

The Impact of Marginalizing The Military Function of Seaports on The Development of Offshore Wind Energy in The South Baltic Region*

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Abstract

In an era of geopolitical threats, the Baltic Sea is becoming an increasingly important maritime area in the growing energy conflict of the modern world. This is primarily due to the increasing number of vessels with difficult identification, which pose a real threat related to ecological disasters, as well as the threat of compromising critical infrastructure, often leading to permanent damage. Given the dynamic development of Polish offshore wind energy, the issue of security in the area of construction and future operation of wind farms seems crucial, especially since this infrastructure will be part of the core infrastructure that secures the livelihoods of residents of the entire Polish Pomerania region.

Therefore, considering the article's niche thematic scope and unique presentation of this issue as its primary objective, the main objective has been clarified: the impact of the marginalization of the military function of seaports on the development of offshore wind energy in the South Baltic region. The research problem in the article is formulated as the following question: Does the current geopolitical situation resulting from the armed conflict in Ukraine and the Middle East influence the direction of seaport development strategies related to the development of wind energy in the South Baltic?

In response to the above issues, the article provides a synthetic review of the preventive function in ports on the Central Coast of Poland and outlines the framework for anticipated changes related to the inadequate strategic actions of ports over the years.

Keywords: seaport functions; offshore area; critical maritime infrastructure.

Introduction

Offshore wind energy represents one of the most challenging investment areas in the European energy transition, driven by the need to decarbonize electricity generation while strengthening the resilience of power systems. Within this broader trajectory, the Baltic Sea is increasingly perceived as a strategic sea, combining favorable wind conditions with an emerging multinational project pipeline, while remaining a complex maritime space shaped by navigation corridors, environmental constraints, and safety concerns [1,2].

Poland is one of the Baltic countries that is particularly and dynamically utilizing the identified conditions for offshore wind energy development, rapidly moving from regulatory planning to implementation. This is indicated by Poland's national economic development goals and the specialized permit framework, which implements the

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recommendations of the PEP2040 energy policy, which indicates an energy growth from 5.9 GW in 2030 to 11 GW in 2040 [3]. At the same time, given the constant changes in the deepening energy crisis, resulting from, for example, the initiation of the military crisis in the Middle East and earlier in Ukraine, legislative and strategic updates have increased the declared long-term trajectory to 18 GW [4], reflecting Poland's intended role as a major player in the offshore wind energy sector in the South Baltic. This spatial orientation resulted in the implementation of changes that affected the area designated for offshore wind energy, which was enlarged to 2,340 km² (approximately 10% of the Polish Exclusive Economic Zone of approximately 22,500 km²), thus representing a technical potential estimated at approximately 33 GW [5]. The combination of policy objectives, designated maritime space and technical potential indicates that offshore wind energy is no longer treated as a marginal supplement to the energy resources of Northern Poland, but as a structural element of the national energy mix.

The development direction toward energy recovery, resulting from the country's geographical location, is presented in a strategic perspective. This is evidenced by investment plans, with many offshore wind farm projects having obtained location permits and entering the development phase by mid-2024. The first electricity deliveries are expected from 2026, and total investment needs are estimated at approximately PLN 130-150 billion. Importantly, the Polish program is not based on a single flagship project, but on several large projects implemented by state-owned energy groups, domestic private investors, and international companies, which indicates the significant scale of capital mobilization as well as the complexity of requirements for managing and coordinating energy challenges [6].

From the perspective of offshore investment, offshore wind energy is inextricably linked to seaport capacity and maritime logistics, particularly with respect to intermodality. It is noticeable that many offshore projects generate demand not only for offshore turbines and specialized foundations but also for installation terminals, heavy-lift berths, storage and pre-assembly areas, and a continuous operation and maintenance system supported by service vessels and specialized facilities in the water area and port territory. This confirms the general trend of Poland developing a functional, multi-port configuration, consistent with the offshore wind energy value chain. This is exemplified by the fact that one of the largest Polish ports, the Port of Gdynia, was designated as the first dedicated installation terminal, while Gdańsk, the second strategic port for the Polish maritime economy, plays a complementary industrial role through production and supply chain integration. Similarly, seaports on Poland's west coast, such as Szczecin and Świnoujście, are strengthening their position as western, border logistics hubs. At the same time, smaller ports, such as Łeba and Ustka, are being adapted as offshore bases due to their proximity to concession areas, which is crucial for daily maintenance, crew rotation, and rapid response operations.

Analyzing the above, including the growing economic cluster related to wind energy in the Baltic Sea, as well as the level of advancement of Polish energy projects, it is first necessary to point out both the relatively high dynamics, but also the increasing level of risk and threats to the security of each investment's success. By 2025, nearly 6 GW of projects were progressing through various stages. Baltic Power (1.2 GW) was the most advanced, with construction activities related to port infrastructure and offshore works planned for 2025-2026, and the first energy export is planned for 2026. Other large projects, such as Baltica 2 (1.5 GW) and Baltica 3 (1.05 GW), remained in the pre-implementation phase, while additional investments (e.g., Bałtyk II and Bałtyk III, each with a capacity of 720-1200 MW) were still undergoing permitting and pre-implementation preparations, despite obtaining environmental decisions. The construction processes themselves were and continue to be associated with delays or capacity mismatches in ports and logistics, which directly translates into higher project implementation costs and schedule delays [7]. Furthermore, it should be emphasized that the geopolitical situation changes at every stage of investment implementation, which also affects the Baltic Sea region. Therefore, offshore wind energy should be analyzed not only as an energy technology, but as a complex infrastructure system embedded in the maritime space, affected by external stimuli that slow down investments and require special attention when considering the protection of critical infrastructure. Furthermore, it should be noted that, in line with advancing technology, all protective mechanisms for strategic investments should be developed. With tensions in the Baltic Sea basin constantly rising and further uncontrolled incidents occurring, a return to expanding the police function in the Baltic Sea should be a priority. And this has been in a terrible state on the Central Coast of Poland for over a decade.

This is confirmed by research focusing on Polish ports, which emphasizes that the readiness of local ports for preventive actions is very limited. This applies not only to port parameters, such as the length, width, depth of the port waters, and the size of the turning basins, which should be able to accommodate both Polish warships and ships from friendly countries in the Baltic region. The limitations of Polish ports also result from the mooring capacity of preventive vessels related to the operations of the Border Guard and the operation of Polish Navy vessels. Most importantly, these limitations stem from Poland's flawed strategic policy, which led to the scrapping of many warships in previous decades, including the liquidation of military facilities in the ports of Hel and Kołobrzeg, where Navy combat units operated.

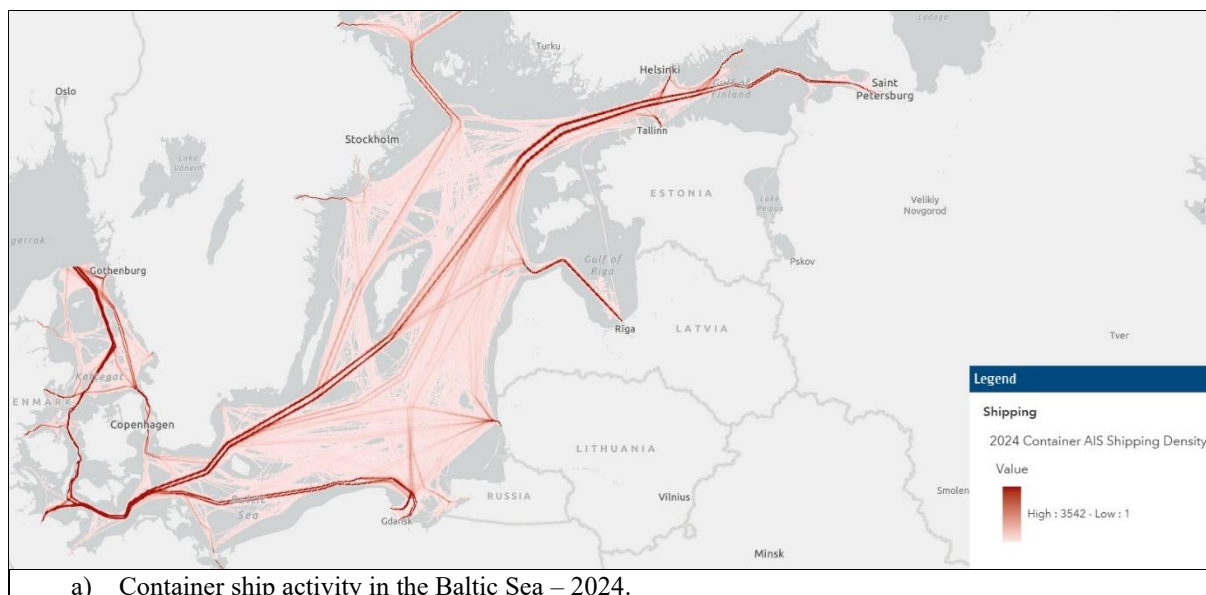
These fundamental factors, determining whether ports can realistically support large-scale offshore wind energy, are currently key determinants of offshore investment development. It is the ability to secure energy investments that enables the development of offshore wind energy supply chains, including the development of shipbuilding, specialized maritime services, component production, regional labor markets, and other elements that support the development of offshore wind energy.

In this context, this study conceptualizes the development of offshore wind energy in the South Baltic as an investment-driven market transformation, the success of which depends on the co-evolution of offshore projects and logistics infrastructure based on ports with adequate security. Basing the introduction on specific objectives, spatial allocations, and project maturity, the article creates a context for further analysis of the resilience of offshore infrastructure and emerging security threats affecting offshore energy systems.

Research materials and methods

When analyzing the impact of the marginalization of seaports' preventive function on the development of offshore wind energy in the South Baltic region, it should be emphasized that almost all seaports located on the Central Coast of Poland are characterized by localism, with historical manifestations of regional scope. On the one hand, the operation of these ports is characterized by a directionality related to the traditional, conservative transshipment function. On the other, an increased focus on incorporating the development aspect can be observed, which sets a new trend in port development, changing its defining characteristics. This latter direction is treated as a kind of "forced action," revealing the lack of a plan for the port, the lack of a plan for the development of the water area and the territory, as well as the indolence of those managing the port and port-related areas. Such a focus also indicates a dangerous marginalization of certain functions, such as transshipment, which are essentially preventive, related to the defense and policing aspects of the port, as well as the water area and the area adjacent to it.

When considering the Polish Central Coast in terms of vessel traffic intensity and all activities, such as those related to fishing and coastal tourism, it can be compared to a sinusoid. Strong poles associated with a very high density of vessels occur in the Tricity agglomeration: Gdynia-Sopot-Gdańsk, and in the vicinity of Świnoujście and Szczecin. Noticeably, very little vessel traffic activity occurs near the ports and harbors of the Polish Central Coast, manifesting itself in the existing so-called "sailing holes," but also in the existence of low transshipment activity, despite very good environmental values. This is presented in the figure below (Fig. 1.).



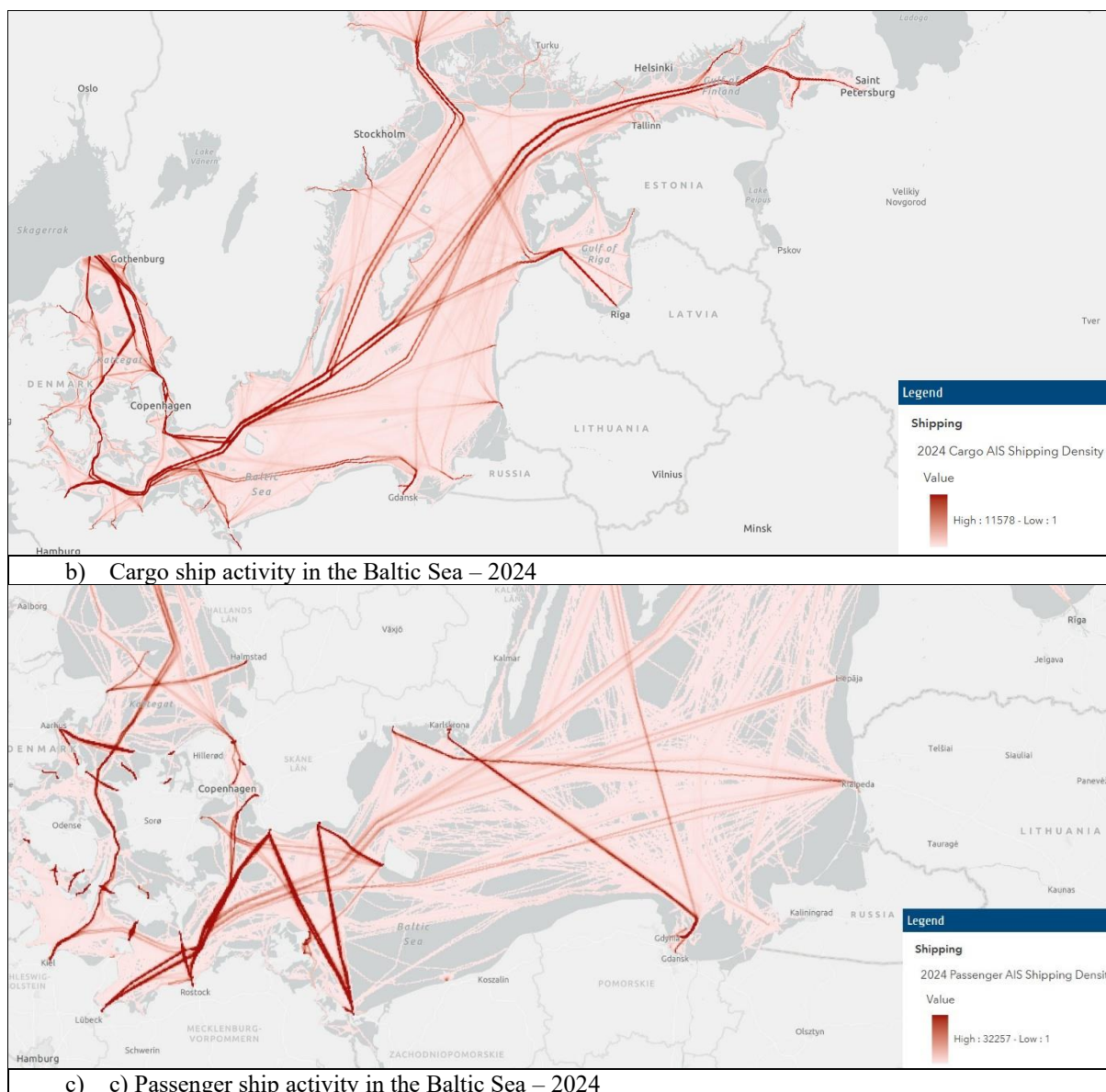


Figure 1. Vessel activity in the South Baltic Sea

Source: Own study based on www.maps.helcom.fi/website/mapservice/index.html

The aforementioned marginalization of some port functions likely stems from the described activity of units and the failure to fully utilize port services as a transshipment hub. A similar trend, which has persisted for years, has undoubtedly forced changes in the port's capital management and led to a complete degradation of the port's perception as a "locomotive" driving economic development, including that related to offshore wind energy. The shift in the polarization of the port's long-term vision has resulted in a distinct lack of direction for the development of land areas with a seaport throughout the entire South Baltic area. This also applies to the operation of Navy and Border Guard units, whose task is to protect state interests, particularly, currently, investments related to developing offshore wind farms.

With this in mind, the main objective of this article has been defined, focusing on the impact of the marginalization of the military function of seaports on the development of offshore wind energy in the South Baltic region. The research problem in the article is formulated as the following question: Does the current geopolitical situation resulting from the armed conflict in Ukraine and the Middle East influence the direction of seaport development strategies related to the development of wind energy in the South Baltic?

Based on the above, an analysis of port infrastructure accessibility was conducted, based on the seaports in Kołobrzeg, Darłowo, and Ustka. This analysis was preceded by a review of literature and online data, particularly

the Statistical Yearbooks of Maritime Economy published by the Central Statistical Office. The selection of seaports on the Polish Central Coast: Kołobrzeg, Darłowo, and Ustka, is primarily due to their past military and preventive functions, and in particular, the development of a maritime energy cluster associated with offshore wind farms within these ports. The advantage of these ports is also the fact that in the past there were Navy units and the proximity of the Central Air Force Training Range and other military units such as: 6th Military Economic Unit in Ustka, Naval Training Center in Ustka, Naval Non-Commissioned Officers' School in Ustka, 7th Coastal Defense Brigade in Słupsk, Base Protection Battalion in Słupsk, 44th Kashubian-Darłowska Naval Air Base, 12th Kołobrzeg Logistic Regiment, Military Recruitment Center in Słupsk, 73rd Light Infantry Battalion.

The following research methods and tools were used in the study:

- Secondary analysis of literature sources and statistical data – this method allowed for the analysis of transport accessibility based on descriptions of the ports in question, including acquired data on the operation of these ports, primarily in terms of their preventive function.
- Case study method of seaports on the Central Coast of Poland – this approach allowed for the analysis of the port's functional characteristics in terms of the safety of both the port infrastructure and superstructure, as well as the structural elements of offshore wind farms.

Analysis of port functions

Local ports on the Central Baltic Coast serve diverse functions (trade, fishing, tourism, and sailing). At the same time, they are assessed for their ability to support offshore wind farm operations, primarily as service bases rather than installation centers. The functional profile of each port is strongly influenced by infrastructure parameters (berth length, fairway depth, turning basins), available real estate, and connectivity to the hinterland, which together determine operational suitability for offshore wind farms.

To ensure port comparability, this section uses a functional-infrastructure perspective and summarizes key parameters for the ports of Kołobrzeg, Darłowo, and Ustka in terms of area, quay length, cargo quay accessibility, fairway parameters, and vessel limits, in accordance with the cited port strategies and port planning documents.

In addition to the aforementioned roles of leading Polish ports on the Central Coast of the South Baltic, these ports, due to their traditional nature, have historically contributed to maritime security through the presence of defense infrastructure, routine coordination mechanisms, and the ability to support surveillance or incident response. Over time, as military functions were reduced or transformed, local ports increasingly evolved towards civilian operations, oriented towards human inclinations, which tended to introduce a residential function within the port. This functional shift is particularly significant for offshore wind energy, which depends on ports not only for logistics and operation but also for rapid access, coordination, and service continuity under threat conditions. Therefore, the following analysis of Kołobrzeg, Darłowo, and Ustka considers both their current functional structure and infrastructure parameters, as well as how a limited security dimension may impact their readiness to support resilient offshore wind farm operations in the South Baltic.

Port of Kołobrzeg – functional profile and offshore-relevant infrastructure

The Port of Kołobrzeg is a multifunctional seaport located at the mouth of the Parsęta River, which continues to maintain its importance both regionally and nationally [8]. Its current portfolio of functions includes fishing, trade (transshipment), sailing, and passenger services. Infrastructure-wise, Kołobrzeg covers an area of 63 hectares, has five basins and quays with a total length of 4.91 km, including 786 m of cargo quays. The port can accommodate vessels up to 100 m long, 15 m wide, and with a draft of up to 5 m. The specified fairway parameters are 1.25 km long, 26 m wide, and 6.3 m deep, with turning basins of 94 m and 140 m in diameter (both at a depth of 6.3 m) [9].

Kołobrzeg also boasts extensive warehouse and office infrastructure (approximately 50,000 m² of warehouse space and approximately 2,000 m² of office space), as well as a railway siding (621 m), which together support the port's commercial operations and can be used for offshore logistics (e.g., spare parts storage and service equipment storage). Access from land is provided by the S6 expressway, national road no. 11, and railway lines 402/404.

Kołobrzeg has a number of features that support its potential role as an offshore wind farm service port. The port offers identifiable quay reserves and areas suitable for investment, creating conditions for the development of the operational facilities necessary for offshore wind farm service (e.g., mooring and servicing of service vessels, organizing spare parts logistics, and storing equipment for ongoing maintenance). At the same time, in order to strengthen operational readiness for regular operations in the field of wind energy, it is justified to improve selected access and maneuvering parameters, in particular those related to the port entrance, approach channel, and available maneuvering and turning space. The current functional profile of the port is dominated by civilian and economic activities (including fishing, commercial cargo handling, passenger traffic, and tourism/sailing) and is not characterized by a permanent, clearly defined police or military function within the current port operations. However, Kołobrzeg has a historical background related to a defense presence (for example, the stationing of an Anti-Submarine Squadron from 1991 to 2002), making the port a significant example of a long-term functional shift from security-oriented roles towards primarily civilian and market applications (Fig. 2.).

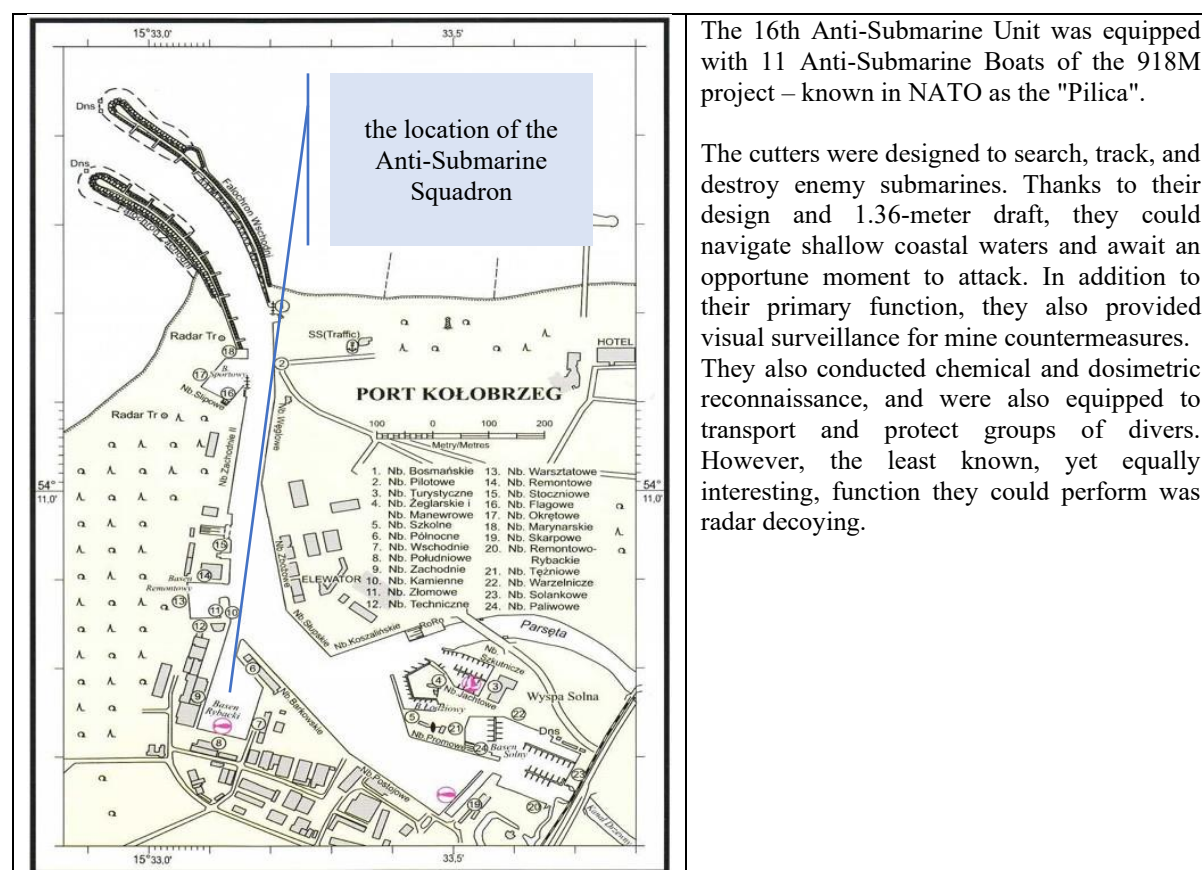


Figure 2. Naval units deployed in the port of Kołobrzeg

Source: Own study based on: www.twierdzakolobrzeg.pl/twierdza/garnizon/549-historia-16-dywizjonu-kutrow-zwalczania-okretow-podwodnych-w-kolobrzegu.

Port of Darłowo – multifunctionality, development plan and offshore-oriented investments

The Port of Darłowo is classified as a small seaport of fundamental local importance and is described as a multifunctional economic structure, hosting fishing, recreational and sports activities, and cargo transshipment. Geographically, the port is located at the mouth of the Wieprz River, approximately 25 nautical miles west of Ustka and 33 nautical miles east of Kołobrzeg [10]. Structurally, the port consists of two parts connected by a 2.5-kilometer port channel: a coastal section with breakwaters, an entrance, an outer port, and a fishing basin, and an inland section (approximately 2.3 km from the entrance) encompassing a turning basin and an industrial basin. The reported total area is 117.16 hectares (88.76 hectares of land; 28.40 hectares of basin) [11]. The total length of the quays is 5.3 km, including 2 km of cargo quays. The maximum parameters of the vessel are 75 m (length), 13 m (width), 4 m (draft), while the parameters of the fairway are 2.36 km long, 23 m wide, 5.5 m deep, and the turning basin is 110 m in diameter and 5.5 m deep [12].

Darłowo's importance for offshore wind energy is primarily reinforced by strategic programming for the development of the offshore wind energy market. This is one of the port's key priorities for 2020-2025, alongside commercial vessel services, maritime tourism, fishing, and environmental protection. This approach shapes the port's ambitions to become a logistics hub for offshore wind energy, supported by targeted investments such as quay modernization (including the renovation of Słupsk Quay I and II), the creation of new warehouse and office space, the development of offshore-oriented infrastructure, and the planned expansion of the turning basin to improve maneuverability and operational efficiency. Currently, Darłowo is primarily a civilian and commercial port, focused on fishing, cargo handling, and tourism. It is not described as having a permanent, separate police or military function within the port's ongoing operations. However, as with other local ports on the Central Coast, Darłowo's long-term evolution can be interpreted as a shift towards market and service functions, providing a useful context for analyzing how the port's changing role may impact its readiness to support offshore wind farm projects and the resilience of offshore energy infrastructure. An example is the constant operational readiness of the Navy's air units, which are primarily used for rescue operations with minimal anti-submarine engagement. The deployment of the ships, despite their convenient location and historical evidence of their presence, is questionable at best. Good access from the S-6 road and the location would suggest that any ships should be operating there. However, no ships are stationed there, even on a standby basis (Fig. 3.).

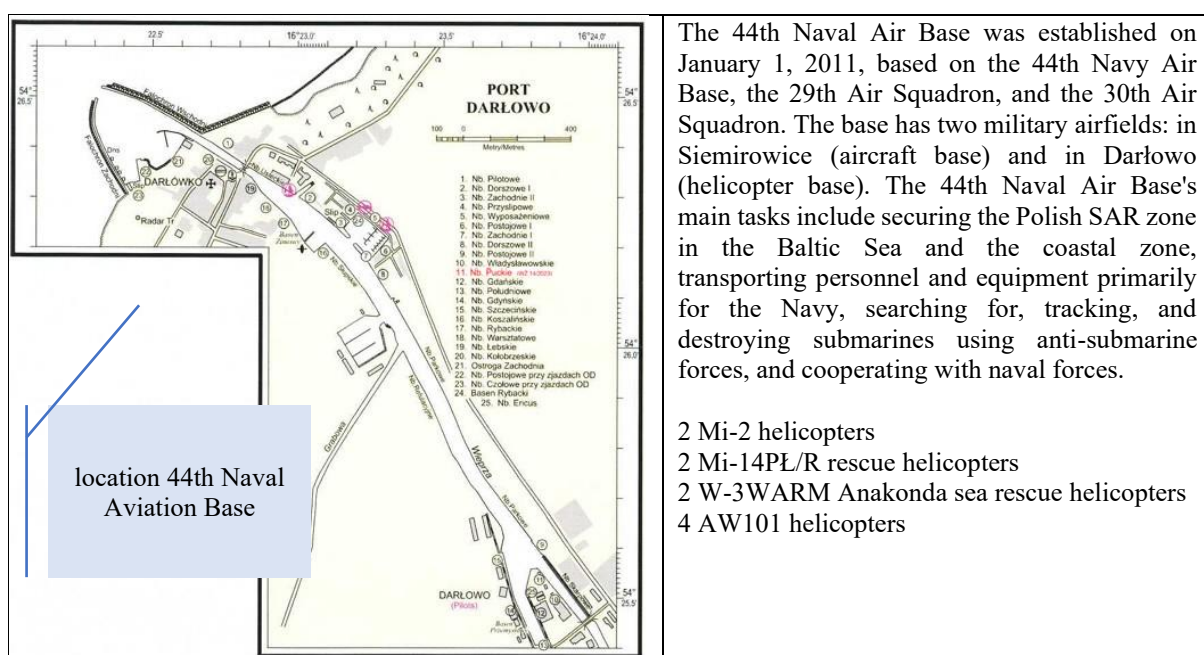


Figure 3. Naval units deployed in the port of Darłowo

Source: Own study based on: www.wojsko-polskie.pl/blmw/44-baza-lotnictwa-morskiego/.

Port of Ustka – functional transformation and formal positioning as an offshore O&M base

The Port of Ustka, located at the mouth of the Słupia River, is one of the largest small seaports on the Polish coast and represents a significant functional transformation over the years. Although the port historically handled commercial cargo and later, especially after World War II, shifted to fishing, its commercial and industrial role has weakened in recent years due to declining cargo turnover and the closure of shipbuilding operations. As a result, the current profile of the Port of Ustka is dominated primarily by fishing-related activities, with other functions playing a secondary role [13]. In terms of infrastructure, the port covers an area of approximately 29.29 hectares, with a total quay length of approximately 3.417 km, of which approximately 160 m is dedicated to transshipment. Typical operational restrictions include vessels up to approximately 60 m in length, 12 m in width and 4 m in draft. The approach and inner fairway parameters are characterized by a route of approximately 1 km in length, approximately 24 m in width, 5.5 m in depth and a turning basin of approximately 67 m in length (at a depth of 5.5 m) [14, 15].

Ustka's importance for offshore wind energy stems primarily from its proximity to early offshore developments in the Słupsk Bank and the Polish Exclusive Economic Zone, making it well-suited for daily service patterns where response times, crew logistics, and vessel availability are crucial. In this context, the port is positioned as an operational and maintenance base for offshore wind farms, and development activities typically focus on quay

modernization and the expansion of technical, office, and warehouse facilities, supported by ongoing coordination of routine maintenance and emergency interventions. At the same time, Ustka's current functional structure is based on civilian, market-oriented activities and is not described as fulfilling a permanent, clearly defined police or military function as part of daily port operations. This aspect further reinforces the broader pattern of shifting roles of ports on the Central Coast towards civilian and service functions, aligned with the offshore wind value chain..

The Port of Ustka, at almost every stage of its existence, was treated as a logistics and training base. Due to the operation of the Navy's training unit, the Naval Training Center in Łędowno, the Port of Ustka was included in operational plans as a possible support point for logistical operations, although the Navy never granted it the status of a base or maneuvering point for naval ships. This long-standing presence in various plans demonstrates that the region itself and the military units stationed within the port's influence area did not demonstrate defensive, let alone preventative, characteristics. However, it should be noted that on more than one occasion in the 1970s and 1980s, a ship on combat duty was stationed there. Sailors from the Naval Training Center in Ustka were transported on mine-laying ships, immediately embarking on a so-called candidate cruise.

In fact, despite the presence of the 7th Coastal Defense Brigade, the Naval Training Center, the 6th Military Economic Unit, and the Central Air Force Training Area in Wicko in Słupsk, no one in power has considered the strategic role of the port of Ustka. Only in recent years has the issue of utilizing ports on the Central Coast of Poland in the context of potential NATO allied operations gained importance. This was fueled by the strategic concept of the Polish Ministry of National Defense, provisionally known as the Pact for the Security of Poland – Central Pomerania. Its goal is to analyze the possibilities of using various elements of Polish infrastructure to ensure the flexibility of transporting allied forces in peacetime, during periods of heightened readiness, and during crises. During the work, it became clear that the port of Ustka is emerging as one of the leading candidates for playing the most important role in military operations in the Central Baltic. This also applies to supporting preventive measures related to securing the operation of critical infrastructure of offshore wind farms within the Słupsk Bank, even with minimal port infrastructure (Fig. 4.).

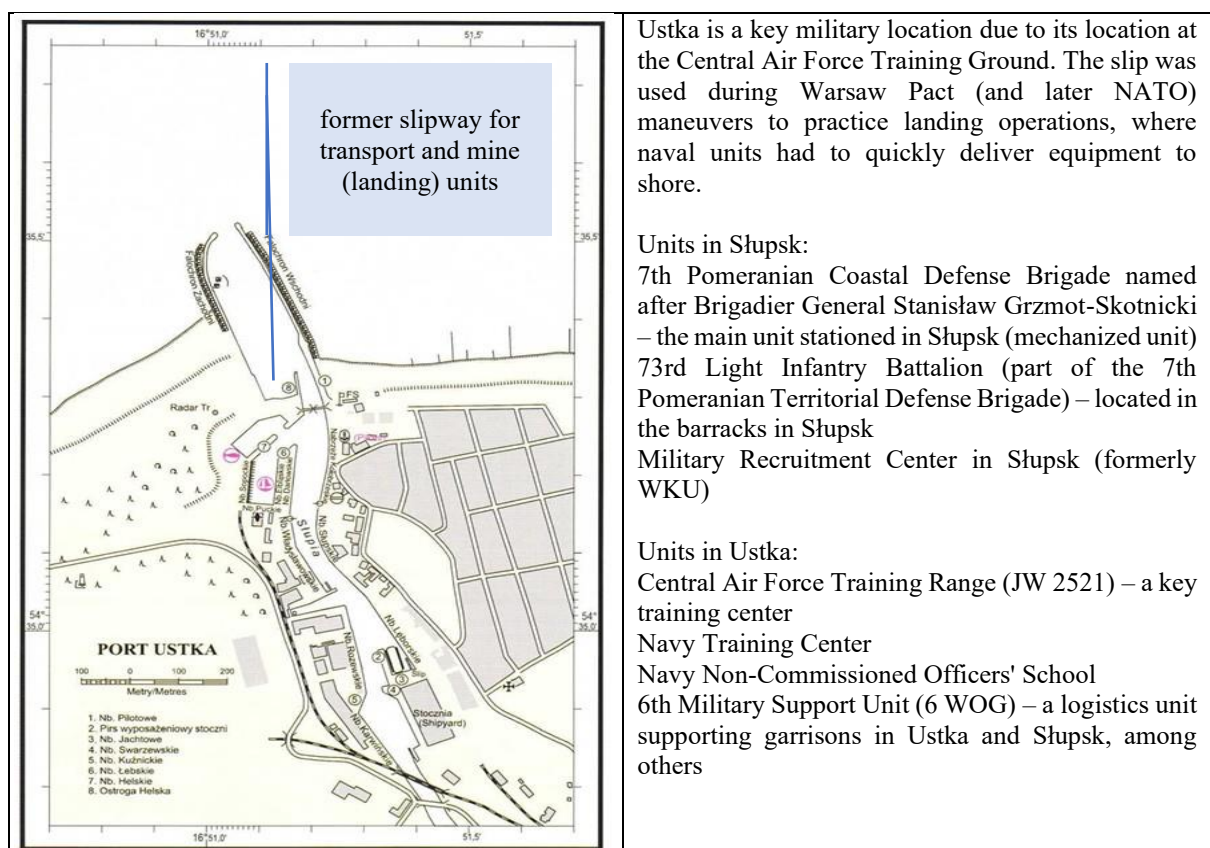


Figure 4. Military infrastructure in the port of Ustka

Source: Own study based on: www.wojsko-polskie.pl.

When analyzing local ports on the Central Baltic Coast in terms of functionality, they can be considered similar in many respects. They all serve similar functions, from trade to fishing, as well as tourism and nautical activities, with varying weightings assigned to each port. Table 1 provides a comparative overview of key infrastructure parameters for the three analyzed seaports (Kołobrzeg, Darłowo, and Ustka), summarizing their size, quay infrastructure, navigational access conditions, and vessel constraints. These attributes are important for assessing the feasibility of offshore wind energy service functions, as they shape quay capacity, operational flexibility, and the ability to handle routine and emergency maintenance logistics.

Table 1. Infrastructure of seaports on the Polish Central coast.

Port	Total area (ha)	Length of quays	Length of cargo quays	Depth of the quays	Waterway in the Port	Maximum vessel parameters
Kołobrzeg	63ha	4.91km	786m	5.5m	1.25km/26m/6.3m	100m/15m/5m
Darłowo	117.16ha	5.3km	2km	4-5m	2.36km/23m/5.5m	75m/13m/4m
Ustka	29.2934ha	3.417km	160m	4.5-5.5m	1175m/24m/5.5m	60m/12m/4m

Source: own study based on Maritime Port Development Strategy for Ustka until 2030, Actia Forum, 2019; spatial development plan for the maritime Port of Ustka environmental impact assessment, Gdańsk, January 2022; draft spatial development plan for internal marine waters—maritime Port in Darłowo environmental impact assessment.

Table 1 highlights significant differences in scale and operational constraints between the analyzed ports. Darłowo has the largest total area (117.16 ha) and the longest quay infrastructure (5.3 km), including the longest cargo quay (2 km), which enhances its potential for logistically intensive service and warehousing functions. Kołobrzeg offers relatively deep quay conditions (5.5 m) and the most flexible vessel parameters (up to 100 m in length and 5 m in draft), suggesting relatively greater flexibility in accommodating service vessels and supporting operations on the port's side. Ustka, although strategically attractive due to its proximity to maritime areas, is the smallest port in terms of area (29.2934 ha) and cargo quay length (160 m) and presents the most restrictive vessel limits (60 m in length and 4 m in draft), which may translate into a stronger reliance on specialized energy arrangements and careful capacity planning. Overall, the comparison confirms that local ports differ not only in size but also in navigational and mooring constraints – factors that directly impact their realistic role in the logistics of offshore wind farm operation and maintenance, as well as response operations. However, from the perspective of the Navy's operation within them, both operationally and preventively, all ports are similar. In principle, they play no significant role in maintaining order both within the port and in the central Baltic Sea. Such actions impact the security of critical infrastructure, which undoubtedly includes the construction of new offshore wind farms.

This unfavorable course of action for the ports of the Central Coast of Poland is unrelated to the current situation. Decades of neglect, associated with the improper development of ports that have always lacked space for military functions, have left the central coast vulnerable, and the infrastructure, which constitutes one of Poland's key investments, is at significant risk. The omissions are largely due to the marginalization of the Navy, which, instead of maintaining adequate combat potential, significantly reduced its size. A summary of the Polish Navy's forces is presented in Table 2.

Table 2. Ship forces of the Polish Navy 1995-2022.

Naval forces of the Polish Navy	Year 1995	Year 2022
Submarines	3	1
Missile Destroyers	1	-
Anti-submarine Surveillance Ships/Corvettes	1	1
Patrol Corvettes	-	1
Missile Frigates	-	2
Mine Countermeasures Command Ships	-	1
Minehunters	-	1
Missile Boats	7	-
Small Missile Boats (Tarantul I class)	4	-
Small Missile Boats (Orkan class)	3	3
Large Submarine Chasers	8	-
Anti-submarine Boats	11	-

Minesweepers/Sweeping Boats	24	17
Amphibious Ships	7	5
Transport Boats	3	3
Signal Intelligence Ships	2	2
Hydrographic Ships	3	2
Training Boats	3	-
Training Ships	3	2
Rescue Boats	2	2
Rescue Boats	5	2
Fuel Tankers	3	2
Sum:	93	47

Source: Own study.

Summary

In summary, with the growing number of vessels in the Baltic Sea and the growing threat from the Russian Federation, maintaining the security of critical maritime infrastructure reveals not only a legal loophole in security, but also a lack of activity in strengthening the Polish Navy's capabilities. The shipping route, parallel to the Polish coastline, is characterized by considerable saturation, and most importantly, by increasing incidents, which can be presumed to be the work of a shadow fleet attempting to circumvent EU sanctions, primarily related to the transport of oil from Russian ports. Given these conditions, implementing wind energy investments without adequate support from land becomes very risky. This applies not only to offshore investments themselves, but also to issues related to the protection of Polish interests, such as those related to fisheries, which are still associated with Poland's Central Coast (Fig. 5.).

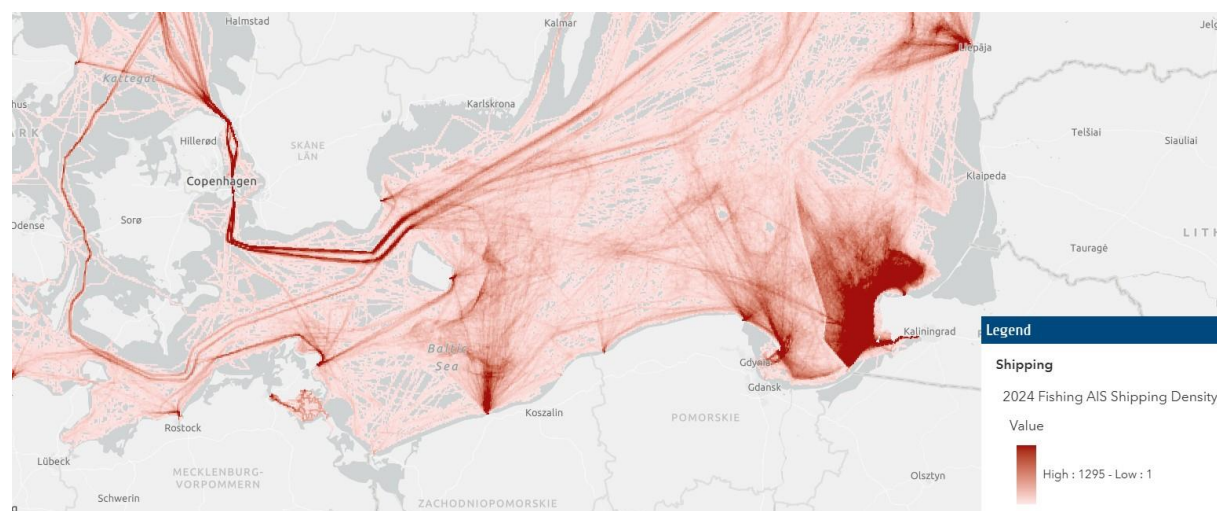


Figure 5. Fishing vessel activity in the Southern Baltic Sea

Source: Own study based on: www.maps.helcom.fi/website/mapservice/index.html

As can be inferred from the figure above, fishing activity on Poland's Central Coast is quite high compared to port activity in other sectors, such as transshipment. Therefore, port orientation related to maintaining military functions in the local ports of Kołobrzeg, Darłowo, and Ustka has not been taken into account over the years. This may be due to the continued imposition of fishing restrictions by the European Union, the trend of changes in this sector related to the scrapping of cutters, or the lack of a development vision for ports on the part of government and city officials. These consequences will undoubtedly influence the incipient development of Poland's flagship maritime investment: the construction of wind farms. The research hypothesis, formulated as follows: the preventive function of a seaport and the proximity of Navy units significantly influence the development of critical infrastructure related to offshore wind energy, was accurately formulated. The characteristics of each port examined, including the abandonment of preventive functions, highlighted the lack of crisis-preparedness of ports to protect and defend critical infrastructure.

Given the development of Russian ports such as Saint Petersburg and Primorsk, which are crucial for Russian exports of crude oil and other goods, it can be assumed that geopolitical tensions and concerns about new installations in the Baltic Sea will increase. Therefore, the main objective of the article, focusing on the impact of the marginalization of military functions of seaports on the development of offshore wind energy in the South Baltic region, has been confirmed. These negative manifestations of hybrid activities are already visible, for example in the context of the increased intensity of GPS jamming in the South Baltic region and the damage to the Balticconnector pipeline between Finland and Estonia. In a situation where Polish wind farms will be located close to the main shipping routes, it can be assumed that in extreme geopolitical tensions, deterrence alone will not be enough, but the use of naval forces will be necessary, which are lacking in the Polish ports of the Central Coast.

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