country. It seems that even if Ukrainian Black Sea ports were fully operational (as is already largely the case today), part of Ukraine's trade (especially its western part) with the world will take place via Polish ports. It is worth mentioning that Lviv is almost the same distance from Gdańsk or Odessa.

Port in Koper, Slovenia

Conclusions: ports as Energy hubs?

- ·Ports already play a strategic role in the energy sector through the transshipment of coal and coke, crude oil and LNG, and their importance in the next decade may increase to the position of true energy hubs. Firstly, with the construction of a floating LNG terminal, we will have increasingly greater opportunities to distribute this raw material to neighboring countries. We already have the appropriate interconnectors to send LNG to Slovakia. The key question is whether it will be possible to conclude an agreement with the Czech Republic in the coming years on the expansion of the Stork 2 project, which will integrate the Polish and Czech markets more strongly.

- Another opportunity is investment in offshore wind farms, which will significantly increase the production of renewable energy in Poland. In this area, Central European countries without access to the sea do not have similar potential and can benefit from importing energy obtained from wind turbines located on the Polish sea. However, much will depend on whether we will have sufficiently large potential for the capacity of energy networks. Germany had a similar idea to transport wind energy from the northern states to the industrialized southern states in their country. However, the implementation of this plan into reality has been extremely slow due to high costs, bureaucratic restrictions and protests from residents against new transmission networks with very high voltage.

- In addition, ports are expected to play a significant role in the development of hydrogen energy. Not only will they be of great importance in the import of low-emission energy carriers, such as hydrogen, ammonia, methanol or synthetic fuels. Ports also have the potential to become places for the production and processing of energy resources. For example, Germany assumes in its concepts the possibility of processing ammonia into hydrogen in port areas and injecting it into the hydrogen network[38]. There are also ideas for building electrolyzer farms near wind farms in order to produce green hydrogen. The natural base for such activities will probably be ports.

German wind farm on the North Sea

3. The Baltic Sea as a space for strategic energy activity
– Zuzanna Nowak, Magdalena Maj

The Baltic Sea is a relatively small area, with a surface area of around 415,000 km², and due to its inland location, it is sometimes called the "Mediterranean Sea of Northern Europe" or even a lake. In German and Scandinavian languages, it is called the Eastern Sea, and in Estonian, the Western Sea. It is the catchment area for 14 countries - industrialized and agriculturally developed - and nine of them lie on its shores: Denmark, Estonia, Finland, Lithuania, Latvia, Germany, Poland, Russia and Sweden. The Baltic Sea only exchanges waters with the North Sea through narrow and shallow Danish straits, and due to the fact that over 250 rivers flow into it, it is a brackish sea - with a low level of salinity (approx. 8 per mile for surface waters). For this reason, the fauna and flora of the Baltic Sea are poorer than in the open North Sea. The Baltic Sea is also a heavily polluted area, with as much as 97% of the pollution released into its waters coming from land (industry, municipal economy, agriculture), and only 3% is generated at sea (ports, mining industry, navigation)[39]. Hence, the issues of environmental protection in the region and preserving biodiversity are of particular importance within the framework of Baltic cooperation. It is also worth mentioning the problem of ships with oil-based fuel and chemicals which could sink to the bottom of the Baltic Sea, the leakage of which could lead to an ecological disaster. However, from the perspective of strategic activities, energy issues are of particular importance in Polish foreign and domestic policy.

Baltic energy resources

The Baltic Basin is known for its hydrocarbons – for example, oil production in Gotland has been ongoing since the 1940s, and since 1975, research has been conducted on the coasts of Russia, Poland and Lithuania by Soviet companies. It is estimated that over 40 areas rich in hydrocarbons have been discovered so far, but the profitability of their exploitation is limited. According to data from the Polish Geological Institute, there are currently two documented oil deposits in Poland's exclusive economic zone in the Baltic Sea (B3 and B8 – from which Orlen - Lotos Petrobaltic extracts oil), and at the same time, the sandstones of the Baltic Basin are considered to be the most promising domestic areas for the occurrence of unconventional oil resources[40]. However, these resources are small and can

Seal – a protected species – on a Baltic beach

potentially meet Polish demand only to a small extent – extraction is approximately 5.7 thousand boe/d (barrel of oil equivalent) of oil per day. There are also small deposits of natural gas in the Baltic Sea – occurring on its own (deposits B4, B6, B21) and together with crude oil (obtained from deposits B3 and B8)[41]. From the latter, gas separated from oil is sent via pipelines to Energobaltic in Władysławowo and is used to produce electricity and heat for the city's needs[42]. In the Polish economic zone of the Baltic Sea and in Pomerania, there are also deposits of shale gas, the extraction of which is, according to geologists, unprofitable due to geological conditions.

Although the Baltic Sea's energy resources are limited, it is an important transport route for hydrocarbons. Among the gas transmission infrastructure, we can mention the following pipelines: Balticconnector between Finland and Estonia, Baltic Pipe connecting Poland and Denmark, and currently unused Nord Stream 1 and 2 gas pipelines connecting Germany and Russia (as a bypass for Ukrainian transit). As part of the development of global gas markets, as well as the policy of diversifying supplies of this raw material to EU countries, several LNG regasification terminals have been built on the Baltic coast, including: in Polish Świnoujście (a floating terminal is also planned in Gdańsk), Lithuanian Klaipeda (FSRU), Finnish Inkoo (FSRU), German Lubmin (other German terminals are located outside the Baltic Sea) - there are also several

"Although the Baltic Sea's energy resources are limited, **it is an important transport route.**"

smaller, locally oriented LNG investments planned. In turn, Russia has an LNG export terminal Portovaya in the Baltic Sea, whose clients were supposed to be EU countries (no sanctions have been imposed on liquefied gas from Russia so far). Nevertheless, the main suppliers of LNG in the Baltic region are currently the United States, Qatar and Norway.

There are also many crude oil import and transshipment terminals located on the Baltic coast. Naftoport from the PERN Group, which transships crude oil and petroleum products in the Port of Gdańsk, is one of the largest facilities of this type in the Baltic Sea area, serving Polish refineries (Płock, Gdańsk) and with access to the German refinery market (Schwedt, Leuna). Since the imposition of sanctions on Russia, Poland has mainly received crude oil from Saudi Arabia, Norway and the United States. Orlen is also developing infrastructure for processing and transporting

Baltic Beta extraction platform on the B3 field

LNG tanker maneuvers in Świnoujście

crude oil from Lithuania through Orlen Lietuva (including through the construction of rail connections and the development of the Możejki refinery), which is ultimately intended to support the energy security of the entire Baltic region. As mentioned in Chapter 2, Baltic ports also play an important role in trade in other raw materials and fuels, including coal and LPG. The expansion of electricity connections in the Baltic Sea region as part of the development of the European common electricity market is just as important. Undersea cables connect, among others, Lithuania and Sweden (NordBalt), Finland and Sweden (FennoSkan), Estonia and Finland (Estlink), Germany and Sweden (Baltic Cable), as well as Poland and Sweden (SwePol). Sweden, due to its nuclear and hydroelectric power plants (which affects the competitiveness of its prices), is the largest European exporter of electricity. It is also worth mentioning that Swedish nuclear reactors located in Forsmark and Oskarshamn use water from the Baltic Sea for cooling (the same is true for reactors in Finland and – eventually – will be in Poland). The Baltic countries plan to disconnect from the Russian power grid (although they no longer trade energy with the Russians) and synchronize with Western Europe in 2025, among others, as a result of the planned Harmony Link cable connection between Poland and Lithuania.

> "The development of the Baltic Sea network is also of particular importance for the regional **green transformation.**"

The development of the Baltic Sea network is also of particular importance for the regional green transformation. It is estimated that the Baltic Sea has potential for 93 GW of offshore wind energy (OWE), and only a small part of it is used so far by Sweden, Finland and especially Germany and Denmark (e.g. in the joint Kriegers Flak project). According to the Polish Wind Energy Association (PWEA) report "Potential of Offshore Wind Energy in Poland" from 2022, Poland alone has a potential of OWE of 33 GW, which could theoretically provide almost 60% of the country's electricity demand[43]. The high potential of the Baltic Sea for OWE is related to its shallow waters, low waves and small tides, combined with a wind speed of approx. 8-10 m/s at a height of 100 m.

Graphics 12.
The potential of offshore wind energy according to the Maritime Spatial Development Plans (2022)

	Water area designated for OWE	Percentage share in the exclusive economic zone	Expected total power
Denmark	11 000 km^2	10%	42.3 GW of which 5 GW in the Baltic Sea
Germany	8 400 km^2	15%	70 GW ((no data for the Baltic Sea itself)
Poland	3 600 km^2	12%	17.2 GW
Finland	3 500 km^2	4,3%	15.7 GW
Estonia	1 850 km^2	5%	9 GW
Sweden	1 400 km^2	1%	6–7 GW
Lithuania	664 km^2	9,4%	2.4–3.3 GW
Latvia	300 km^2	1%	4 GW

Source: WindEurope, Offshore Wind in EU Maritime Spatial Plans.[44]

In terms of the development of innovations and new technologies in the Baltic area, business is interested in the development of hydrogen infrastructure cooperating with offshore wind turbines (e.g. the Neptunus energy hub of the Swedish company OX2), while researchers are paying attention to the potential of the Baltic Sea for the use of CCS technology (Carbon Capture and Storage). Due to the geographical conditions of the Baltic Sea, as well as the current level of technological advancement, tidal energy or solar energy (offshore) is of marginal importance in the coastal landscape.

Low waves on the Baltic Sea

Baltic International Energy Cooperation

The Baltic Sea region plays an important role in Polish foreign policy. Facing challenges such as further development of connections (road, sea, rail), protection of the population, environment and climate, promotion of tourist attractions, and of course the expansion of interstate energy infrastructure requires strengthening cooperation with neighboring countries in both bilateral and international formats, at the governmental, local government and non-governmental level. In his exposé on the tasks of Polish foreign policy in 2024, Minister of Foreign Affairs Radosław Sikorski emphasized both the topic of regional cooperation in the format of the Bucharest Nine and the Three Seas Initiative – as valuable and successful provided that they contribute, among others, to the development of energy infrastructure in the region – and generally referred to the expansion of gas and electricity connections with Poland's neighbors. He also drew attention to the increase in security in the Baltic Sea with the accession of Sweden and Finland to NATO[45].

The network of links with the Baltic and Nordic countries to the north, Germany to the west, as well as Poland's participation in organizations and initiatives such as the Council of the Baltic Sea States, the Helsinki Commission, the Baltic Sea Parliamentary Commission, the Three Seas Initiative or the developing Baltic Sea Energy Security Summit, facilitate coordinated actions for regional development[46]. However, the reference point for many initiatives is the European Union Strategy for the Baltic Sea Region, which focuses on three priorities: protection of the sea, integration of the region and increasing prosperity, supplemented by specific objectives (including those related to energy market reliability or adaptation to climate change). Energy objectives are implemented within the framework of strategic and legal documents of the EU and national energy and climate plans (NECP), using, among others, tools such as BEMIP (Baltic Energy Market Investment Plan), Connecting Europe Facility (CEF), Interreg Baltic Sea Programme, PCI – list of projects of common inte-

rest, or the plan for zero air, water and soil pollution[47]. Thanks to the use of such tools, Poland had the opportunity to implement many investments – e.g. modernize Polish ports (CEF), support the construction of the Baltic Pipe (PCI and CEF) and the LNG terminal (PCI).

Although the countries in the region have very different energy mixes, are at different stages of economic development, and are characterized by different historical conditions (which was particularly highlighted by the issue of the construction and use of the Nord Stream gas pipelines), regional cooperation in the context of the recent energy crisis and the military crisis on the EU's eastern border is gaining particular importance. The leading energy topics common to the region include: expanding the potential of offshore wind farms in the Baltic Sea (tightening cooperation in the production and transmission of wind energy), protecting critical offshore infrastructure, increasing energy security in the context of the war in Ukraine, and improving regional energy efficiency as part of the green transformation. The April 2024 meeting of the leaders of eight Baltic countries in Vilnius (also attended by representatives of the European Commission and NATO) led to the signing of a joint declaration on important aspects of energy security development in the region - resistance to cyber and physical attacks. The region also plans to focus on innovation and is developing, among others, hydrogen and energy storage technologies.

Tourist attractions in Gdansk

> "However, the reference point for many initiatives is the **European Union Strategy for the Baltic Sea Region.**"

Construction of the Baltic Pipe gas pipeline

It is worth emphasizing that although Russia actively participated in Baltic projects until 2022, its membership in many organizations has now been suspended or the scope of its activities has been revised. Among others, the joint declaration of the Ministers of Foreign Affairs of Denmark, Estonia, Finland, Iceland, Lithuania, Latvia, Germany, Norway, Poland and Sweden and the High Representative of the Union for Foreign Affairs and Security Policy – i.e. all members of the Council of the Baltic Sea States (except Russia) – regarding the complete suspension of the Russian Federation (as well as Belarus as an observer) from the work of the organization at all its levels was significant[48]. Many regional initiatives explicitly assume reducing energy and significant dependence on Russia, and even building resilience to threats that may come from it.

The Baltic Sea in Polish energy policy

At the national level, as described in the first chapter, the National Security Strategy (NSS) adopted in 2020 defines key actions to enable full use of the opportunities and advantages generated by Poland's access to the Baltic Sea. The NSS assumptions include the expansion of existing natural gas import capacities (including through the expansion of the LNG terminal in Świnoujście, the construction of the LNG terminal in the Gulf of Gdańsk, and the construction of the Baltic Pipe) and the expansion of oil infrastructure. The Energy Policy of Poland until 2040 (PEP2040) of 2021[49], a reference document for the country's energy policy, also places emphasis on the expansion of international gas connections, which is to lead to the creation of "a gas transmission and trade center for the countries of Central and Eastern Europe and the Baltic States in Poland" as part of the "North-South Gas Corridor"[50]. The creation of such a hub would make the market and price conditions for using Polish infrastructure more attractive, which would increase the liquidity of the gas market and perhaps allow for lower rates for end users in the country. It is also planned to expand the infrastructure for bunkering with low-sulfur LNG fuel in the Baltic Sea.
The document mentions the development of oil imports to Poland by sea, which is to be achieved, among others, by building the second line of the Pomeranian Pipeline (the lack of such infrastructure significantly hindered the resolution of the crisis related to oil pollution from the "Przyjaźń" pipeline in 2019). As part of the "Zero-emission energy system" pillar, PEP2040 also gives priority to the development of OWE - due to the high degree of stability of their operation and the implementation of the assumptions of the European Green Deal. The need for ongoing updating of legal acts for offshore renewable energy installations, the expansion of transmission networks in the north of the country, as well as the construction of port logistics facilities is recalled. On December 17, 2020, the Act on the promotion of electricity generation in offshore wind farms, known as the offshore act, came into force, which is to provide impetus to launch investment processes. The implementation of the first OWE projects has already begun, but investors are encountering problems, including: with obtaining permits for the construction of artificial islands and the crossing of undersea cables, the length of decision-making processes, staff shortages or forward-looking thinking about changing planning documents (e.g. the Spatial Development Plan for Polish Maritime Areas).
The choice of location for a Polish nuclear power plant is determined by access to cooling water, hen-

Beach in Lubiatowo

ce priority is given to coastal locations. This is also emphasized by the Polish Nuclear Power Program – (PNP/PPEJ) - from 2020, in which an additional argument in favor of Baltic locations refers to the high demand for electricity in the north of the country and the possibility of transporting large-sized cargo (necessary for the construction of reactors) by sea. The decision on the location of the first nuclear power plant was made at the end of 2023 and concerns the area called "Lubiatowo - Kopalino" in the Choczewo commune. PEP2040 also gives great importance to the integration of Poland's electricity with the Baltic states. After the start of Russia's full-scale aggression against Ukraine in 2022, the assumptions for the update of PEP2040 were published, in which significant emphasis was placed on changing the approach to ensuring energy security towards even greater diversification and independence - including by additionally accelerating the construction of coastal energy import infrastructure.

Although seaports have been an important element of the Polish economy for years, it was only the embargo on Russian fossil fuels and the need to transship oil and coal in ports that contributed to a significant increase in the role of this infrastructure for the country's energy security. The draft update of the National Energy and Climate Plan until 2030[51] additionally draws attention to support for the construction of the Nordic-Baltic Hydrogen Corridor and other infrastructure for cross-border hydrogen transmission. Although in all of these documents, Poland's future energy security is defined on the basis of the expansion of the import potential and energy generation in the coastal area (in order to move away from raw material supplies from the east), they lack a clear and conscious quantification of Poland's growing energy dependence on the Baltic Sea.

"**They lack a clear and conscious quantification** of Poland's growing **energy dependence** on the Baltic Sea."

Guarantors of energy security

In order to guarantee the functioning of the national energy system, it is necessary to ensure, among others, the continuity of supplies of raw materials and electricity (domestic and foreign), diversification of supply routes, conclusion of contracts, accumulation of reserves, physical and cyber protection of infrastructure[52]. Due to the strategic importance of the energy sector for the economic stability of Poland, as well as the high costs of energy investments combined with high risk, the need to establish trade relations with foreign partners (often state-owned), the necessary coordination of various energy sectors in the country and at the international level, especially in crisis situations, etc. - energy security in Poland is ensured by State Treasury companies.

In the shareholder structure of Orlen S.A., a multi-energy Polish corporation that is the largest taxpayer in the country, the State Treasury holds 49.9%[53]. The company's extensive portfolio includes production and import of oil and gas (largely by sea), refineries, numerous fuel stations and it aims to develop small nuclear reactors (SMR) in Poland. It also invests in renewable energy sources, and its flagship project is the Baltic Power offshore wind farm with a capacity of 1.2 GW. Another entity important for energy security from a maritime perspective is Gaz-System (100% owned by the State Treasury) - the owner of the LNG terminal in Świnoujście and operator of the Baltic Pipe and other intersystem and transmission gas pipelines. The PERN Capital Group (100% owned by the State Treasury) manages oil logistics in Poland, including Naftoport, oil storage facilities and pipelines. The power interconnections (including the SwePol Link cable) are operated by the Polish Power Grids, also 100% owned by the State Treasury.

In the case of nuclear power, the special purpose vehicle tasked with building the first such installation is PEJ – Polish Nuclear Power Plants (100% owned by the State Treasury). Together with a consortium of American companies Westinghouse and Bechtel, they will build the first Polish reactor in the Choczewo commune (with the initial assumption of the share of Polish companies

LNG tanker in Świnoujście

in the supply chain – the so-called local content – at 40–50%). The State Treasury is the dominant shareholder in Polish seaports, which played a key role in the emergency import and distribution of coal in 2022, and also act as an intermediary in the import of fuels (including LPG) and energy raw materials.

The competition between entities implementing offshore wind farms on the Polish coast is interesting – the Baltic Power project is being implemented by the aforementioned Orlen and the Canadian company Northland Power; Baltica 2 and Baltica 3 are projects of the Polish Energy Group (the State Treasury holds a 60.68% share) and the Danish Ørsted; Bałtyk II and Bałtyk III are being jointly implemented by Polenergia (a private group) and the Norwegian Equinor; and the F.E.W. Baltic II project is being implemented by the German concern RWE. Since, de facto, a new branch of the economy is being built in Poland along with the development of OWE, it is necessary to transfer technology and good practices from more experienced foreign partners. At the same time, the involvement of smaller ports (as a base for the construction and operation of OWE) and Polish entrepreneurs in the supply chains for offshore wind energy is growing. Local content is estimated at 20–30% in the first stages of construction and operation of wind farms, and after 2030 it may amount to at least 50% according to plans.

Companies of significant importance for the economy subject to the ownership supervision of the Minister of State Assets are Orlen and PGE[54]. In turn, the Government Plenipotentiary for Strategic Energy Infrastructure is responsible for PERN, Gaz-System, PSE under the Energy Law (including as a result of unbundling), who from 2021 is also responsible for PEJ under the power of attorney. The Plenipotentiary is currently the Undersecretary of State from the Ministry of Climate and Environment, who may be transferred to the newly established Ministry of Industry, based in Katowice. The Ministry of Industry may eventually take over several departments operating in the Ministry of Climate and Environment, but for now the only substantive one is the Department of Mining and Metallurgy separated from the Ministry of State Assets. Interestingly, the Office of the Government Plenipotentiary for Strategic Energy Infrastructure (which deals with, among others, preparing analyses and concepts) is located in the Ministry of Funds and Regional Policy. The question therefore arises whether, from the perspective of realizing the overriding interest, which is the country's energy security, such a division of tasks between individual ministries is functional and effective. There are concerns that formulating a coherent, updated energy policy may be difficult in this situation - although it should be emphasized that due to the ongoing inter-ministerial changes in the energy sector, it is difficult to make a final judgment. Nevertheless, building Poland's security

> "Energy security in Poland is ensured by **State Treasury companies.**"

dependent on the supply of raw materials and fuels via the Baltic route also requires good cooperation with the Ministry of Foreign Affairs (in the context of activities on the international and regional forum) and the Ministry of National Defense (in relation to the protection of the Baltic Sea). It may be beneficial to establish an inter-ministerial working group for this task.

"Whether, from the perspective of realizing the overriding interest, which is the country's energy security, such a **division of tasks between individual ministries** is functional and effective?"

Poland's energy dependence on the Baltic Sea

After the commencement of Russia's full-scale aggression against Ukraine, the energy infrastructure built up over the years in the Baltic Sea and on the coast, as well as the strategic interest of the state implemented by state-owned companies, allowed for the diversification of energy and raw material supplies to Poland. Independence from Russia and redirection of part of the import to the Baltic route meant increased energy security in the country (especially in terms of certainty and continuity of supplies). Given these changes and the planned further development of energy infrastructure in the Baltic Sea area, however, the question should be asked: what is the real degree of Poland's energy dependence on the Baltic Sea? What will it be in the perspective of 2040?

Energy import through the Baltic Sea

The following method was used in this study to quantify Poland's energy dependence on the Baltic Sea. In the first step, energy imports through the Baltic Sea were calculated based on available data:

- the main, most important from the perspective of energy security, energy resources and energy carriers were identified, i.e. hard coal, natural gas, crude oil and electricity (other solid and liquid fuels, including coke, oils, petrol, kerosene, etc. require additional analyses);
- data on energy imports via the sea route was collected, i.e. net imports of the main energy raw materials and energy carriers, using the infrastructure in the Baltic Sea, where the net value in the balance is the result of total imports via the Baltic Sea and total exports;

the volume of energy import through the Baltic Sea was converted into an energy unit.

"Independence from Russia and redirection of part of the import to the Baltic route meant **increased energy security** in the country."

Power hard coal

Power coal in Poland is mainly used for the needs of professional energy, i.e. for the production of electricity and heat in power plants and combined heat and power plants. Other types of coal, also included in this category, are used in heating plants and individual heating. Before the war in Ukraine, a significant part of the supply for the latter group of recipients was imported from Russia. Coal mined in Poland, due to its quality

(sulfurization, calorific value), is more suitable for utility-scale power sector and it was more difficult for it to compete with cheaper, better-quality coal from Russia. Despite the large amounts of power and coking coal imported by Poland from Russia (almost 8.5 million tons in 2021), in April 2022 - without waiting for the reaction of the European Union - the Polish government adopted a law prohibiting the import and transport of Russian fuel. The last transports were registered in May 2022. Despite concerns, Poland has become completely independent from Russian coal imports. Due to the impossibility of quickly increasing domestic coal production before the upcoming heating season, the State Treasury was ordered to import coal from countries other than Russia[55]. As a result, 91%, i.e. 7.5 million tons of imported power coal was received in 2023 in Polish ports. The largest amount was transshipped in Gdańsk 67% (5.5 million tons) and Gdynia 12.1% (1 million tons). This constitutes approx. 14%[56] of domestic power coal consumption. The main import destinations were: Colombia (4.2 million tons), South Africa (1.2 million tons) and Australia (0.6 million tons)[57].

Coal heaps in the port of Gdańsk

"Despite concerns, **Poland has become completely independent** from Russian coal imports."

Natural gas

The year 2022 was a breakthrough year for the Polish gas sector, as import sources, prices, consumption volumes and the direction of gas flows changed. In 2021, Russian gas accounted for about 87% of all gas imported to Poland, including that sent onwards to Germany via the Yamal pipeline (without it, it was over 50%). In 2022, this amount dropped sharply to 20%, and in 2023, Poland did not import any gas from Russia at all. Liquefied natural gas (LNG) and gas imports via the Baltic Pipe accounted for 78% of imports at that time. Gaz-System intends to assess the level of market interest in exporting regasified LNG to Slovakia, Lithuania, Denmark, Germany, the Czech Republic and Ukraine.

The year 2023 was the first year without gas and crude oil from Russia. Domestic demand for this raw material was met by domestic extraction, both from deposits in Poland and on the Norwegian Continental Shelf, and purchases from foreign suppliers. Gas imports to Poland amounted to 14.1 billion m^3, with domestic consumption amounting to approx. 17 billion m^3. One of the main sources of foreign gas acquisition last year were LNG deliveries, which satisfied approx. 38% of demand.

• Port in Świnoujście

The Orlen Group (with the then PGNiG – the main importer of gas to Poland) used the fully booked capacity of the Świnoujście terminal, which received a record 62 shipments of liquefied natural gas, i.e. four more than in the previous year, with a total volume of approx. 4.66 million tons of LNG (approx. 6.2 billion m³ of gas)[58]. This is almost 46% of all gas imports to Poland. The United States provided the largest number of LNG supplies – 41 ships as part of long-term and spot purchases, followed by Qatar – 19 supplies and one shipment each from Trinidad and Tobago and Equatorial Guinea. Since the beginning of the Świnoujście terminal, 268 cargoes of liquefied natural gas have reached the gas port. After the expansion, which is to be completed last year, it will increase to 8.3 billion m³. The expansion involved the construction of the third largest tank with a capacity of approx. 180 thousand m³ and the construction of a second quay, which allowed for the reception and unloading of a larger number of units, up to over 70 per year. The construction of the second quay also allowed for the export of raw material[59]. Further intensification of domestic LNG import will be possible thanks to the launch of the second Polish gas port in the Gulf of Gdańsk, planned for 2028. The Orlen Group has reserved full regasification capacity in it, which will amount to 6.1 billion m³ per year. After the investment is put into operation and the expansion of the LNG terminal in Świnoujście is completed, the total capacity of both installations will increase to approx. 14 billion m³ per year[60].

• Baltic Pipe pipeline

Through the Baltic Pipe offshore pipeline, which was launched in autumn 2022 with a route running from gas fields in the Norwegian North Sea through Danish territory, 44% (6.5 billion m³) of gas reached the domestic market. The capacity of this pipeline has not yet been fully utilized, as it amounts to 10 billion m³.

"The year 2023 was **the first year without gas and crude oil from Russia.**"

otal export of natural gas from Poland amounted to approx. 0.814 billion m³. This constitutes 6 percent of that import[61]. In the methodology for calculating the energy dependence index on the Baltic Sea, import through the Baltic Sea was reduced by the total export of natural gas (including LNG), obtaining net import.

Crude oil

Crude oil and fuel transshipments in 2023 at Naftoport reached a record value of 36.6 million tons, of which crude oil accounted for approx. 25 million tons. The main directions of crude oil imports were: Saudi Arabia (45%), Norway (39%), the United States (5%) and Nigeria (5%). Only an estimated 2% of the raw material was imported from Russia before the export was stopped in February[62]. Currently, almost all crude oil imports are brought into the country by sea. Some of the oil is re-exported to Germany (thus, Polish infrastructure contributes to increasing the energy security of neighboring countries). According to POPiHN (Polish Organization of Oil Industry and Trade) data, refinery processing in 2023 amounted to 27 million tons of crude oil. Only 3% came from domestic extraction, so 97% is imported - mostly by sea. Total oil export from Poland amounted to about 0.18 million tons. This is less than 1% of that imported, so it does not significantly affect the net import result. Nevertheless, in the methodology for calculating the energy dependence index on the Baltic, import via the Baltic was reduced by total export[63].

Electricity

In 2023, Poland imported 3.8 TWh of electricity net from Sweden, which was 2.2% of consumption. In addition, in the net balance, Poland imported electricity from Germany, Lithuania and minimal amounts from Ukraine. As a result of these flows, Poland was a net importer of almost 4 TWh in 2023[64].

Baltic Sea Energy Dependency Index

In the second step, the total energy dependence on the Baltic Sea was estimated:

- data on the consumption of individual raw materials/energy carriers and the total energy supply was collected[65];
- partial indices of energy dependence on the Baltic Sea were determined for individual main raw mate-

rials/energy carriers (illustrated in Graphics 13);
• the total energy dependence index on the Baltic Sea was determined in two variants by:
a) comparing the import of the main raw materials (power coal, natural gas, oil) or energy carriers (electricity) through the Baltic Sea to their total consumption in the country;
b) comparing the import of the main raw materials (power coal, natural gas, oil) or energy carriers (electricity) through the Baltic Sea to the total energy supply in the country (and not only to the consumption of these four raw materials/carriers; the definition of energy supply is given in footnote no. 65).

Graphics 13.
Partial dependencies of imports of main raw materials and energy carriers using Baltic infrastructure in relation to their domestic consumption in 2023

	Energy coal	Natural gas	Crude oil	Electricity
Energy dependence on the Baltic Sea	14%	78%	90%	2%

Source: own elaboration, M. Maj.

The highest import dependence among those analyzed occurs for crude oil and natural gas.

Graphics 14.
Baltic Sea energy dependency index in versions a) and b)

	Version a)	Version b)
Energy import (net) through the Baltic Sea (PJ)	1 771	1 771
Domestic energy consumption (PJ)	3 669	4 341
Energy dependence on the Baltic Sea	48%	41%

Source: own elaboration, M. Maj.

Comparing the import of the main energy resources (power coal, natural gas, oil) or energy carriers (electricity) through the Baltic to their total consumption in the country, the energy dependence index on the Baltic was obtained in version a), amounting to 48%. In version b), the index shows the dependence of import through the Baltic compared to the demand for all energy resources, energy carriers and fuels, not only those imported through the Baltic. However, since the main energy resources/energy carriers used in the Polish economy are imported using the infrastructure in the Baltic, the difference between versions a) and b) is not significant (Graphics 14).

"The **energy dependence index** on the Baltic was obtained, **amounting to 48%.**"

Forecast of dependence on the Baltic Sea for 2040

The expansion of offshore wind farms has real potential to generate around 17 GW of RES (Renewable energy sources) capacity, which is almost one third of the total installed capacity in Poland. In combination with the planned coastal nuclear power plant, which is to ultimately generate from 6 to 9 GW, Poland could obtain up to 26 GW of installed capacity in the Baltic Sea. In addition, in accordance with the assumptions of the currently applicable strategic document - the Energy Policy of Poland until 2040[66], for the purposes of calculations it was assumed that a number of gas investments will be made in the Baltic region, i.e. the construction of an FSRU regasification terminal in the Gulf of Gdańsk, the expansion of the LNG terminal in Świnoujście and an increase in the capacity of the Baltic Pipe.

Assumptions:

- The data was adopted based on data from Annex 2 to PEP2040 of February 2, 2021. A newer document, NECP (National Energy and Climate Plan) of February 2024[67], has scenario data until 2030, when it is assumed that nuclear and not fully offshore capacities, which are the investments that most affect the energy dependence indicator on the Baltic Sea, are not yet operational.
- The method of calculating the Baltic energy dependency index remains the same as described in the previous subsection.
- The forecast for 2040 assumes no electricity imports. If nuclear and offshore wind power capacity on the sea is available, imports through the Baltic from Sweden may not be necessary. For the calculation of the Baltic energy dependency index, it is irrelevant whether electricity is imported or produced using infrastructure located in or around the Baltic Sea basin, i.e. cables or wind turbines and a nuclear power plant, respectively.

Graphics 15.
Forecasted Baltic energy dependency index for 2040 in versions a) and b)

	Version a)	Version b)
Energy import (net) through the Baltic Sea (PJ)	2 191	2 191
Domestic energy consumption (PJ)	3 605	3 670
Energy dependence on the Baltic Sea	61%	60%

Source: own elaboration, M. Maj.

By comparing the forecasted import of the main energy resources (power coal, natural gas, crude oil) or energy carriers (electricity) through the Baltic Sea to their total forecasted consumption in the country (Graphics 15), the forecasted energy dependence index on the Baltic Sea in version a) was obtained, amounting to 61% in 2040.

"The **forecasted energy dependence index** on the Baltic Sea was obtained, amounting to **61% in 2040.**"

Conclusions: what dependency is excessive dependency?

- Although the Baltic Sea alone is not able to meet Poland's energy needs with its resources and constitutes only a fraction of the supply of raw materials, it is an important transport and trade route for the Polish economy. Together with the ports, transshipment terminals and energy infrastructure located in the region, the Baltic Sea is a key element of the regional geopolitical puzzle and a guarantor of access to global supply chains of raw materials, fuels and electricity. Poland's dependence on the Baltic Sea will grow with the implementation of subsequent projects – a nuclear power plant, offshore wind farms, FSRU.

- It would seem that, taking into account the growing role of the Baltic Sea, a comprehensive and long-term state strategy for the region will be created, giving appropriate importance to the development of coastal projects, coordination of work between state-owned companies and foreign partners, obtaining financing, military protection – with particular emphasis on the importance of the Baltic Sea for ensuring the country's energy security.

- Meanwhile, Poland's current political documents, although emphasizing the importance of building individual power installations at sea or on the Polish coast for generating the required electricity and diversifying supply routes, lack a broader updated strategic vision. The current National Security Strategy requires revision to better take into account the development of energy infrastructure and to place it in the broader context of the country's changing foreign policy and security policy. This, in turn, will better translate into the tasks of ministries and State Treasury Companies and specific logistics projects.

- Therefore, the Polish coast and sea waters require a multi-faceted strategy that will combine the details related to the diversification of supplies and the construction of the country's energy security, and will also allow for a broader perspective and understanding of the connections between assets, systems and sectoral policies.

- Given Poland's current energy dependence on the Baltic Sea, which is around 40% and – according to forecasts – expected to potentially reach around 60% in 2040, a deeper reflection should be carried out on the acceptable level of Poland's energy dependence on the Baltic Sea in view of the plans for the development of energy infrastructure on the coast and sea waters, and taking into account potential threats from Russia.

4. The Baltic Sea as an area of special protection – Captain (OF-5, POL N), Rafał Miętkiewicz, Associate Professor

Hydrocarbon resources located in the territory of the Republic of Poland do not allow the energy security of the country to be ensured based on its own extraction. Considering the complex and dynamic security situation, the only way to ensure diversified supplies of strategic raw materials in the form of crude oil and natural gas, as well as coal (market situation in 2022) is to use the coastal location of our country. It should be noted that supplies made by sea come from countries located many days of sailing from Poland and to carry them out, specialist ships (chemical tankers, oil tankers, bulk carriers) must cover thousands of nautical miles each time. Maintaining regular connections guaranteeing stable supplies is related to the need to overcome choke points (in the form of channels, straits, etc.), as well as waters characterized by a high level of tension and instability.

Energy infrastructure facilities on the Polish Baltic coast

Infrastructure in the form of sea ports and specialist terminals and access to global maritime trade routes not only constitute a "window to the world" enabling import from stable suppliers, but also provide the opportunity to co-shape the market (raw materials transported on board ships can be redirected in accordance with one's own economic interest), create the opportunity to join the process of building security in the region, raising the importance of the Republic of Poland in the international arena. The Baltic Sea waters constitute a huge, renewable reservoir of wind energy (second place among the northern seas), which in the case of the Baltic Sea is characterized by a potential of around 93 GW[68]. The Baltic Sea is one of the most dynamically developing markets for offshore wind energy. Strategic projects for the construction of offshore wind farms are currently being carried out by most coastal states. An important aspect is the inclusion of NATO's eastern flank countries (Lithuania, Latvia, Estonia, Finland) in this trend, most of which did not show any initiatives in this area a few years ago. Energy security issues are inextricably linked to the coastal location of the Republic of Poland, which constitutes a completely different environment for implementing state policy in this area. Therefore, it is necessary to analyze the key infrastructure facilities

Danish wind farm on the Baltic Sea

operating in Polish maritime areas, as well as engage in polemics regarding their protection, both in the national and broader context.

Sea ports

The coastal location of the country and the possession of seaports in the case of the Republic of Poland are one of the advantages in terms of freedom of trade and building the energy security of the country. The year 2023 was another record year in terms of the amount of goods (145.7 million tons) transshipped in the main ports of the Polish Baltic coast (Szczecin–Świnoujście, Gdańsk, Gdynia), exceeding the tonnage from 2022 by 9.56% (Graphics 16). Russia's aggression against Ukraine and the crisis on the energy market have changed the structure of transshipment (bulk)[69]. The Port of Gdańsk, with transshipments at over 80 million tons, thanks to increased transshipments of liquid fuels (+47.5%), grains (+60%) and coal and coke (+1.1%), maintained second position in the Baltic Sea in 2023 (behind Russian Primorsky). The port of Gdynia also recorded a significant increase in transshipments of liquid fuels (+57.3%). Increased sea transshipments of liquid fuels (41.1%) result from the policy of supply diversification and cutting off from Russia (a ban on importing Russian oil by sea has been in force since December 2022, and a ban on importing Russian petroleum products has been in force since February 2023). Polish ports, on the other hand, recorded a nearly 2.3 percent decrease in the number of transshipped containers (from 3,061,951 TEU[70] to 2,991,771 TEU in 2023)[71].

LNG terminal in Świnoujście

Graphics 16.
The structure of selected transshipments of the main Polish ports in 2023 compared to 2022

Loads (selected)	Gdańsk		Gdynia		Szczecin–Świnoujście port complex		Total	
	2023	Change year/year	2023	Change year/year	2023	Change year/year	2023	Change year/year
Coal and coke	13 360.9	+1.1%	2 825.4	–17.0%	2 937.6	–31.9%	19 123.85	–8.6%
Grains	3 091.9	+60.0%	6 759.7	+42.7%	2 631.8	59.5%	12 483.44	+50.1%
Wood[72]	156.6	–71.4%	178.3	– 66.6%	182.2	–20.4%	517.07	– 60.6%
Fuels	37 646.4	+47.5%	3 541.1	+57.3%	8 560.3	+14.4%	49 747.82	+41.1%

Source: own elaboration, R. Miętkiewicz, based on: Polskie porty morskie w 2023 r. [Polish seaports in 2023][73]

Container transshipment in Gdańsk. Source: Baltic Hub Container Terminal in Gdańsk

The LNG terminal in Świnoujście is the largest facility of this type in the Baltic Sea, with a regasification capacity currently reaching 6.2 billion m³ per year. In the record year of 2023, the terminal handled 62 supplies of liquefied natural gas, reaching a volume of 4.66 million tons of LNG (in 2022, 58 methane carriers were accepted, and in 2021 - 35 ships), which means full use of the reserved capacity of the gas port. The United States (41 ships in the reference year 2023) and Qatar (19 units) remain the main import sources. The imported volume allows for covering approx. 30% of our country's total demand for the raw material[74]. Work is underway to increase the nominal regasification capacity of the terminal to 8.3 billion m³ per year. In addition to import functions and the possibility of further redistribution of the raw material by land and sea (smaller methane carriers), the terminal has the capacity for process storage of LNG in two tanks with a capacity of 160,000 m³, with a third tank with a capacity of 180,000 m³ to be put into operation in the first months of 2024.

"**Seven critical zones** were identified along the Baltic Pipe route, resulting from the intensity of maritime traffic.."

Baltic Pipe gas pipeline

The Baltic Pipe offshore gas pipeline is part of a series of investments increasing Poland's energy security in terms of gas supplies. Access to deposits located under the Norwegian Shelf (thanks to the connection with the Europipe II gas pipeline) allows for the import of up to 10 billion m³ of gas per year. The nearly 900 km long gas pipeline route runs through the territory of Denmark, waters of Poland, Denmark and Germany, and geographically crosses parts of the North Sea and the Baltic Sea, including the Baltic Straits, one of the most congested maritime communication arteries in the world (sea routes south and north of Bornholm leading to ports of the Baltic States). Seven critical zones were identified along the Baltic Pipe route, resulting from the intensity of maritime traffic. Importantly, from the point of view of the safety of the Baltic Pipe infrastructure, it intersects with over twenty other infrastructure facilities (NS1 and NS2 gas pipelines, telecommunications cables, etc.).

American tanker in Świnoujście

FSRU terminal

The FSRU terminal, which is to be located east of Naftoport, is to enable the import of approximately 6.1 billion m^3 of natural gas per year (one regasification unit) to the country by 2027/2028. The implementation of this project, including the purchase of a unit, the construction of a breakwater and an offshore and onshore gas pipeline (249 km) is to be responsible for increasing the energy security of the Republic of Poland, and potentially, other countries in the region. The architecture of the terminal is to enable the mooring of a second regasification vessel. The location of the FSRU terminal on the Gdańsk coast extends the delivery time and constitutes a kind of accumulation of critical energy infrastructure (Naftoport) near the Kaliningrad Oblast, but it will be an investment that can be implemented faster than the construction of another gas port. The issue of accessibility and freedom of navigation is also significant due to the range of depths of the target water body.

Extraction of oil and gas from Baltic deposits

The only entity that has been involved for several decades in both exploration and exploitation of offshore oil and gas deposits in the 3,177 km^2 area of the Baltic Sea shelf is Lotos Petrobaltic (from the Orlen Group). The company also holds two concessions for extraction from deposits B3 and B8, which are in operation. The gas accompanying the oil extracted from the B8 deposit is sent through a 75 km underwater pipeline, and from the B3 deposit to Władysławowo, to Energobaltic through an 82.5 km long pipeline. Its CHP (combined heat and power) plant produces heat energy transferred to the municipal heating network.

Baltic oil and gas extraction does not reach a strategic scale for ensuring the country's energy security, but it is an interesting example of building the capacity to exploit raw materials, and in the case of natural gas, also its transmission via an offshore gas pipeline in difficult sea conditions.

The above-mentioned data on the import capacity of coastal infrastructure indicate the strategic importance of investments in the area of ensuring supplies of the raw material in relation to demand (Graphics 17). Gaz-System's revised gas consumption forecasts in Poland for 2024 indicate the need to ensure supplies of 16 billion m^3 (instead of the previously forecasted 18.8–19.4 billion m^3)[75], with domestic extraction covering approx. 20% of demand. In the case of Poland, access to the sea provides the possibility of meeting consumption needs, flexibly increasing the imported volume, and potentially building a position as a gas hub for the countries of the region.

Graphics 17.
Variants of natural gas supply by sea

Infrastructure	Import capacities [billion m^3/year]	Variants [billion m^3/ year]
LNG terminal in Świnoujście	6.2 – 8.3	Variant min. – 22.55 Variant max. – 26.75
Baltic Pipe	10	
FSRU	6.1 – 8.2	
Extraction by Lotos	0.25	

Source: own elaboration, R. Miętkiewicz.

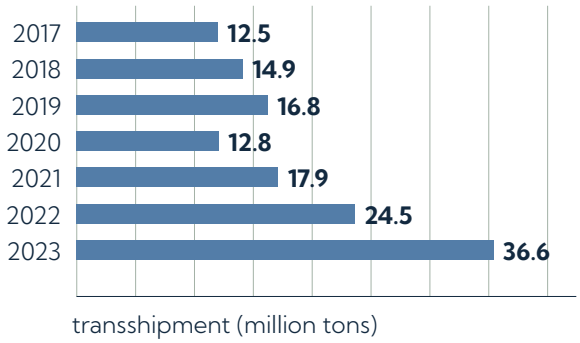
The above investments are in line with the assumptions of Pillar IV, which is a supplement to PEP2040 and covers building energy sovereignty by quickly making the national economy independent from fossil fuels and their derivatives originating from the Russian Federation and other countries covered by sanctions[76].

Crude oil logistics – Naftoport. Source: "NAFTOPORT"

Naftoport

Located on the coast of the Gulf of Gdańsk, Naftoport is an important element of the logistics of crude oil supplies for the domestic refining industry. As the only deep-water facility of this type in the country, it allows for the transshipment of 36 million tons of crude oil (record operating result achieved in 2023) and 4 million petroleum products annually. The facility is equipped with five berths, where tankers with a displacement of 30, 50, 2x150 and 300 thousand DWT[77] can moor. The structure of transshipment of crude oil and petroleum products in recent years is presented in Graphics 18.

Graphics 18.
Transshipments of crude oil and petroleum products carried out at Naftoport in 2017–2023



Source: based on: Naftoport, Ponad 36 mln ton w roku 2023 [Over 36 million tons in 2023][78].

In the aforementioned year of 2023, Naftoport handled 471 supplies (tankers), which was a significant increase compared to the previous year (49% increase in the volume of transshipped oil and its products), when 24 million tons of raw material were transported on board 363 tankers. The results of the discussed facility prove the validity of having an efficient technological infrastructure guaranteeing the handling of energy raw material supplies. One of the actions that will respond, in the long term (decades), to the need to increase transshipments is to be the construction of a new, deep-water berth capable of handling the largest possible class of tankers sailing in the Baltic Sea (VLCC[79] with a length of up to 300 m, width of 60 m and a draft of up to 15 m and a maximum load capacity of 180,000 tons). The new quay will enable the increase of Naftoport's transshipment capacity by another 9 million tons per year. The main source of raw material imports in 2023 were Saudi Arabia and Norway[80]. The storage and technological back premises of the transshipment facilities of the seaside terminal are two crude oil bases in Gdańsk belonging to PERN (Gdańsk Base and Oil Terminal in Gdańsk). Thanks to the Pomeranian pipeline, Naftoport has a direct pipeline connection with refineries in Gdańsk and Płock.

Offshore wind energy

The development of offshore wind energy is an element of one of the four pillars (II – zero-emission

energy system) of Poland's energy transformation. At the same time, it is indicated that the offshore wind sector will be able to play a key role in the process of building a European economy based on clean hydrogen technologies[81]. The initial estimates of the wind potential of Polish maritime areas indicated the possibility of obtaining up to 15.3 GW of power (two development phases according to PEP2040). PWEA analyses published in 2022 assume that in the case of releasing twenty additional locations that were not included in the current Spatial Development Plan of Polish Maritime Areas (PZPPOM), the total potential may amount to as much as 33 GW. Thus, in the perspective of 2040, SWE could be responsible for covering 57% of Poland's total estimated demand for electricity, with the expected average annual energy production at 130 TWh[82].

The European Commission estimates the total potential of the Baltic Sea at around 93.5 GW. However, such a radical increase in capacity would require offshore wind farms to occupy an area exceeding 4,500 km² (current plans assume SWE[83] on an area of 2,340 km²), which will constitute approx. 20% of the area of the Polish exclusive economic zone (EEZ[84]). Such actions also require changes to the existing regulations prohibiting the construction and use of offshore wind farms within the boundaries of internal waters and the territorial sea (Journal of Laws 2023.960). Poland is a signatory to the Marienborg Declaration (by 2030, wind energy production in the Baltic Sea will reach at least 19.6 gigawatts, i.e. seven times the current capacity), the aim of which is to increase energy resilience and reduce dependence on Russia[85].

Tanker in Naftoport. Source: „NAFTOPORT"

> "**The offshore wind sector** will be able to play a key role in the process of building a European economy based on clean hydrogen technologies."

Nuclear energy

The development of nuclear energy concerns obtaining a stable source of electricity with a total installed capacity of 6 to 9 GW thanks to the launch of six units (capacity of each of them 1-1.6 GW) containing pressurized water reactors PWR[86]. Considering the specificity of nuclear energy, it can be stated that it does not compete with renewable energy sources, and its advantage is the ability to stabilize the operation of the power system created with the participation of offshore wind energy. The location of the first Polish power plant (Lubiatowo-Kopalino) of this type was considered advantageous, taking into account both this factor and the high demand for energy in the region and access to water[87] (reactor cooling and transport issues of large-size structural elements). The Baltic Sea therefore has to play the role of a reservoir of cool sea water (intakes at a distance of 5.5 km from the shore and a discharge channel of approx. 3.5 km and depth of 18 m)[88]. Secondly, the sea communication routes and the proximity of two large sea ports (Gdynia and Gdańsk) as well as the construction of the transshipment pier will affect the accessibility of the construction area and provide the basis for a stable and safe supply chain.

SWEPOL

The 450 kV HVDC submarine cable connection with a rated power of 600 MW connects the coast of Sweden (Stärnö peninsula near Karlshamni) and Poland (west of Ustka with a converter station near Słupsk).

The line, approximately 254 km long (238 km under the seabed), was put into service in 2000. A unique solution used in the SWEPOL Link is the use of a 24 kV MCRC return cable instead of traditionally used electrodes. Since the launch of SWEPOL Link, at least a dozen cases of connection failures have been recorded, including both technical (electrical) failures and mechanical damage caused by fishing activities and anchors[89]. The connection was damaged as a result of a series of mysterious events (failure at the Stärnö power station), which occurred shortly after the sabotage on Nord Stream 1 and Nord Stream 2[90].

"Since the launch of **SWEPOL Link**, at least a dozen cases of **connection failures** have been recorded."

At the end of 2023, a political declaration was signed obliging Poland to connect the power grids of the Baltic States by February 2025, which would mean desynchronizing these grids with the Russian and Belarusian systems (regaining control over their own power grids by disconnecting from the Russian-controlled BRELL system). In terms of energy security, the Harmony Link interconnector project (Lithuania–Poland) is also being implemented. Lithuania has become the first country in the EU to completely stop importing Russian oil and gas[91], so the investment is another step for this country in building energy security. Initially, the line was supposed to run along the bottom of the Baltic Sea along the Russian waters of the Kaliningrad Oblast, but due to the rising costs of the project, it was decided to move the route to land (e.g. via the corridor created during the construction of the Rail Baltica railway line). Undoubtedly, in addition to financial issues, one of the reasons for the decision to be changed could have been the security situation in the Baltic Sea. These activities bring the Baltic countries closer together in terms of integrating the internal European electricity market (Baltic Synchronization Project).

Threats to the Maritime Domain as Perceived by NATO

As perceived by the North Atlantic Treaty Organization, threats that occur in maritime areas are extremely complex and multidimensional. Challenges that have been present for years, such as piracy, terrorism (Red Sea) or illegal migration by sea (Mediterranean Sea), are joined by completely new ones or those whose reactivation before Russia's attack on Ukraine in 2022 were considered unlikely (open combat operations at sea - Black Sea). Threats, although occurring in specific regions, are characterized by having a global impact. Actions taken against coastal and offshore critical infrastructure facilities, as well as maritime communication lines that are arteries for the transport of strategic raw materials (mainly oil and natural gas) have a direct impact on this state of affairs[92].
In relation to threats resulting from the neo-imperial policy of the Russian Federation, NATO (conclusions of the Vilnius Summit in 2023) identifies the protection of critical infrastructure at sea

Volodymyr Zelensky and Jens Stoltenberg at the summit in Vilnius in 2023

as one of the collective commitments of member states building maritime security[93]. Threats to undersea critical infrastructure (pipelines, power cables, fiber optic connections, etc.) are considered particularly real and may occur in the future. The results of surveys conducted among EU Protective Security Advisors (EU PSA) indicate the high position of critical infrastructure facilities as primary, secondary and tertiary targets of terrorist attacks in the coming years. According to the opinion of almost 82% of respondents, in the next three years (January 2023) it is expected that a foreign state will undertake hybrid actions in the form of terrorist activity in the EU. Energy infrastructure facilities may become the target of terrorist acts (40% of respondents)[94].

The European Centre of Excellence for Countering Hybrid Threats (Hybrid CoE) indicates that forms of maritime operations may include the use of fishing vessels to conduct aggressive activities, attacks by fast vessels, anchoring in the immediate vicinity of undersea infrastructure under the guise of a failure, etc., or cyberattacks on maritime infrastructure facilities (ports and offshore wind farms). Other scenarios may include unlawful announcements and closures of maritime zones under the guise of military exercises, introducing control zones for passing vessels[95], and attempts to introduce a blockade of a coastal state.

"A unit responsible for coordinating the protection of critical undersea infrastructure was established **at NATO headquarters**."

The level of potential challenges is evidenced by the fact that, as a result of discussions at the NATO Defense Ministers' meeting (February 2023), a unit responsible for coordinating the protection of critical undersea infrastructure was established at NATO headquarters. It was agreed to establish a Maritime Centre for the Security of Critical Undersea Infrastructure at the Maritime Command (MARCOM)[96].

With the accession of Sweden and Finland to NATO, the security architecture of the Baltic Sea region has changed significantly. The border of NATO's eastern flank with the Russian Federation has increased and currently amounts to 1,340 km, of which hundreds of kilometers fall on the land territory of Finland. It is indicated that Lithuania, Latvia and Estonia remain the most vulnerable to potential military actions from Russia, whose only land corridor providing a connection with the allies is the so-called Suwałki Gap[97]. Even limited actions against the Baltic states, as part of a challenge to the Western states and the dominant position of the USA, may serve Russia as a test of the unity of the alliance[98]. The geographical location of the Swedish territories increases NATO's ability to deter and defend the Alliance. Gotland in particular is a critical logistical point for the delivery of troops, weapons and supplies in the event of a Russian attack on the Baltic states or Poland. In retaliation to Sweden's accession to NATO, Russia announced the re-establishment of the Leningrad Military District (abolished 14 years ago) with the intention of strengthening its military presence (troop grouping) in the north-western area[99]. One of the factors that may increase tensions in the Baltic region is the use of ports for the export of Ukrainian products, as well as the transport of military aid to fighting units, not to mention the rotation of US forces stationed in the countries of NATO's eastern flank.

"The border of NATO's eastern flank with the Russian Federation has increased and currently amounts to **1.340 km.**"

Polish perspective

Taking into account the security issues of diversification corridors responsible for building stable supplies of strategic raw materials, attention should be paid to the specific location features of coastal infrastructure. Facilities in the form of specialist terminals are concentrated around large agglomerations of the Tri-City (Naftoport, refinery, ports in Gdynia and Gdańsk, within a radius of several dozen kilometers the location of the nuclear power plant) and Szczecin and Świnoujście (ports and LNG Terminal, as well as the Baltic Pipe gas pipeline exit). An important aspect is of course the direct proximity of infrastructure located in the Tri-City area to the area of the Kaliningrad Oblast. This increases the susceptibility to attempts to spy on these facilities and the range of threats from both land and sea. Offshore wind farms will be located outside the border of territorial sea waters, where laws guaranteeing free navigation for sea users apply. These investments are located near busy communication routes and areas suitable for conducting covert underwater activities. They are also characterized by the presence of weak points in the form of transformer stations (artificial islands) or hundreds of kilometers of submarine, energy export lines. Critical infrastructure located at sea and on the coast appears to be particularly susceptible to subthreshold threats, using the lower hemisphere (underwater threats) and cyber activities.

The Baltic Sea basin can be described as an arena of contemporary rivalry between the conflicting parties. Attention is also drawn to the difference in the perception of the security situation in the Baltic region. The threat from Russia to countries such as Lithuania, Latvia and Estonia, or even Poland, due to their potential and geographical location, is existential in nature. Denmark, Sweden and Finland perceive it as a threat, while Germany will perceive this situation more as a challenge[100].

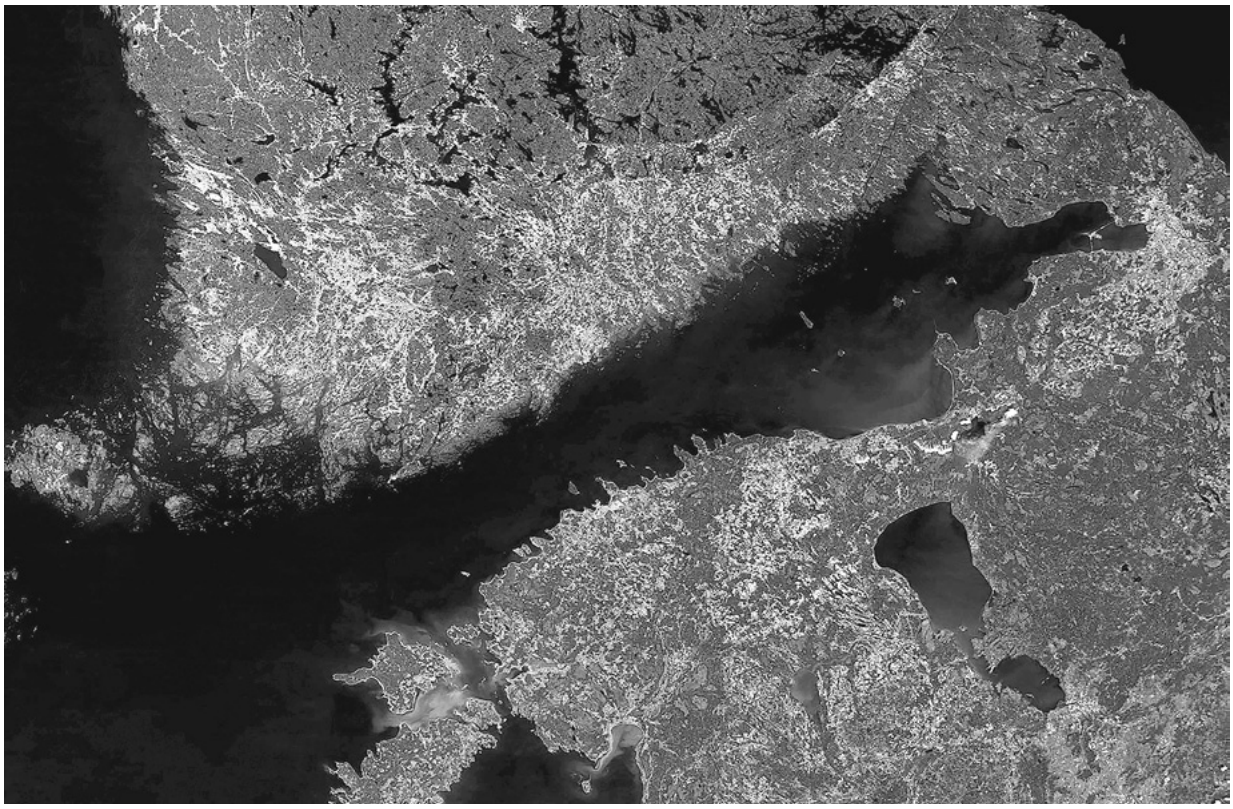
> "The Baltic Sea basin can be described as an **arena of contemporary rivalry** between the conflicting parties."

Therefore, a major challenge in terms of building security in the Baltic region is to maintain consistency of views on the assessment of threats, their monitoring and the principles of responding to incidents, e.g. in relation to maritime critical infrastructure facilities. The actions of the Russian Federation, historically speaking, have been focused on bilateral relations (e.g. on the Moscow-Berlin, Moscow-Paris line), instead of the EU-Russia, which favors divisions in multilateral arrangements (e.g. EU-Russia, NATO-Russia).

Proximity of the Kaliningrad Oblast to the Tri-City

The importance of the Baltic Sea for the Russian Federation

When attempting to assess the future security situation, one must also ask about the scope of Russian strategic interests in the region. From Russia's perspective, the Baltic and North Seas are part of a larger geostrategic Arctic-North Atlantic space, an area of operations stretching all the way to the Black Sea. Important sea lines of communication run through the Baltic Sea, and in the event of a military confrontation, control over this space will be a military priority for all parties involved[101]. Maintaining maritime communication between Saint Petersburg and the Kaliningrad Oblast is also an important issue. The historical issue of the possibility of cutting off access to the Gulf of Finland, both shores of which are controlled by NATO member states (Estonia's purchase



NASA satellite image of the Gulf of Finland

of Blue Spear anti-ship guided missile batteries) returns. In the absence of freedom in using sea areas, Russia's military presence on the territory of Belarus or rapid access to the coasts of the Baltic countries will become important. The Russian fleet also has the ability to pass to the White Sea through the White Sea-Baltic Canal, which is difficult to navigate and requires the use of 19 locks that eliminate the differences in the water levels of both seas.

As a result of its policy, Russia is politically isolated, and its military potential in comparison with NATO in the Baltic theater of operations has significantly decreased. Hence, active attempts to seek asymmetric and hybrid measures to compensate for the unfavorable situation. After the damage to Nord Stream 1 and 2, Russia no longer has similar underwater assets in the Baltic Sea[102]. At the same time, it is estimated that over the past ten years, Moscow has increased its underwater maritime activity four to five times[103].

Since the Western embargo and price cap on global oil sales, Russia has been operating a fleet of ghost tankers with deliberately unorganized ownership and insurance issues (flags of Cameroon, Gabon, Djibouti, Palau, and Belize), which has allowed the Kremlin to continue exports despite the restrictions. According to Finnish estimates, a fleet of about 70 old tankers with a unit capacity of over 100,000 tons of crude oil pass through the Gulf of Finland every week. On average, twelve such vessels cross Norwegian waters daily. This number is approximately the same or even greater than before Russia's attack on Ukraine[104]. The total size of the ghost fleet is estimated to be up to 1,400 vessels[105]. Additionally, Swedish reports indicate that the ghost tankers may be used for espionage, as evidenced by the presence of recon-

> "Russia has been operating a fleet of **ghost tankers** with deliberately unorganized ownership and insurance issues."

naissance devices[106]. In addition, the movements of this fleet may be camouflaged by GPS interference, which is already common in the Baltic Sea, as well as deliberate switching off of AIS transmitters.

The ghost fleet poses a serious ecological threat (also in terms of potentially saving lives at sea) due to its age (the average age of tankers leaving Kaliningrad at the beginning of 2024 is particularly high and is over 29 years old, compared to 15 in 2020)[107], technical condition and qualifications of the crews, and carrying out cargo transfer operations between ships on the open sea (even several STS operations[108] before the oil reaches its destination). Their main destinations are: India, Greece, China and Morocco. The use of the ghost fleet is also an element of war, because wherever these ships appear, the risk of incidents involving them increases. These units are also characterized by periods of so-called unexplained downtime in the Baltic, Mediterranean and Arabian Seas. The above confirms Russia's use of the merchant fleet as an important tool for financing war.

The provisions of international law guarantee freedom of navigation, which ensures freedom of this procedure, and the fight against the ghost fleet brings poor results. It can be assumed that any attempts to control and block the passage of units in the waters of the Baltic Straits would be met with a decisive reaction from Russia and the use of its navy, which would ultimately exacerbate the situation in this sensitive region..

"**Any attempts to control** and block the passage of units in the waters of the Baltic Straits would be met with a decisive reaction from Russia."

Summary

Referring to the Baltic Sea as a "NATO lake" may lead to a false belief, in the author's opinion, about the full control of the strategic situation and the general dominance of the Alliance over the Russian Federation, mainly in the context of conventional naval forces. It should be remembered that Russia has been building its A2/AD (Anti Access/Area Denial) capabilities for many years, and the systems that create them are deployed in the Kaliningrad Oblast and the Northwestern Federal District (Saint Petersburg). The Russian naval doctrine of 2022 in force is confrontational in nature and mentions the expansion of Russia's potential in the Baltic Sea. Even a cursory analysis indicates that the Baltic region is a contact zone of states and entities that form them with different military (NATO–Russia), economic and political (EU–Russia) interests. It is indicated that the value of Russia's long-standing economic ties and political influence in the region has been lost, and its ability to project military power has been reduced to an unprecedented minimum[109]. The importance of the Baltic Sea for Russia is evidenced by the fact that in September 2023, 57% of Russia's total oil exports were shipped from ports on the Baltic Sea. The forces of the Russian Federation permanently stationed in the region are indeed being transferred to Ukraine, but security should not be built in relation to the reduced potential of the enemy engaged in a different direction[110], especially in relation to Russia's announcements of increased spending on its army and its expansion.

"The Baltic region is a **contact zone of states and entities** that form them with different military (NATO–Russia), economic and political (EU–Russia) interests."

Conclusions: Is the critical infrastructure on the "NATO lake" safe?

- The Baltic Sea remains a region of tension between Western countries and Russia, intensified by the ongoing war in Ukraine, which evokes an increase in the number of threats of potentially different forms,
- In the Baltic Sea, there is dynamic expansion of the critical energy infrastructure of coastal states striving to increase their security and build the resilience of societies,
- The Baltic Sea continues to play an important role in Russia's policy, remaining an important artery for oil exports from Baltic ports using a so-called ghost fleet, which poses a real threat to the ecosystem and is used to create hybrid threats,
- The ports of the Kaliningrad Oblast are the only Russian seaports in the Baltic Sea that are ice-free year-round, which proves their strategic importance for the Russian Federation,

Port in Russian Kaliningrad

- The change in the security architecture caused by the accession of Sweden and Finland to NATO significantly influenced the position of the Alliance in the region, re-evaluating previous assumptions, e.g. in terms of the defense capabilities of the Baltic states, creating new opportunities and increasing the potential of the region,

- In response to the NATO enlargement process, Russia intends to increase its military presence, which leads to the acceleration of the militarization of the region,
- Investments of the Republic of Poland aimed at increasing the diversification of hydrocarbon supplies, as well as building its own potential in the field of energy generation based on offshore wind farms (potentially also energy storage in combination with hydrogen technologies) create independence for the state, but their location in the marine environment creates certain vulnerabilities to threats,
- In order to detect symptoms of threats early enough, further consolidation of activities within the framework of cooperation between the countries of the "Baltic community of values and national interests" is necessary between services, with particular emphasis on naval forces,
- In the era of multiplying threats generated by numerous actors in open or hidden links with the Russian Federation, determination in exercising control over maritime areas (airspace, surface space, water column and seabed) and the constant presence of naval forces at sea, presenting the attitude of coastal states and NATO, are becoming increasingly important,
- One of the key aspects of building the security of critical infrastructure facilities will be increasing their resistance to cyber threats, the intensification of which is observed in the Baltic states.

5. Summary: not only the sea can help – Mariusz Ruszel, PhD, Professor of the Rzeszow University of Technology

The Baltic Sea region is of strategic importance to Poland in the context of diversifying sources and directions of energy supply, as well as implementing signed contracts for the supply of crude oil and natural gas supplied by the USA (2043) and Qatar (2034). Access to the sea allows a tactical advantage to be built in international relations[111]. Security and freedom in the Baltic Sea are the foundation of the economic security of Central and Eastern Europe. Among the countries of Central and Eastern Europe, only Poland has access to the sea and therefore has a privileged position compared to other countries in this region. This means that through Poland, the countries of this part of Europe have access to the global market for energy resources. From the perspective of the USA, Poland is a strategic transit route that allows for the implementation of economic competition in Central and Eastern Europe with the Russian Federation. This is particularly important at the time of expiration of Russian contracts for the supply of energy resources, because US energy diplomacy has the ability to acquire new receiving markets.

It should be emphasized that the Baltic Sea is of strategic importance for: Denmark, Estonia, Russia, Finland, Lithuania, Latvia, Poland, Germany, and Sweden[112]. On one hand, the safety of navigation in the Baltic Sea basin is crucial for the energy security of Poland and other countries of Central and Eastern Europe[113]. On the other hand, this region is of strategic importance for the Russian Federation, which exports over 50% of its crude oil from ports located in this region with the help of a ghost fleet to end users. At the same time, Russia has announced significant militarization of this area, which in the context of basing Poland's energy security on the northern vector of foreign policy creates certain risks. For this reason, ensuring energy security in the Baltic Sea region requires the military involvement of the North Atlantic Treaty Organization (NATO) countries. All the more so because in the coming years the threat of a terrorist attack on critical infrastructure facilities located in the Baltic Sea basin will increase. It is possible that they will be subject to increased surveillance. An increase in interference, including GPS transmitters, has been ob-

> "From the perspective of the USA, **Poland is a strategic transit route** that allows for the implementation of economic competition in Central and Eastern Europe with the Russian Federation."

served in this region recently.

Taking into account the above aspects, the energy infrastructure, which enables the receipt of crude oil, liquid fuels, and natural gas, located in Poland in the Baltic Sea region is of fundamental importance. In relation to crude oil, in 2023 record volumes of liquid fuel transshipments (an increase of over 47.5% compared to 2022) were observed, which underlines the strategic importance of the port in Gdańsk. Naftoport allows for the receipt of 36 million tons of crude oil and 4 billion tons of petroleum products. It is crucial that deliveries by sea create flexibility in terms of creating the architecture of contracts for the supply of crude oil, in which no intermediaries have to participate. n the context of natural gas, key infrastructure includes the LNG terminal in Świnoujście, with a regasification capacity of 6.2 billion m^3 per year (to be expanded to 8.3 billion m^3), and the Baltic Pipe gas pipeline, which connects to the Europipe II pipeline and has an import capacity of 10 billion m^3 annually. Taking into account domestic production of natural gas (approx. 3 billion m^3) and existing import capacities from the north (16.2 billion m^3), the total potential is seen to be almost 20 billion m^3 of natural gas. Taking into account domestic consumption of natural gas at approx. 16 billion m^3 (estimated for 2024), we will obtain the possibility to re-export approx. 3-4 billion m^3.

Nevertheless, Poland must have an alternative way of ensuring the continuity of supplies of energy resources and fuels, regardless of the sources from the north, which is currently strategic in nature. The risk of various incidents in the Baltic Sea region clearly indicates that the security of supplies of crude oil, fuels, natural gas, and electricity cannot be based solely on the northern vector. It should be emphasized that the Baltic Sea basin has enormous potential for the development of wind energy. For this reason, wind farm facilities located in the maritime area must be protected at the national and international level. Political and military cooperation of all countries in the Baltic Sea region with the North Atlantic Treaty Organization is essential. This maritime region will also be key to the process of building a nuclear power plant. In the long term, it will be necessary to ensure the se-

> "Poland must have an **alternative way of ensuring the continuity of supplies of energy resources and fuels**, regardless of the sources from the north."

Servicing the largest tankers in the Baltic Sea. Source: "NAFTOPORT"

curity of the supply chain of elements necessary for the implementation of the investment. Sea ports will play an important role. The issue of access to cool sea water for reactor cooling will also be important. In addition, the northern axis also includes a submarine power connection with Sweden (450 kV), as well as submarine cables ensuring the energy security of the Baltic states, which are becoming independent not only from Russian oil supplies, but also from Russian electricity supplies. The above aspects indicate that the issue of the Baltic Sea basin is not limited only to the security of oil, fuel and natural gas supplies. The context is broader and all the more requires the construction of solid alternatives.

"**The eastern vector has ceased to be important** in the context of crude oil imports."

Analyzing the western direction, it can be seen that the extension of the NATO pipeline system to Poland (CEPS product pipeline) and further to the Baltic States (Lithuania, Latvia, Estonia) and Ukraine[114] is of strategic importance for Central and Eastern Europe. The CEPS system allows for the transport of over 12 million m^3 of aviation fuel for military and non-military purposes[115]. This issue should be the subject of more detailed analyses. From the western direction, it is also possible to import natural gas via interconnectors, i.e. Mallnow (277 GWh/day of natural gas), GCP GAZ-SYSTEM/ONTRAS (48.7 GWh/day) and Lasów. In this way, natural gas from Norway could alternatively reach Poland. All the more so because the Baltic Pipe gas pipeline is included in the Europipe II gas pipeline, which connects with the Federal Republic of Germany. It is also necessary to take into account the highly developed capacity between the Netherlands and Germany, which would create opportunities for importing liquefied gas from LNG terminals in the Netherlands or Belgium.

The strategic corridor is the north-south axis, which connects sea basins. Analyzing the southern direction, one can see the possibilities of using the natural gas interconnections between Poland and the Czech Republic as well as Poland and Slovakia, and then Hungary, Romania and Bulgaria. In turn, crude oil could reach the Czech plants of the Orlen company from Trieste in Italy via the TAL pipeline.

On the other hand, the eastern vector has ceased to be important in the context of crude oil imports. It is currently being considered in the context of using natural gas storage facilities in Ukraine in the scope of seasonal balancing of supplies of this raw material. Considering the fact that Ukraine has huge natural gas storage facilities, further analyses should be taken into account in the scope of their use for the purposes of strengthening the energy security of the region. Currently, Ukraine is receiving aid in terms of supplies of fuels necessary for defense against Russian military aggression. The eastern direction also includes the Baltic countries, of which Lithuania has an LNG terminal in Klaipėda with import potential of 3.75 billion m^3.

Calm Baltic Sea

Conclusions and future perspective:

- It should be emphasized that access to the Baltic Sea is currently a geostrategic interest of Poland, and energy security in the scope of supplies of crude oil, gasoline, fuels and natural gas depends on maintaining safety and undisturbed navigation in this region. On the other hand, it is in the interest of the countries of Central and Eastern Europe to maintain stable access to supplies of energy resources and fuels by sea, because it increases not only the possibilities of diversifying the sources and directions of supplies of energy resources, but also provides a basis for changing the architecture of raw material contracts together with indexing prices to European or American markets. With such possibilities, it is possible to create a basis, for example, for price arbitrage in Stockholm. Contracts are freed from prohibited clauses, and prices cease to be political in nature, and become economic. Taking into account the above circumstances, one should ask how the continuity of energy and fuel supplies to Poland and the countries of Central and Eastern Europe will be maintained in the event of incidents damaging Poland's strategic energy infrastructure or circumstances that make it impossible to maintain the continuity of navigation in the Baltic Sea basin? It should be recalled that in 2015 Lithuania conducted military exercises simulating an attack on the LNG terminal in Klaipėda.

- With resignation from Russian supplies of energy resources, the importance of Polish ports has increased, and they will naturally become objects of increased risk of incidents aimed at limiting their functionality. For this reason, it is of fundamental importance to ensure the protection of strategic energy infrastructure located in the Baltic Sea region, as well as to expand the naval fleet capable of controlling key geographical areas. We should not forget about threats in cyberspace, ICT, as well as disinformation instruments that may be aimed at weakening Poland's privileged position in relation to other countries of Central and Eastern Europe. Multi-level security and increased resilience on the northern vector within the economic dimension of Poland's foreign policy are becoming crucial. At this point, it is worth asking what disinformation, ICT and cyber instruments can the Russian Federation use to disrupt the continuity of supplies of energy resources and fuels to Polish ports? This issue should be the subject of further reports and analyses. Critical infrastructure facilities must be particularly protected in the event of various incidents, such as fire. An important element is the ownership structure of many entities included in the group of companies serving energy security and logistics in the Baltic Sea region. It should be assumed that actions may be taken to take over shares of a given company or to attempt to discredit management boards. Service companies, as well as those supplying components and ICT software, will also be of critical importance. Tender procedures, as well as public-private cooperation, may prove crucial. It cannot be ruled out that students and graduates from the East will be more interested in doing internships, apprenticeships, and applying for jobs in companies providing broadly understood logistics, service and ICT support for facilities related to Poland's energy security. Attempts to carry out research projects and interviews for theses by doctoral students interested in accessing sensitive data of individual facilities may also increase. Taking into account the above circumstances, special attention should be paid not only to the physical protection of critical infrastructure facilities located in the Baltic Sea basin, but also to companies and individuals responsible for individual processes and activities that should be subject to counterintelligence protection.

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- It is in the interest of Poland and the countries of the region to build such political relations and develop energy infrastructure that in a crisis situation in the Baltic Sea basin will enable the continuity of supplies based on alternative routes. This will not be easy, because the political relations between the Visegrad Group countries and the Russian Federation are of a different nature. Poland's entire energy security cannot be based only on the northern vector. For this reason, it is necessary to develop energy infrastructure in such a way that in a crisis situation in the Baltic Sea basin it will possible to ensure the continuity of energy supplies using intermodal transport in the supply of crude oil and fuels, as well as intersystem connections of natural gas from the west and south. For this reason, it is necessary to develop the appropriate permeability of intermodal transport for the supply of crude oil and fuels, and not only reverse natural gas interconnectors, but also to increase their capacity and to expand gas compressor stations and national transmission gas pipelines that will not be a limitation for the transmission of natural gas.

List of abbreviations

AIS	Automatic Identification System
A2/AD	Anti Access/Area Denial
BEMIP	Baltic energy market interconnection plan
BRELL	Belarus, Russia, Estonia, Latvia, Lithuania
CEE	Central and Eastern Europe
CEF	Connecting Europe Facility
CEPS	Central Europe Pipeline System
CHP	Combined heat and power
DWT	Deadweight tonnage
Dz. U.	Journal of laws
EEZ	Exclusive Economic Zone
EU PSA	European Union Protective Security Advisors
FSRU	Floating Storage Regasification Unit
GCP	Grid Connector Point
GW	Gigawatt
Gwh	Gigawatt hour
HVDC	High voltage direct current
Hybrid CoE	European Centre of Excellence for Countering Hybrid Threats
ICT	Information and communications technology
NECP	National Energy and Climate Plan
kV	kilovolt
LNG	Liqufied Natural Gas
LPG	Liquefied Petroleum Gas
MARCOM	Maritime Command
MKiŚ	Ministry of Climate and Environment
MSZ	Ministry of Foreign Affairs
MON	Ministry of National Defense
MW	megawatt
NATO	North Atlantic Treaty Organization
OWE	Offshore Wind Energy
OWF	Offshore Wind Farms
PCI	Project of Common Interest
PEJ	Polish Nuclear Power Plants
PEP2040	Poland's Energy Policy until 2040
PGNiG	Polskie Górnictwo Naftowe i Gazownictwo (Polish Oil and Gas Mining)
PGE	Polska Grupa Energetyczna (Polish Energy Group)
PNP/PPEJ	Polish Nuclear Energy Program
POPiHN	Polish Organization of Oil Industry and Trade
PRW	Pressurized Water Reactor
PSE	Polish Power Grids
PSEW	Polish Wind Energy Association
PZPPOM	Spatial Development Plan for Polish Maritime Areas
RES	Renewable Energy Sources
RP	Republic of Poland
NSS	National Security Strategy
SMR	Small Modular Reactors
STS	Ship to ship
TAL	Transalpine pipeline
TEU	Twenty-foot equivalent unit
EU	European Union
USA	United States of America
VLCC	Very Large Crude Carrier

List of graphics and photos

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Footnotes

Access to the sea as a strategic goal for Poland – Paweł Turowski

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