Poland's energy security in 2026: A critical assessment

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The authors of the report sincerely thank all the interlocutors who took the time and shared their knowledge and experience with us. All interviews were conducted on the condition of anonymity.

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Executive summary

Poland's energy security has changed in substance, not only in scale. Over the past decade, the country has moved away from direct dependence on Russian supply routes and toward a system built on diversified infrastructure and national control over key assets. This shift has reduced exposure to political coercion in gas and oil, but it has also created a system that is more complex and more sensitive to disruption at specific points. Energy security in Poland today depends less on fuel availability and more on the resilience of infrastructure and the capacity of institutions to manage stress.

Large investments in LNG terminals, gas interconnectors, ports, and electricity networks have strengthened supply security. At the same time, they have concentrated critical functions in a limited number of locations. This is most visible along the Baltic Sea coast, which now underpins gas imports, fuel logistics, and future offshore wind development. Disruption in this corridor would have immediate national effects. Electricity security faces additional pressure from ageing generation units, rising demand linked to electrification, grid congestion, and limited flexibility, especially in distribution networks. Heat systems and fuel logistics remain weakly integrated into energy security planning despite their relevance for households, emergency services, and crisis response.

The institutional system governing energy security is dense and fragmented. Responsibilities are spread across ministries, regulators, system operators, state owned companies, and local authorities. Formal competences are defined in law, but coordination in practice is uneven. Decision making slows under stress, information does not always flow vertically or horizontally, and crisis escalation paths are not consistently clear. The growing role of private and partially foreign owned operators in critical infrastructure increases the need for clear obligations and enforceable security standards.

The threat environment Poland's energy system is facing is broader than traditional supply disruption. Physical sabotage, cyber incidents, maritime risks, supply chain delays, and extreme weather all pose credible risks. These threats are magnified by long repair times for key components, limited domestic manufacturing capacity, and reliance on specialised external suppliers. As a result, energy security increasingly depends on repair capability, workforce availability, and institutional readiness rather than on reserve volumes alone.

Within this context, the Baltic Sea has become a central element of national energy security. The concentration of ports, terminals, and offshore assets creates strategic value but also systemic vulnerability. Energy security is therefore closely linked to maritime security and regional cooperation.

This report assesses Poland's energy security through infrastructure, institutions, and threats.

1 Introduction and analytical framework

1.1 Purpose, scope & methodology

This report is designed to serve as a practical toolkit for understanding **energy security in Poland**. The aim of the report is to assess and analyse the Polish energy security architecture as it is, not strive for a perceft scenario. The report also builds on Poland's chairmanship of the European Council, during which **energy security** was identified as a priority area, and reflects the broader European context in which national energy systems are increasingly treated as security assets.

The scope of the report is deliberately focused. It does not attempt to provide a comprehensive overview of the entire Polish energy sector. Instead, it concentrates on those segments of infrastructure, governance, and regulation that are most relevant to security, resilience, and international cooperation. The analysis integrates the **geopolitical, legislative, and regulatory environment with an examination of institutional coordination gaps and decision-making bottlenecks** within the Polish system. Particular attention is given to issues where infrastructure dependency, legal authority, and operational responsibility intersect, as these areas are most likely to shape outcomes in crisis conditions.

The methodology combines **qualitative and quantitative research tools** to support this objective. Qualitative methods form the core of the analysis and include structured policy and document review, stakeholder interviews, and a focused case study. While the initial research design envisaged the use of the Delphi method to structure expert input and reduce bias, time constraints among interlocutors led to the use of semi-structured interviews. Interviewees were drawn from the public sector, private industry, and the expert community. Most interviews were conducted in person, with a limited number carried out online or through written correspondence. To ensure candour, all interviews were anonymised and referenced using alphabetical identifiers without indication of institutional affiliation or hierarchical position.

For the purposes of this report, consultations were conducted with representatives of the following organisations, listed by relevance with state institutions first: the Ministry of Foreign Affairs, the Ministry of Climate and Environment, the Ministry of Energy, the Government Security Center, the Maritime Operations Center, the Polish Naval Academy, Polish Power Grid Company (PSE), the Polish Electricity Committee, the Polish Wind Energy Association (PSEW), Orlen and Equinor.

Quantitative analysis was applied selectively to complement qualitative findings. Data analysis and statistical reviews were used to contextualise infrastructure capacity, system exposure, and selected performance indicators, rather than to construct a comprehensive statistical model of the energy sector. This blended approach allows the report to deliver a focused assessment aligned with its purpose, providing analytical depth where it informs security and cooperation objectives, while avoiding unnecessary breadth that would dilute its practical relevance. The report is a result of independent work of analysts from the Casimir Pulaski Foundation.

1.2 Defining energy security in the Polish context

Energy security can no longer be understood only as a narrow question of access to cheap fuels or the management of import dependency ratios. Energy has become a central variable in economic development, industrial competitiveness, national security, and the clean energy transition. As a result, energy security now concerns the functioning of the entire energy system and its ability to support modern societies under conditions of change and stress.

The **contemporary understanding of energy security** therefore extends across the full value chain, from primary resource acquisition to final energy consumption. It encompasses not only supply availability but also system stability, affordability, durability and the **'three Rs': resilience, robustness and redundancy**. This broader perspective reflects the reality that vulnerabilities increasingly arise not at the point of supply, but within networks, infrastructure interfaces, and operational coordination. In this context, the **security of electricity grids and the protection of critical energy infrastructure**, both on land and at sea, have become core components of energy security rather than secondary technical concerns.

Electricity security, as defined by the International Energy Agency, forms a particularly important element of this expanded concept. It refers to the ability of the power system to deliver electricity reliably and continuously, despite disruptions affecting generation, networks, or control systems.[1] As electricity becomes the backbone of decarbonised energy systems, failures in the grid have systemic consequences that extend beyond the energy sector, affecting economic activity, public services, and social stability.

Poland illustrates this complex reality with particular clarity. Located at the intersection of geopolitical tension, economic transformation, and energy system change, it has experienced first-hand the strategic use of energy as a tool of coercion. The past four years have confirmed that energy commodities are not neutral goods, but instruments that can be weaponised against import dependent states. The strategic lesson of diversification has been rather well absorbed and implemented by successive Polish governments through investments in alternative supply routes and infrastructure.

Future challenges, however, differ in nature from those of the past. Securing and stabilising the electricity grid under a rapidly changing energy mix, protecting new generation and network assets, and preparing critical infrastructure for climate induced disruptions require a different order of strategic thinking. These challenges place greater emphasis on system management, infrastructure protection, and institutional coordination than on fuel sourcing alone.

Against this background, this report defines energy security through the lens of resilience, as the capacity of the Polish energy system to function reliably under pressure. Its objective is to assess energy security as it exists in practice, rather than as an aspirational policy goal. The report therefore serves both as a **diagnostic tool and as a practical guide to** navigating the structure, constraints, and vulnerabilities of the Polish energy system.

2 Historical, strategic & legal foundations

2.1 Historical evolution of the Polish energy system

Poland's present energy security landscape reflects how inherited infrastructure was preserved and adapted after 1989 rather than fundamentally redesigned. The socialist energy system was organised around coal fired generation and vertically integrated utilities. Transmission and distribution networks were built for stable output from large units. They were not designed for flexibility or rapid reconfiguration. Security was defined as internal sufficiency within a closed system.

After 1989, reforms prioritised system continuity during economic transition. In electricity transmission, investment during the 1990s focused on rehabilitating existing lines and substations. Dispatch and control systems were upgraded to improve reliability. These measures stabilised operations but did not alter grid structure or introduce redundancy. The basic topology of the network remained unchanged but the country strived, in words of the World Bank, "to develop an energy policy that would enhance efficiency and increase competition in the [energy] sector".[2] In practice, however, limited progress in market restructuring, including the persistence of vertically integrated utilities, weakened investment incentives in both generation and grid infrastructure. This constrained long-term capacity renewal and network expansion, with downstream effects on system security and electricity costs borne by consumers.

District heating followed a similar pattern. Investment programmes targeted loss reduction and efficiency improvements.[3] Networks were rehabilitated rather than restructured. Fuel dependence remained concentrated, often on a single source. Operational flexibility in crisis situations was therefore limited. Liberalisation of oil and gas markets increased import exposure, while gas supply contracts and infrastructure remained oriented toward eastern routes. Storage capacity and alternative import options developed slowly. Energy security was treated mainly as a market issue rather than a strategic concern.

EU accession changed regulation and financing conditions. Network upgrades and environmental compliance advanced with European support, while policy and market integration became the dominant frame for policy decisions.[4] Geopolitical risk and infrastructure protection received limited attention.

A clear shift occurred after 2014. Russia's actions in Ukraine triggered diversification of gas and oil supply routes. LNG import capacity and interconnectors were prioritised, both continental and with Norway.[5] These investments reduced supplier dependence but concentrated critical functions in a small number of assets. These primarily concern four major infrastructures: the Baltic Pipe, the LNG Terminal in Świnoujście, the Poland–Lithuania Gas Interconnector, and the Poland–Slovakia Gas Interconnector. [6]

By 2022, Poland had significantly reduced dependence on Russian energy. The energy crisis which erupted following Russia's invasion of Ukraine exposed new vulnerabilities related to grid constraints, logistics, and infrastructure concentration, especially along the coast. Energy security thus begun to shift from supply access toward system resilience, setting the baseline for current policy debates.

Coal mine in Jastrzębie Zdrój
Source: Adobe stock

2.2 National strategic documents shaping energy security

Poland's energy security framework is defined by several strategic documents that differ in legal status, analytical quality, and internal coherence. While they collectively shape infrastructure planning and fuel choices, they do not constitute a stable or fully consistent strategic framework.

Energy Policy of Poland 2040

The Energy Policy of Poland 2040 (PEP2040) is a statutory document adopted under the Energy Law and remains the main reference point for long-term energy policy. It sets objectives for generation capacity, transmission infrastructure, fuel diversification, and energy efficiency, while assigning implementation responsibilities. The document entered into force in 2021 and remains formally valid, despite being outdated in several key areas at the time of adoption.

PEP2040 significantly underestimated the pace of renewable deployment. It projected solar capacity of 5–7 GW by 2030 and 10–16 GW by 2040,[7] while installed solar capacity had already exceeded 7 GW by the end of 2021.[8] The document also adopted a conservative decarbonisation pathway, assigning natural gas a central role as a transition fuel, with a projected share of nearly 30% in the energy mix by 2030.[9] Coal was assumed to account for up to 56% of electricity generation, a level already achieved well before the middle of the decade. Renewable energy targets were set at 23%, a threshold reached in 2023. The gap between projections and actual developments suggests that PEP2040 reflected political compromise rather than system dynamics.

A limited update was introduced in 2022 following Russia's invasion of Ukraine, recognising the need to reduce dependence on Russian fossil fuels. A further revision announced in early 2023 was not completed. After the 2023 elections, the new government declared its intention to conduct a comprehensive revision of PEP2040 and extend its horizon to 2050.

National Energy and Climate Plan

The National Energy and Climate Plan (NECP, abv. in PL: KPEiK) is Poland's primary instrument under EU energy and climate governance, prepared pursuant to Regulation (EU) 2018/1999.[10] While required by EU law, the plan is intended to reflect national policy choices.

The first NECP was published in 2019 and revised multiple times between 2024 and 2025. The October 2024 version introduced two scenarios: a business-as-usual pathway (WEM) with a 41% reduction in greenhouse gas emissions relative to 1990, and an accelerated pathway (WAM) targeting a 53.9% reduction. Under the WAM scenario, renewable energy was projected to reach 51.8% of final electricity consumption by 2030 and 79.8% by 2040.[11] At the same time, natural gas was designated as a transition fuel, with consumption projected to increase by around 5 bcm annually by 2030.[12]

The NECP has faced sustained criticism for its modelling assumptions. Electricity demand was projected to rise to around 300 TWh by 2040 from a current level of approximately 160–170 TWh, partly justified by population growth assumptions that contradict official demographic projections indicating long-term population decline.[13] According to one of our interlocutors, modelling difficulties and methodological inconsistencies contributed to repeated delays in publishing updated versions.[14]

From an energy security perspective, the NECP emphasises energy efficiency and demand reduction. However, the instruments proposed remain weakly specified and continue to rely on mechanisms such as the white certificate scheme, which has shown limited effectiveness.[15] More broadly, the plan continues to frame energy security primarily in supply terms, with limited attention to system flexibility and infrastructure resilience.

Following the reinstatement of the Ministry of Energy in 2025, the NECP underwent a strategic review, with the latest version published at the end of December 2025. This revision reorients projected electricity generation by lowering forecast contributions from onshore and offshore wind while increasing the anticipated role of natural gas and nuclear energy. This shift has raised significant concerns, particularly given that only six months earlier the Ministry of Climate and Environment had articulated ambitious targets for the expansion of renewable energy, that as of early 2026 are being substantially revised by the Ministry of Energy. Crucially, as we were told by one of our interlocutors, the shift in priorities also stems from a reassessment of grid security. Gas-fired power plants are intended to serve as a stabilizing element of the system, even if they do not operate for a full number of hours.[16]

Under proposals advanced by the Ministry of Energy, onshore wind capacity is capped at 20.4 GW in the WEM scenario, down from 34.5 GW in the previous NECP, a reduction of more than 14 GW and widely seen as insufficiently ambitious. Offshore wind projections have likewise been lowered from 18 GW to 11.8 GW, a cut of 6.2 GW. This recalibration is difficult to justify given recent offshore wind auctions, which showed that new capacity can be secured at some of the lowest costs in the power system.

Internal consistency and priority conflicts

Taken together, Poland's strategic documents reveal persistent tension between decarbonisation objectives, energy security considerations, and shifting institutional preferences. Conservative assumptions in PEP2040, frequent revisions of the NECP, and changing ministerial priorities have produced a fragmented strategic landscape. This undermines long-term signalling, complicates infrastructure planning, and increases uncertainty for system operators and investors, with direct consequences for energy security.

2.3 European Union legal & policy significance for energy security

European Union law defines the binding perimeter within which Polish energy security decisions are taken. While Member States retain formal competence over their energy mix, EU legislation structures the instruments, governance models, and crisis responses available to national authorities. In practice, this means that energy security policy in Poland is shaped less by declaratory strategies and more by compliance with EU market rules, security of supply obligations, infrastructure governance, and resilience requirements.

At the core of this framework is the internal energy market acquis. Regulation 2019/943 on the internal market for electricity and Directive 2019/944 on common rules for the internal market for electricity require market based price formation, non-discriminatory network access, and the functional independence of system operators and regulators. For Polish decisionmakers, this constrains the use of administrative measures justified solely on security grounds, such as permanent price controls, preferential dispatch, or direct political control over system operation. Security driven interventions must thus be designed within competition and state aid constraints, which affects their scope, legal durability, and timing.

Security of supply legislation further narrows the space for unilateral national action. Regulation 2017/1938 on the security of gas supply and Regulation 2019/941 on risk preparedness in the electricity sector impose mandatory risk assessments, preventive and emergency planning, and regional coordination. These instruments limit improvised national crisis responses that could destabilise neighbouring systems, but they also support Polish energy security by embedding crisis management within legally defined procedures for information exchange, solidarity, and coordinated response. Regulation 2022/1032 on gas storage reinforces this logic by treating storage as a system security instrument under EU oversight, shaping national choices on cost allocation and operational control.

Strategic orientation is increasingly shaped by **overarching EU policy frameworks**. The European Green Deal establishes decarbonisation, electrification, and system integration as long term structural objectives, influencing infrastructure prioritisation and investment logic even where security concerns dominate. The REPowerEU Plan amended these objectives and translated them into short and medium term security measures by prioritising diversification, demand reduction, accelerated renewables, and grid investment following Russia's invasion of Ukraine. For Poland, this has reinforced the linkage between energy security and decarbonisation, reducing the scope for long term reliance on transitional fossil solutions.

Infrastructure planning is further structured by Regulation 2022/869 on trans-European energy infrastructure, which defines priority corridors and the **Projects of Common Interest** mechanism, as well as by the **European Grids Package** and the upcoming revision of the **Energy Security Architecture**. This framework determines which Polish infrastructure projects can benefit from accelerated permitting, cross border coordination, and political legitimacy. Financing instruments such as the Connecting Europe Facility under Regulation 2021/1153 and the Recovery and Resilience Facility under Regulation 2021/241 link access to funding with reform milestones, administrative capacity, and alignment with EU priorities, constraining sequencing but supporting rapid implementation where alignment is achieved.

Finally, the scope of EU influence has expanded into **supply chains, cybersecurity, and critical infrastructure protection**. The Critical Raw Materials Act introduces a security driven approach to materials essential for energy infrastructure, affecting decisions related to renewables, grids, storage, and nuclear supply chains. Directive 2022/2555 on cybersecurity and Directive 2022/2557 on the resilience of critical entities classify large parts of the energy sector as essential entities subject to mandatory risk management and supervisory oversight. For Poland, this shifts energy security toward an institutional challenge, where regulatory capacity, enforcement, and coordination become as important as physical assets.

Overall, the **EU legal and strategic framework constrains Polish energy security policy** where unilateral intervention or delayed reform would otherwise be preferred by the government. At the same time, it supports Poland by embedding national decisions within predictable legal structures, regional coordination mechanisms, and shared financing instruments. Energy security outcomes therefore depend not only on infrastructure choices, but on the ability of Polish institutions to operate effectively within this European governance environment.

2.4 Sector specific legal regimes

Electricity system and renewable energy law

Electricity security in Poland is governed by two overlapping legal regimes: the **Energy Law Act of 10 April 199717 and the Act of 20 February 2015**[18] on renewable energy sources. Together, they define how the power system is planned, operated, and constrained under both normal and stress conditions. The Energy Law assigns operational responsibility to the transmission and distribution system operators and regulatory oversight to the Energy Regulatory Office.

This core framework is supplemented by a dense set of **sector specific laws and market instruments** that materially affect electricity security, including the Offshore Wind Act, renewable energy auction regulations, the capacity market, and balancing market rules. Recurrent crisis interventions such as electricity price freezes, as well as earlier regulatory distortions including double grid tariffs for energy storage prior to 2021, have further weakened investment signals and system flexibility. More broadly, electricity legislation is amended frequently and often inconsistently, with the Act on Renewable Energy Sources alone revised seven times between 2015 and 2021.

The **renewable energy law** introduces a parallel logic that increasingly shapes system behaviour. Priority access, guaranteed offtake, and long term support schemes for renewable generation constrain operational flexibility, particularly during congestion and scarcity. As renewable penetration grows, security relevant decisions such as curtailment, grid access, and system reconfiguration become legally sensitive rather than purely technical. The coexistence of security obligations and legally protected renewable rights creates structural tension that current legislation does not fully resolve.

A further weakness lies in the absence of a dedicated legal framework for system flexibility, storage, aggregation, and demand response. These functions are treated as ancillary market features rather than as core security instruments. As a result, the law lags behind the operational reality of a system increasingly dependent on non-generation tools for resilience. Grid development planning obligations exist, but they do not adequately align grid expansion timelines with the pace of electrification and renewable deployment, increasing exposure to congestion and operational stress.

Gas and LNG regulation

Gas security is regulated primarily by the Energy Law Act and the Act of 16 February 2007 on stocks of crude oil, petroleum products and natural gas,[19] supplemented by a number of specific provisions. This framework enables strong state influence over strategic gas assets while maintaining formal market compliance. Transmission, storage, and LNG terminal operations are subject to public service obligations linked directly to security of supply.

For decisionmakers, this regime provides comparatively robust tools to manage import diversification and short term supply disruptions. The LNG terminal in Świnoujście operates under a security aware regulatory framework that allows capacity use and expansion decisions to align with national strategic priorities.[20] At the same time, gas law remains focused on supply continuity rather than system interaction. Legal instruments for managing prolonged demand shocks, cross sector dependencies, or cascading failures involving electricity and heat are limited. This can lead to coordination gaps during complex crises.

Oil stocks and fuel security law

Oil and fuel security is governed primarily by the aforementioned Act of 16 February 2007 on mandatory stocks, which establishes strategic reserves, release mechanisms, and clear allocation of responsibility between public authorities and obligated companies. This is arguably the most security oriented segment of Polish energy law, designed explicitly to manage short term supply disruptions and price shocks.

The strength of this framework lies in its clarity and enforceability. Its limitation is its narrow functional scope. The law does not address vulnerabilities related to refining concentration, fuel logistics bottlenecks, or interdependencies with electricity, digital infrastructure, and transport systems. Fuel security is therefore legally robust in isolation but weakly integrated into system wide resilience planning.

Heat and municipal energy law

Heat security is regulated primarily under the Energy Law Act and the Act of 8 March 1990 on municipal self-government.[21] District heating systems are treated as local public services rather than as elements of national critical infrastructure. Ownership and operational responsibility rest largely with municipalities, which significantly shapes security outcomes. This institutional fragmentation is compounded by the absence of a comprehensive national database of heating units, leaving the sector largely excluded from systematic analysis, modelling, and strategic planning.

From a **national energy security perspective**, this creates a structural gap. Local authorities often lack the financial capacity, technical expertise, and legal instruments required for resilience investment and crisis response. Heat law prioritises tariff regulation and consumer protection, while resilience, redundancy, and emergency preparedness remain secondary. As a result, one of the most socially sensitive energy services is weakly embedded in national security planning, despite its centrality during extreme weather and supply disruptions.

Emergency powers and crisis legislation

Extraordinary powers affecting the energy sector derive mainly from the Act of 26 April 2007 on crisis management and constitutional emergency provisions.[22] The crisis management framework enables coordination, information exchange, and prioritisation of critical services, but it does not grant direct operational control over energy infrastructure. Authority remains dispersed across ministries, regulators, regional authorities, and operators.

This legal design preserves proportionality and legality, but it limits speed and clarity in fast moving energy crises. Sector specific emergency powers are fragmented across multiple acts, and there is no single energy focused command structure. The hierarchy between emergency measures and long term contractual or regulatory obligations, including renewable support schemes, remains legally ambiguous.

Legal gaps and implementation weaknesses

Across sectors, **Polish energy security law is characterised by strong asset specific regulation and weak system level integration**. Electricity and renewable law generates structural tension between security driven operation and legally protected generation rights. Gas and fuel law offers clear tools but remains supply centric. Heat law is fragmented and locally constrained. Emergency legislation prioritises legality over operational clarity.

The central weakness is not lack of legal instruments, but misalignment between sectoral regimes and the realities of cross sector disruption, cyber physical risk, and infrastructure concentration. This increases reliance on informal coordination in crises and exposes limits of the existing legal architecture under sustained stress.

2.5 International agreements

During Poland's Presidency of the Council of the European Union in the first half of 2025, **energy security was elevated from a sector specific policy area** to one of the core dimensions of the EU's broader security agenda. Beyond continuity of supply and the political objective of eliminating Russian fossil fuel imports, the **Presidency reframed energy security around the protection of critical infrastructure, both physical and cyber, and the strategic risks stemming from dependence on imported energy technologies and components**. This shift was reflected in Council discussions that increasingly treated grids, terminals, subsea assets, and digital control systems as part of the Union's security perimeter rather than purely economic infrastructure.

At the final Transport, Telecommunications and Energy Council meeting under the Polish Presidency, ministers endorsed the need for a wider policy toolbox that extends beyond market instruments and emergency regulation, explicitly recognising the role of diplomatic coordination, legal tools, political signalling, and closer cooperation with NATO in protecting energy infrastructure.[23] This reframing fed into negotiations under the Danish Presidency, where member states agreed on a partial mandate for the 2028–2034 Connecting Europe Facility, opening the possibility to interpret eligible expenditures more broadly to include resilience and protection measures alongside capacity expansion.

In parallel, the European Commission presented **new grid related initiatives**, including the Electricity Grids Action Plan and elements of the emerging grid packages, which were discussed in Council with a strong emphasis on resilience and implementation constraints. Debates focused on endogenous challenges such as permitting delays and investment gaps, as well as exogenous vulnerabilities linked to supply chain dependencies for cables, transformers, and substation components. According to interlocutors, Poland and the Baltic states are actively advocating that part of EU grid funding be earmarked for infrastructure protection, including physical hardening, monitoring, and cyber security upgrades, rather than being limited to modernisation and capacity growth.[24] These discussions remain at an exploratory stage and have not yet been codified in binding funding rules.

EU level debates have been complemented by concrete regional initiatives. In June 2025, Poland, Lithuania, Latvia, and Estonia signed a **Memorandum of Understanding on cooperation in the protection and resilience of critical energy infrastructure** on the margins of the Energy Council.[25] The memorandum commits the signatories to joint preventive measures, coordinated threat assessment, enhanced information exchange, and aligned incident response for both onshore and offshore infrastructure. Unlike earlier political declarations, it provides for cross national and cross agency working groups and envisages a pilot initiative, the Flagship Model of Excellence in Infrastructure Protection and Resilience, signalling an intent to move toward operational cooperation and to link security commitments with funding decisions.

At the **broader Baltic Sea level**, cooperation continues under the Baltic Energy Market Interconnection Plan High Level Group framework, which includes all Baltic Sea states with Norway as an observer. Under BEMIP, several political declarations have been adopted, including the Marienborg Declaration on offshore wind development. While the framework spans renewable energy, gas, and nuclear cooperation across generation, transmission, and market integration, its structural limitation remains the lack of binding implementation mechanisms, as commitments rely on permissive language and do not mandate regular operational coordination or joint exercises. At the same time, Poland remains outside several parallel Baltic initiatives, including work on the Bornholm Energy Island, the Baltic Energy

BEMIP High-level Group meeting in Warsaw

Source: Directorate for Energy, European Commission

Hub concept, and the Energy Highways initiative under the EU Grids Package, with participation currently limited to selected projects such as Harmony Link driven primarily by Lithuania.

Bilateral cooperation has also intensified. In 2025 Poland and Norway signed a **Partnership Agreement on energy security, green transition, and the protection of critical energy infrastructure.**[26] Compared to multilateral Baltic formats, this partnership is narrower geographically but more focused substantively, with particular emphasis on offshore installations and subsea infrastructure, drawing on Norway's North Sea experience and Poland's growing exposure in the Baltic Sea. Poland also maintains strategic partnership agreements with other Baltic Sea states, including Sweden, where energy is embedded among several cooperation areas.

In parallel, the **Polish-French Treaty of Nancy on Enhanced Cooperation and Friendship** signed in 2025 adds a distinct nuclear dimension to Poland's energy security architecture.[27] Its dedicated nuclear protocol provides a framework for long term cooperation across nuclear energy, fuel cycle, and industrial supply chains. This cooperation has already begun to materialise, most notably through the selection of Arabelle steam turbines for Poland's first nuclear power plant, anchoring a portion of the project's critical equipment supply within a European industrial ecosystem and linking nuclear deployment directly to strategic autonomy considerations.

All of these agreements were concluded or operationalised in 2024 and 2025, **reflecting an acceleration of regional and bilateral cooperation in response to heightened awareness of hybrid threats to energy infrastructure,** particularly in the Baltic Sea. This trend is reinforced by Poland's presidency of the Council of the Baltic Sea States from 1 July 2025, where critical infrastructure protection has been identified as a priority.[28] At the transatlantic level, the EU-UK Security and Defence Partnership establishes a framework for consultations on countering hybrid threats and strengthening critical infrastructure resilience beyond traditional military domains.[29] For Poland, this creates an additional channel to embed energy infrastructure protection within broader European and transatlantic security cooperation, particularly in maritime awareness, cyber resilience, and the protection of subsea assets.

3 Institutional architecture and competence matrix

3.1 Central government and regulatory institutions

Poland's energy governance is defined less by the absence of institutions than by the repeated reallocation of competences among them. Two legal acts provide the structural foundation: the Energy Law, which establishes the core institutions of the energy system, and the Act on the Organisation of Government Administration, which allocates energy related competences across ministerial domains. Within this framework, energy security has been shaped by recurring institutional reconfigurations that have weakened continuity and coordination.

2015–2023: The war of fiefdoms

Until 2015, energy policy was coordinated within the **Ministry of Economy**, where electricity, fuels, renewables, and nuclear preparatory work were handled through specialised departments, while climate and environmental policy remained separate. This division already generated coordination gaps, particularly in implementing EU climate and energy legislation.

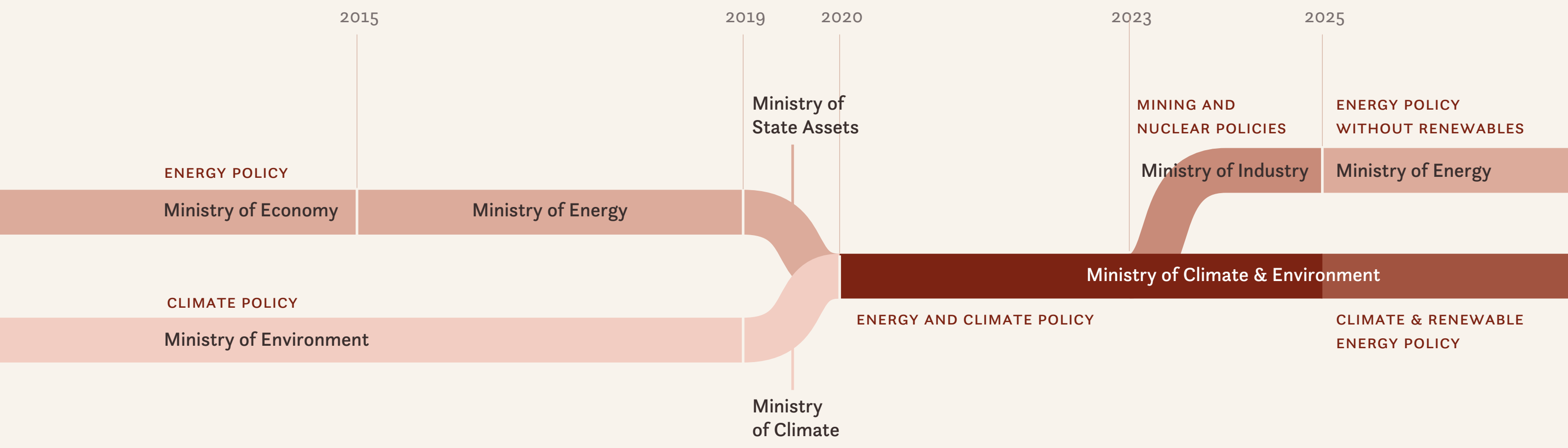
The **creation of the Ministry of Energy** in late 2015 aimed to centralise control over the power, fuels, and mining sectors, particularly coal. **Energy security and diversification projects, including the LNG terminal and Baltic Pipe, advanced during this period**, supported by the Government Plenipotentiary for Strategic Energy Infrastructure, whose mandate reflected the growing securitisation of energy policy. However, the continued separation of climate policy entrenched tensions between supply security and decarbonisation objectives.

In 2019, energy competences were transferred to **the newly established Ministry of Climate and Environment**, integrating energy, climate, and environmental policy for the first time. This reorganisation was intended to align Poland with evolving EU priorities and to reconcile diversification with decarbonisation. In practice, strategic policymaking was weakened by the separation between policy authority and ownership control, as supervision of state-owned energy companies remained with the Ministry of State Assets. Coordination relied on interministerial mechanisms and ad hoc arrangements, which proved slow during periods of crisis.

2023–2025: A two-headed hydra

After the 2023 elections, energy governance became increasingly fragmented. The **creation of the Ministry of Industry** in 2024 shifted responsibility for mining and parts of industrial transformation away from the Ministry of Climate and Environment, while ownership supervision over energy companies largely remained with the Ministry of State Assets. Strategic

Graph showing the changes in allocation of energy and climate policy within the scope of Polish ministries over the last decade



energy and climate policy stayed within the Ministry of Climate and Environment, reinforcing a three-way split between policy design, industrial coordination, and asset control.

Formal coordination mechanisms existed, including joint committees, but overlapping mandates and divergent policy priorities delayed updates to key strategic documents, including the Energy Policy of Poland and the National Energy and Climate Plan. **This period exposed the limits of functional division** in a context where energy security, industrial policy, and decarbonisation required tightly integrated decision-making.

2025–today: An unachieved consolidation

In 2025, the government **reestablished the Ministry of Energy, transferring most energy-related competences from the Ministry of Climate and Environment and the Ministry of Industry**. The renewed ministry assumed responsibility for energy security, national energy planning, nuclear and hydrogen programmes, market oversight, and coordination with EU and regional partners. This move partially restored coherence between strategic policymaking and ownership supervision.

However, the decision to leave renewable energy within the Ministry of Climate and Environment perpetuated institutional fragmentation. Frequent restructuring over the past decade has weakened institutional memory and reduced external confidence in Poland's governance stability. While the current arrangement improves clarity compared to the previous period, it remains vulnerable to future reshuffling.

Energy Regulatory Office and regulatory capacity

The President of the Energy Regulatory Office (URE) is a central, formally independent authority responsible for regulating electricity, gas, and fuel markets, approving tariffs, and promoting competition in line with national policy and EU law. Over time, the Office's mandate has expanded significantly, encompassing market monitoring, implementation of renewable energy support mechanisms, biomethane regulation, consumer protection tools, and advisory functions related to legislative change.

This expansion has not been matched by commensurate institutional reinforcement. Although the Office's budget has increased, staffing levels and remuneration remain uncompetitive, constraining regulatory capacity. The growing gap between responsibilities and resources weakens the regulator's ability to act as an effective stabilising actor in an increasingly complex and stressed energy system.

Division of competences and responsibilities within the energy sector in Poland

Ministry of Energy
(Ministerstwo Energii)

Directs two government administration sections:
- Energy policy
- Management of energy resources

Political responsibilities
- Long-term energy security and balance of electricity and gas systems.
- Development of energy infrastructure and energy markets.
- Integration of nuclear and hydrogen into the national energy mix.
- Regulation of the fuel market from a security-of-supply perspective.

Main functional blocs within the Ministry of Energy
- Energy transition.
- Gas, oil and fuels security: LNG, pipeline diversification, strategic reserves
- Nuclear energy development: Preparation of Polish Energy Policy2040 and the National Energy and Climate Plan
- Security and crisis response, in close coordination with National Security Centreand system operators.
- European and international affairs

Chancellery of the Prime Minister through the Council of Ministers
(Kancelaria Prezesa Rady Ministrów)

Sets the overall direction of national energy and climate policy
- Approves key strategic documents, including:
  – Energy Policy of Poland until 2040 (PEP2040)
  – National Energy and Climate Plan (NECP)
  – Polish Nuclear Power Programme
- Adopts regulations defining:
  – The scope of action of individual ministers
  – The responsibilities of their administrative departments

Hosts the Government Centre for Security (Rządowe Centrum Bezpieczeństwa – RCB).

Ministry of State Assets
(Ministerstwo Aktywów Państwowych)

- oversight of energy state-owned energy companies
- oversight of coal mining state companies

Ministry of Climate and Environment
(Ministerstwo Klimatu i Środowiska)

- Lead ministry for: climate policy, renewable energy, energy efficiency, critical raw materials
- Also holds additional competences beyond the scope of this report.

Climate and energy responsibilities
- Overall climate policy, including: UNFCCC negotiations, EU climate legislation and dossiers
- Renewable energy policy, including security aspects of offshore wind.
- Management of EU Emissions Trading System (ETS) revenues and their use for the energy transition.
- Energy efficiency and household support programmes:
  – Czyste Powietrze (Clean Air)
  – Mój Prąd (My Electricity)
- Critical raw materials policy.

Government Plenipotentiary for Strategic Energy Infrastructure
(Pełnomocnik Rządu ds. Strategicznej Infrastruktury Energetycznej)

- Serves as a unique institutional bridge across multiple dimensions of energy security.
- The current plenipotentiary serves as a Secretary of State in the Ministry of Energy
- Coordinates the development, operation and protection of infrastructure critical to the continuous supply of:
  – Electricity
  – Gas
  – Fuels

Ministry of Foreign Affairs
(Ministerstwo Spraw Zagranicznych)

- Does not conduct sectoral energy policy.
- Plays a key role where energy intersects with: foreign policy
- International treaty law

Core functions related to energy
- Manages formal notifications and depositary communications for international treaties.
- Co-leads EU energy issues together with:
  – Ministry of Climate and Environment
  – Ministry of Energy
- Supports energy diplomacy

Coordination mechanisms at central level

At the central level, **energy governance in Poland operates through a loosely coordinated triangular structure involving the Ministry of Energy, the Ministry of Climate and Environment, and the Prime Minister, with the Ministry of Foreign Affairs** involved where energy policy intersects with foreign relations, EU law, and international agreements. Formally, this arrangement allows broad coverage of energy security, climate objectives, and diplomatic considerations.

In practice, however, it relies heavily on informal coordination, ad hoc interministerial contacts, and personal leadership rather than on stable, institutionalised mechanisms.

The **dispersion of energy-related competences** across ministries and agencies complicates coordination not only for external stakeholders but also for the government itself. Responsibilities for EU energy legislation, sanctions, strategic infrastructure, ownership supervision, crisis response, and bilateral energy relations are distributed across multiple institutions and departments, often without a clear hierarchy. This fragmentation weakens the state's capacity to act coherently under pressure. The dispute with the Czech Republic over the Turów coal mine exposed these shortcomings, as the lack of early coordination between environmental, energy, ownership, and foreign policy authorities delayed response, and ultimately imposed significant financial and reputational costs on Poland.[30]

Coordination challenges are reinforced by weaknesses in strategic planning and analytical integration. **Energy policy documents** are frequently based on assumptions that are already outdated at the time of publication, reflecting both procedural delays and the underestimation of key system trends. Scenario building is inherently difficult in the energy sector due to data complexity and technological uncertainty, but these challenges are compounded by limited coherence across government analysis. Poland hosts several state-owned analytical centres, including the Centre for Climate and Energy Analyses (CAKE), the National Centre for Energy Analysis (NCAE), and the Energy Market Agency (ARE), which provide data, modelling, and forecasts to support decision-making. However, these entities operate largely in parallel, with limited coordination and no effective whole-of-government analytical framework linking their outputs to strategic policy formulation.[31]

Lack of coordinated strategic communication further weakens coordination. On multiple occasions, core assumptions underpinning energy and climate strategies have been publicly announced and later revised or reversed by senior authorities. This inconsistency undermines policy credibility, creates confusion among investors and operators, and erodes public trust in the direction and feasibility of the energy transition.

Finally, coordination failures have tangible **system-level consequences**. A widening gap has emerged between strategic ambitions and the material pace of change in the energy system. Coal capacity is being withdrawn faster than firm replacement capacity is delivered, while nuclear power remains years away and gas is increasingly constrained by cost, regulatory pressure, and security considerations. This misalignment creates a growing adequacy risk in the power system, particularly during peak demand and periods of low renewable output. As a result, energy security risks shifting from a strategic concept to an operational vulnerability, characterised by higher price volatility, reliance on emergency measures, including increased dependence on short-term imports.

3.2 System operators and strategic energy companies

Poland's **operational energy security depends on a narrow set of system operators and state controlled firms** that concentrate control over networks, import gateways, storage, and large scale investment pipelines. Their mandates are rooted in the Energy Law Act, while ownership and oversight are shaped by the State Treasury's role and ministerial allocation of supervisory competences.

In practice, these operators and state controlled companies also **play a significant political role in shaping national energy policy assumptions**. Their investment plans, system assessments, and risk narratives feed directly into strategic documents such as PEP2040, successive versions of the NECP, and the design of instruments including the capacity market, renewable support schemes, and offshore wind regulation. Through their dual position as operational actors and policy interlocutors, they exert material influence over how energy security is defined, historically privileging supply diversification and infrastructure expansion over market based flexibility and demand side solutions.

Electricity transmission and distribution operators

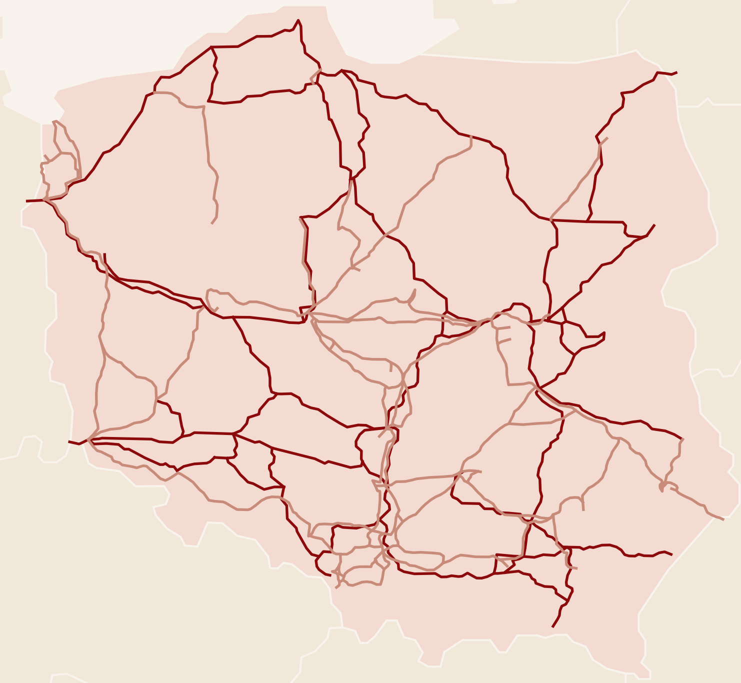
Polskie Sieci Elektroenergetyczne (PSE) is the sole electricity transmission system operator, licensed by the President of the Energy Regulatory Office until the end of December 2030. The sole shareholder of the TSO is the State Treasury. PSE's statutory duties cluster around four functions: safeguarding supply security and quality, maintaining adequacy and reliability of the transmission system, operating the central balancing mechanism, and coordinating operation with interconnected European grids. Beyond physical operation, PSE is the primary repository of power system data, giving it exceptional institutional authority in both planning and crisis framing.

Three operational stress lines of the transmission system matter most for energy security. First is physical protection of the transmission grid against technical failure, extreme weather, and sabotage risk. Second is cybersecurity and supply chain exposure, including procurement practices that can overvalue price at the expense of certification, supplier assurance, and resilience. Third is stability under decentralisation. The rapid growth of distributed generation has reduced end to end system visibility and eroded traditional balancing services. A central example is photovoltaic micro-installations, which have exceeded 1.6 million units and around 13 GW, connected primarily to low voltage networks. Many devices have unverified cyber resilience and inconsistent cyber hygiene, creating a systemic risk channel that cannot be addressed by PSE alone.

Distribution system operators are therefore not peripheral actors but frontline security institutions. The largest DSOs are PGE Dystrybucja, Tauron Dystrybucja, Enea Operator, Energa Operator, and Stoen Operator. They sit at the interface between prosumers (active energy consumers; they both consume and produce electricity), local grids, and the national system. Their security relevance is driven by three realities: they host most micro-generation and controllable loads, they hold much of the operational visibility for low voltage assets, and they are the first layer where device standards, certification, and cyber hygiene can be enforced in practice. Their uneven technical capacity and varying governance and ownership arrangements add friction to system wide resilience, especially for coordinated cyber defence and restoration planning.

Battery energy storage remains underdeveloped relative to system needs, despite its potential role in balancing, congestion management, as well as in grid forming services. While regulatory barriers such as double grid tariffs were removed only in 2021, investment has lagged

The electricity transmission in Poland



Source: PSE

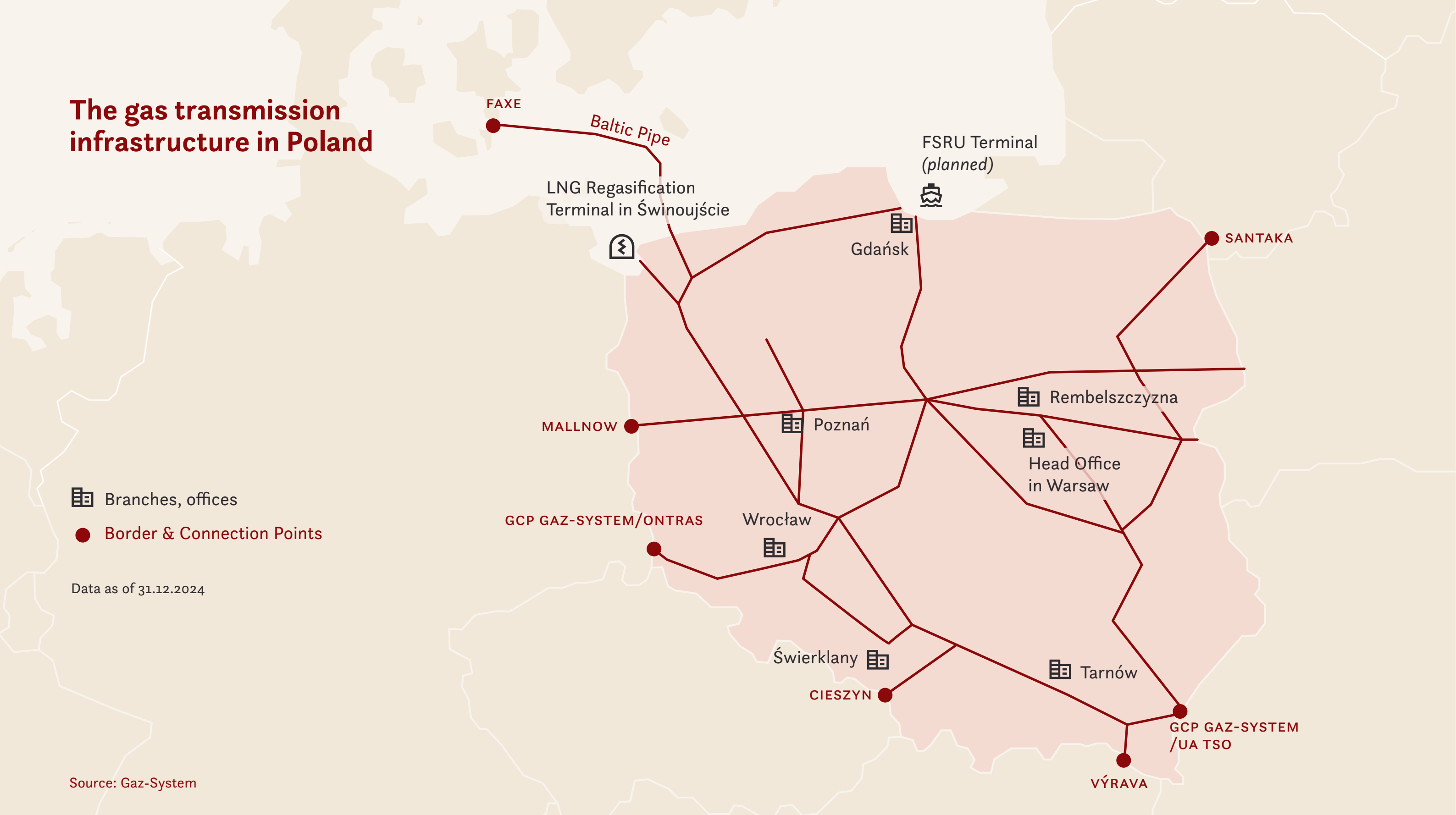
due to regulatory uncertainty, limited revenue stacking opportunities, and the dominance of generation focused adequacy mechanisms. As a result, storage has not yet emerged as a system level security instrument, even though its deployment could partially offset declining coal flexibility and reduce reliance on politically sensitive capacity support.

PSE has increasingly positioned itself as a system stability authority, including through its anti-blackout package workstream shaped by lessons from recent European outages, and proposals for stress tests including controlled shutdown exercises. This has increased PSE's public visibility and influence. Although formally independent, PSE operates under political oversight through the Government Plenipotentiary for Strategic Energy Infrastructure, a role previously held by figures such as Piotr Naimski and currently by Wojciech Wrochna. This governance arrangement places the operator at the intersection of technical system management and political priorities. PSE's operation of the capacity market, balancing market, and system services gives it a central role in ensuring adequacy and short term stability, but these mechanisms are also subject to strong political influence, particularly in relation to coal capacity retention, price containment, and security driven intervention.

Gas transmission and storage operators

Gaz-System is the sole gas transmission system operator, designated in 2006 and licensed by the President of the Energy Regulatory Office until early December 2068. The State Treasury is the sole shareholder and the company is supervised by the Government Plenipotentiary for Strategic Energy Infrastructure. Gaz-System operates the high pressure transmission grid, interconnectors, and balancing, and it is also the owner and operator of the LNG terminal in Świnoujście.

Gaz-System's security contribution is best captured by the investment execution record and the capacities provided. The major diversification spine includes the GIPL interconnector with Lithuania at roughly 1.9 to 2.4 bcm per year with bidirectional flows, the Poland-Slovakia interconnector at roughly 4.7 to 5.7 bcm per year with bidirectional flows, and the Baltic Pipe corridor enabling up to 10 bcm per year of imports from the Norwegian Continental Shelf. The most recent terminal expansion increased



The gas transmission infrastructure in Poland

Source: Gaz-System

Świnoujście regasification capacity to 8.3 bcm per year. The planned FSRU is presented as a further diversification and flexibility instrument with an estimated 6.1 bcm per year. Together, these assets explain how Poland achieved a rapid exit from Russian gas dependency while simultaneously concentrating critical functions along a limited number of nodes.

Gaz-System is also positioning itself for **post-fossil infrastructure roles**: biomethane integration, hydrogen transmission planning and participation in initiatives such as the Nordic Baltic Hydrogen Corridor, and exploration of CO_2 transport pathways, including analysis of repurposing gas infrastructure and work on routes linked to Gdańsk, referenced in the ECO2CEE initiative. This dual mandate, managing short term security while preparing for structural transition, makes Gaz-System a central strategic actor even as gas becomes more politically contested.

Oil and fuel logistics operators

Oil and fuel security in Poland is centred around **Orlen** as the dominant vertically integrated oil company, with **PERN** providing the critical transport, storage, and logistics backbone. Orlen controls crude oil processing, fuel production, wholesale supply, and a large share of retail distribution. Following the consolidation of the former Lotos assets and the integration of PGNiG's gas business, Orlen has become the central operational actor linking crude imports, refining, fuel logistics, and downstream supply. In security terms, the continuity of Orlen's refining operations, particularly at the Płock refinery, directly determines the availability of fuels for transport, industry, and emergency services.

PERN is the state-owned operator responsible for crude oil pipelines, fuel pipelines, and a nationwide fuel storage and logistics system comprising 19 fuel bases. It manages the physical continuity of crude supply to refineries and domestic fuel distribution, operating under a legal regime that prioritises security of supply and emergency preparedness. A key element of this architecture is the northern supply corridor, which links maritime crude deliveries through Naftoport (oil imports port) in Gdańsk to the inland pipeline system via the Pomeranian pipeline. This corridor underpins Poland's ability to diversify crude supply routes and reduce dependence on eastern directions. In the

The oil pipeline and 19 fuel bases

Source: PERN

aftermath of the 2022 energy crisis, it served a crucial nod for oil imports to Germany when pipeline deliveries stopped.[32]

From an energy security perspective, **Poland's oil and fuel segment benefits** from relatively clear emergency logic, including mandatory stockholding, defined release procedures, and centralised operational control. At the same time, vulnerabilities arise from the concentration of critical nodes at refineries, ports, pipelines, and storage bases, as well as reliance on specialised repair capacity and external crude supply chains. Damage or disruption at a limited number of locations could therefore have cascading effects on fuel availability and transport.

Alongside Orlen and PERN, private traders and distributors such as Unimot contribute to diversification and market responsiveness, particularly in road fuels and LPG. These actors enhance redundancy at the margin, but their performance in crisis conditions remains structurally dependent on Orlen's refining throughput and PERN's pipeline and storage infrastructure.

Strategic energy companies and control structures

Beyond system operators, **Poland's energy security is shaped by state controlled firms that dominate generation, fuels, and investment execution.** The key groups are PGE, Tauron, Enea, PGG and JSW. The largest of all, however, is Orlen, the former PGNiG gas business which integrated the former Lotos assets after consolidation. These entities matter because they translate strategy into assets: generation portfolios, network investments through their DSO subsidiaries, fuel logistics interfaces, storage and trading capability, and the pace of coal unit retirements versus replacement capacity delivery. Their commercial incentives, balance sheets, and governance constraints therefore directly affect adequacy, price volatility exposure, and the feasibility of resilience investments.

The **coal mining sector, albeit in decline and although formally separate from system operators, remains politically intertwined with electricity security governance**. State owned mining companies and coal dependent utilities such as PGG or JSW continue to shape adequacy assumptions, capacity market design, the timing of coal unit retirements, and have an outsized influence in the energy dialogue in Poland. Employment considerations, regional political pressure, and negotiated social agreements have repeatedly influenced decisions on coal capacity retention, reinforcing coal's role as residual security infrastructure even as its economic and technical viability declines.

Ownership and control remain concentrated in the State Treasury for the most security critical operators and many strategic firms, which gives the government leverage in crises and over investment direction. The recurring constraint is governance fragmentation: policy authority, ownership supervision, and operational responsibility do not always sit in the same place at the same time. This is why system operators like PSE and Gaz-System can become de facto strategic agenda setters, and why coherence between ministries, regulators, operators, and state controlled firms is a decisive variable for energy security outcomes.

3.3 Role of local government and municipalities

Municipalities sit at the point where energy policy becomes physical service delivery. Under the Act on Municipal Self Government, the county (gmina) is responsible for meeting collective needs of the local community through its own tasks, which in practice includes organising local public services that depend on reliable energy and heat supply, and running municipal entities that provide them. This is not a symbolic competence. It gives municipalities legal standing to plan, own, procure, contract, and prioritise local energy related services, while operating inside national regulatory frameworks that constrain pricing, licensing, and security standards.

District heating governance is the clearest area where municipal agency is both direct and operational. The Energy Law assigns the mayor (wójt or burmistrz), or city president the duty to develop the assumptions for a local plan for supply of heat, electricity, and gaseous fuels for the municipality for at least 15 years, and to update those assumptions at least once every three years. This planning duty shapes where and how district heating expands, which areas are prioritised for network modernisation, and how municipal buildings are connected or shifted to alternative heat solutions. It also determines whether municipal decarbonisation goals are translated into implementable investment pipelines, because the planning documents are the formal interface between local demand forecasts, spatial development, and the investment intentions of heat system operators. In parallel, district heating remains a regulated activity, so municipalities that own or control heating companies must operate within the national regulatory regime for concessions and tariff approval administered by the Energy Regulatory Office, which becomes particularly consequential during fuel and price shocks.[33]

Local infrastructure ownership is the second pillar of municipal influence because ownership determines investment tempo, technology choices, and resilience margins. The Act on Municipal Economy[34] provides the legal basis for municipalities to conduct municipal economy activity through organisational forms such as municipal companies and other arrangements used to deliver public utility services. In energy security terms, this is most visible in ownership or control of district heating generation assets, combined heat and power units, heat networks, local boiler houses, and the energy infrastructure of municipal buildings, including backup power and critical facility readiness. Ownership also creates governance responsibilities that matter for security, including appointing supervisory bodies, enforcing technical maintenance standards, and deciding whether resilience investments are treated as optional upgrades or as mandatory service continuity requirements.

4 Energy system and infrastructure baseline

4.1 A snapshot of the energy mix, import dependency & exposure

Poland's energy system baseline is defined by a structurally evolving electricity mix combined with persistent exposure to external supply and price shocks across multiple energy carriers. **In electricity generation**, Poland has reduced the relative role of coal while rapidly expanding renewable capacity, primarily wind and solar. In 2025, coal still accounted for just over 53% of electricity generation, while renewables reached 31%.[35] Although this represents a threefold increase in renewable electricity output over the past decade, Poland remains below the renewable shares of Germany at nearly 59% and the United Kingdom at 52%, while exceeding the Czech Republic's level of approximately 17%.[36] This places Poland in an intermediate position regionally, neither a laggard nor a frontrunner, but structurally constrained by its legacy system.

The **transformation of the electricity mix has been driven primarily by economic pressures rather than a sustained strategic commitment** to system transformation. Rising costs of coal generation, EU regulatory pressure, and the improving competitiveness of renewables pushed change forward despite repeated political efforts to delay or soften transition pathways. Successive governments sought to shield the coal sector and its workforce by resisting more ambitious EU climate and energy policies, framing domestic coal as both an economic asset and a security reserve. Coal has been embedded in political narratives of energy sovereignty and national resilience, including as a perceived last resort option in scenarios of external supply disruption, which has justified exceptional treatment and demands for country specific exemptions within EU frameworks.

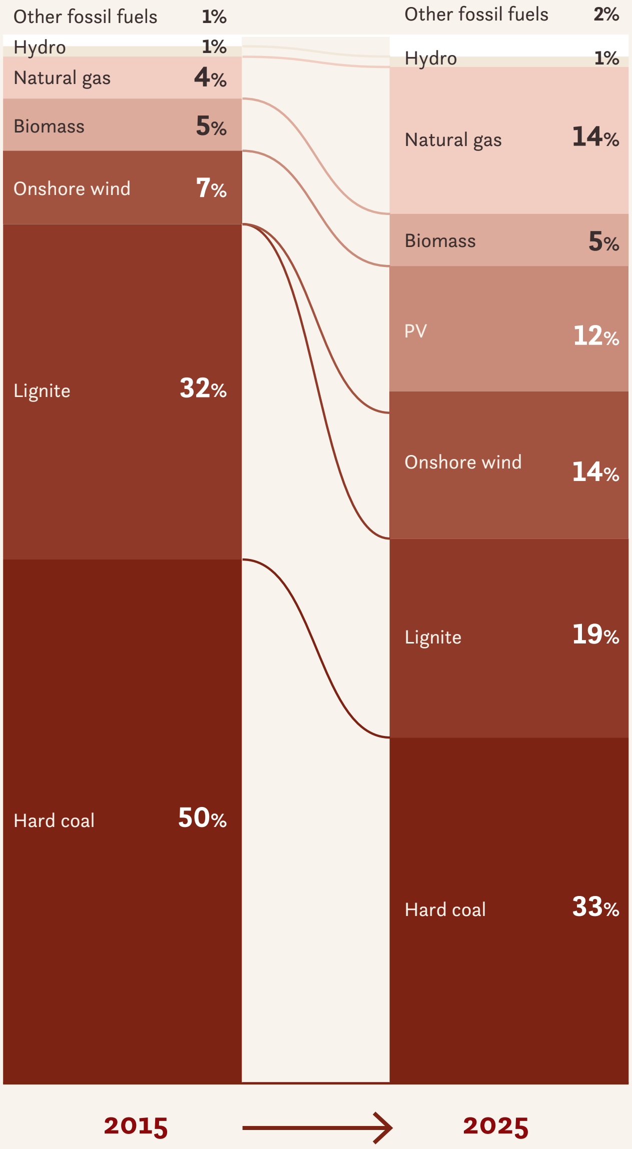
This **approach reflects deeper historical and economic preconditions** that differentiate Poland from many other EU member states. The structure of its energy system, industrial base, and regional labor dependencies have repeatedly been used to argue for slower transition timelines and regulatory flexibility.[37] In this context, Poland has been described as an outsider to the mainstream trajectory of EU energy and climate policy integration.[38]

Recent opposition to the proposed 90% emissions reduction target for 2040 and efforts to delay the implementation of ETS2 represent a continuation of this logic, prioritising short term political and sectoral stability over long term economic resilience and exposure reduction.[39]

At the same time, the **rapid expansion of solar energy illustrates a parallel and partially contradictory dynamic within the system**. The so

Power generation

figures are rounded up to the closest decimal point



Source: Forum Energii

called "solar boom" was largely underestimated in official strategic planning and emerged instead from economic necessity combined with generous incentive schemes for households and small producers. This bottom-up expansion revealed both a high level of social acceptance for renewable energy and a readiness among market participants to invest when regulatory and financial conditions align.[40]

However, this growth has also generated new **systemic vulnerabilities** related to grid stability and operational security. With approximately 1.5 million prosumers connected to the system, Poland's electricity generation profile has become more volatile and less predictable. PSE, the national transmission system operator, has highlighted that the speed and scale of renewable expansion have increased balancing challenges and operational risks for the transmission grid.[41] As a result, energy security concerns increasingly extend beyond fuel availability to include system stability, dispatchability, and the capacity of infrastructure to absorb variable generation. This reframes exposure not only in geopolitical terms but also in technical and market terms, where insufficient grid adaptation can itself become a constraint on further diversification.

Across gas, oil, and heat, Poland remains structurally exposed to external shocks despite significant diversification since 2022. While Russian supplies have been eliminated, **the system remains dependent on imported fuels**, global market pricing, and maritime logistics, making it sensitive to geopolitical tensions, supply chain disruptions, and price volatility. This exposure is amplified by the absence of a consistently updated and internally coherent strategic framework. Key policy documents, including the Polish Energy Policy 2040, have not been revised with sufficient regularity or analytical depth, resulting in ad hoc decision making rather than anticipatory planning.[42] This has reduced predictability for investors and operators across all energy carriers and has undermined stated objectives such as increasing local content in renewable energy investments, which require long planning horizons and regulatory clarity to materialize.[43]

4.2 Electricity grid & system infrastructure

Poland's generation structure remains anchored in a large fleet of centrally dispatched thermal units, increasingly complemented by variable renewables that have expanded faster than the system's flexibility resources and network hosting capacity. Adequacy is therefore no longer only a question of installed capacity, but of dispatchable availability, flexibility, and the ability to deliver power to load under network constraints. It is likewise a question of coal units aging and becoming less reliable going forward. The national transmission system operator's National Resource Adequacy Assessment for 2025 to 2040 frames adequacy through probabilistic metrics such as loss of load expectation and expected energy not served, and it explicitly tests the system under scenarios that differ by the pace of coal retirements, new gas investment, storage deployment, and demand response participation.[44] This approach reflects a reality in which the adequacy margin is increasingly shaped by operational stress conditions rather than average year energy balance, especially as the system shifts toward higher shares of weather dependent generation and higher electrified demand.

Transmission is the binding constraint for the next investment cycle and a core determinant of how quickly the generation mix can change without undermining security of supply. **PSE's transmission development plan for 2025 to 2034**, agreed by the regulator,[45] envisages a step change in grid buildout, including roughly 4,700 km of new 400 kV lines, 28 new substations, and modernization of 110 existing substations. The plan also anticipates structural system changes such as offshore wind integration, new large scale sources in the north, and reinforcement of north to south transfer, including an internal HVDC concept to relieve corridor constraints. In practical energy security terms, this signals that bottlenecks are no longer episodic but systemic, meaning that dispatch feasibility and congestion management increasingly shape both wholesale market outcomes and the reliability envelope.

Distribution grids are where electrification readiness is most exposed because distributed solar, new connections, and emerging loads concentrate on medium and low voltage networks that were not designed for bidirectional flows at scale. The rapid rise of microinstallations, reaching over 1.5 million connected units by the end of 2024, increases local voltage management complexity, raises the need for automation and flexibility procurement, and intensifies the investment requirement for transformers, feeders, and digital control.[46]

The operational consequences are visible in **curtailment and redispatching trends**. The regulator's redispatching reporting notes a significant increase in non-market reductions of renewable generation in 2024, ordered both by the transmission operator and distribution operators, which indicates that network constraints and operational balancing limits are already forcing the system to shed low marginal cost generation.[47] Distribution reinforcement is therefore not only a decarbonisation enabler but a security measure, because without it the system shifts from fuel dependence risk to infrastructure saturation risk.

At the EU level, the Commission has explicitly positioned anticipatory investments, digitalisation, and improved planning coordination between transmission and distribution operators as the central mechanism for making grids fit for accelerating electrification, underscoring the scale of investment required by 2040.[48]

Interconnectors and regional integration provide both resilience and new operational complexity. Poland participates in the European target model for cross border trade and offers long term cross zonal capacities on synchronous borders with Germany, Czechia, and Slovakia, while maintaining HVDC interconnection capability with Sweden and Lithuania.

These links are not only commercial pathways but also adequacy and balancing instruments under stress conditions, provided internal bottlenecks do not prevent their effective use. The Baltic states' synchronization with the Continental Europe synchronous area in February 2025 strengthens the regional stability architecture in which Poland is a key hub, while further projects such as the planned Harmony Link are intended to deepen the Poland Lithuania corridor's strategic value. Utilisation and availability statistics for LitPol Link illustrate[49] that the asset has substantial technical capacity and meaningful energy exchanges, making it relevant to both regional security and congestion patterns. In winter security terms, ENTSO E's seasonal outlook reporting situates Poland among the areas where adequacy risks may emerge under exceptionally adverse conditions,[50] reinforcing that cross border capacity is a resilience asset, but not a substitute for domestic flexibility and network deliverability.

4.3 Renewables

Solar

Solar photovoltaics in Poland has become a system defining security variable because its scale now affects not only decarbonisation trajectories, but also grid stability, adequacy logic, and import exposure. **Poland reached 21.8 GW of installed PV capacity by the end of the first quarter of 2025**, with 59% in microgeneration and 41% in PV farms and small systems, and large farms above 1 MW accounting for about half of new capacity additions.[51] By the end of 2024 Poland had 1,544,574 on grid micro installations with total capacity of 12,749.891 MW, and micro installations exported more than 8.5 TWh to the grid in 2024, which shows that distributed PV is not only self-consumption but a material injection into system operations.[52] This structure matters for security because it combines two very different risk profiles: millions of prosumer assets connected mainly to low voltage networks, and a rapidly expanding fleet of utility scale farms that concentrates output in specific grid zones.

At the same time, the speed of **PV growth has outpaced grid absorption** in parts of the country. The IEO notes mounting connection refusals since 2022 and increasing curtailment pressures, indicating that network constraints are now a binding factor for further PV deployment. Curtailment (any action that reduces the amount of electricity generated to maintain the balance between supply and demand) has become an explicit operational security tool: a 2024 summary based on regulator data reports that non market redispatch ordered by PSE reduced PV generation by 597.26 GWh in 2024, with most of the volume attributed to balancing needs rather than local network constraints, confirming that high midday PV output increasingly collides with system level flexibility limits.[53]

PSE's own operational communications show repeated instances of ordered PV reductions due to oversupply and the need to restore regulating capacity, illustrating that this is not an abstract risk but a recurring operational pattern.[54] The security implication is that Poland's solar expansion is already shifting the centre of gravity of resilience from generation adequacy toward grid reinforcement, flexibility procurement, and distribution level observability and control, because the system must handle steep evening ramps and periods of local surplus without relying on emergency curtailment as a normal balancing instrument.

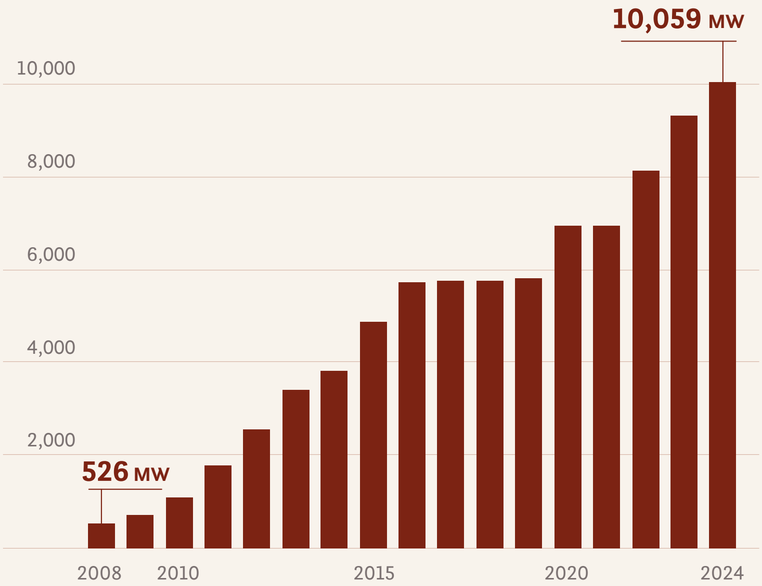
Solar also creates an **external dependency channel** that is Poland specific in impact even if European in origin. **Up to 95% of panels installed in Europe originate from China** and that the policy debate is increasingly linking renewable deployment to criteria such as sustainability and cybersecurity. For Poland, which expanded PV at one of the fastest rates in the EU, this translates into a large installed base whose hardware supply chain is exposed to price cycles, geopolitical friction, and potential future compliance requirements on equipment provenance and cyber assurance. All in all, solar in Poland increases resilience by diversifying away from coal and by spreading generation across many nodes, but it also hardens new vulnerabilities: congestion and curtailment as a structural feature, greater dependence on distribution networks, and long term exposure to imported components that dominate the installed base.

Wind

Wind power in Poland is now a security relevant infrastructure pillar because it supplies a large and growing share of electricity while simultaneously creating new grid stability and Baltic maritime protection requirements.

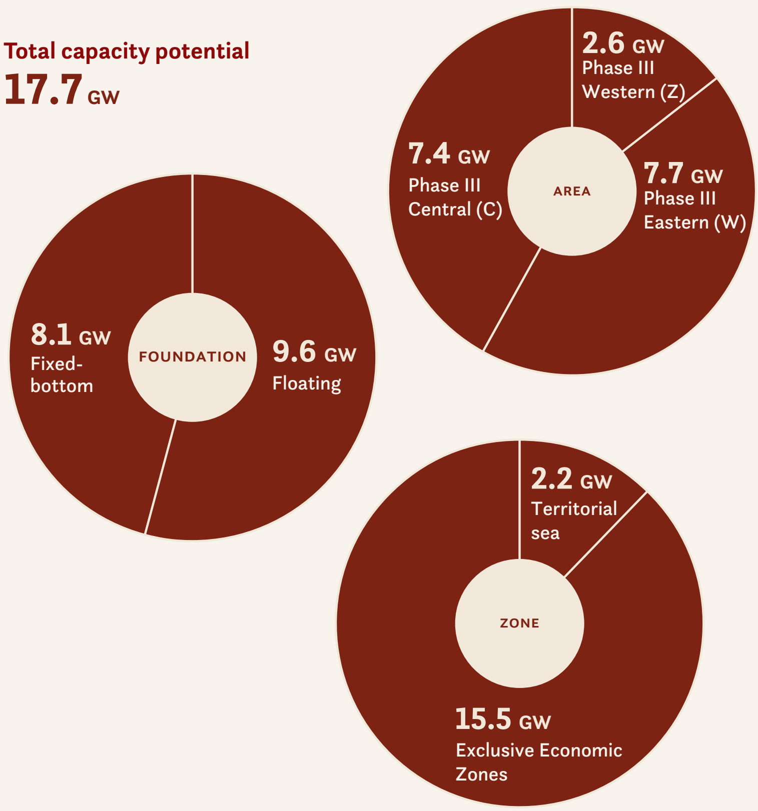
Onshore wind capacity exceeded 10 GW in 2024, with policy planning aiming for 15.8 GW by 2030 and a longer-run pathway that depends heavily on further permitting liberalisation. The key domestic constraint has been the distance regime for turbine siting.[55] The 2023 amendment

Total installed wind power capacity in Poland from 2008 to 2024 (in megawatt)



Source: IRENA © Statista 2026

Installed capacity potential of proposed new sites. Share by: area, foundation type, and zone.



Source: *Potential of Offshore Wind in Poland. Comprehensive analysis of offshore wind development opportunities in Polish maritime areas.* Wind Industry Hub, 2022.

to the Distance Act reduced the effective 10H barrier by setting a minimum distance of 700 metres from residential buildings, and the government has pursued further easing as part of the post 2023 acceleration agenda.[56]

From a system security perspective, the most important operational signal is that wind is increasingly curtailed not because it is marginal, but because grid flexibility is becoming binding. The Energy Regulatory Office reports that in 2024 the transmission system operator ordered wind generation reductions totalling nearly 125.1 GWh, mainly for balancing purposes at 118.05 GWh, with a smaller component linked to grid constraints at 7.03 GWh.[57]

Offshore wind adds a **second security dimension, converting the Baltic Sea into an energy infrastructure theatre** where physical protection, monitoring, and incident response have become part of energy policy. National targets point to 5.9 GW of installed offshore capacity by 2030 and 18 GW by 2040, enabled by a contracts for difference framework and an auction pipeline. Deployment is moving from planning into construction. The Baltic Power project developed by Orlen and Northland Power states an expected capacity up to 1.2 GW and start of production from 2026, illustrating that the first wave is now a near-term operational reality rather than a strategy slide.[58]

Large investors are taking final investment decisions for additional projects. Equinor and Polenergia agreed a final investment decision for two offshore wind farms of 720 MW each, with generation expected from 2027 and full operation by 2028, within a broader push toward around 6 GW by 2030.[59] The second phase is now price discovered in competition, as the President of URE reported that the first offshore auction concluded with winning bid prices from 476.88 PLN/MWh to 492.32 PLN/MWh, which sets the new benchmark for long run consumer exposure and for how much offshore can scale without repeating the cost volatility seen in other European tenders.[60]

The security implication is twofold: wind strengthens diversification and reduces fuel import exposure, but it also increases dependence on imports of foreign parts, reliance on network reinforcement, balancing tools, and distribution level control, while offshore wind requires a credible Baltic protection architecture for subsea cables, offshore substations, and maritime logistics. These issues are discussed in more detail in Chapter 6.

Biomass

In Poland, biomass is not a marginal balancing fuel but a structurally dominant component of the renewable baseline.

At the same time, its fuel base is internally fragmented: an older but still useful sectoral baseline points to 2.3 million hectares of fallow land, an estimated annual surplus of 11.8 million tons of straw, and forests covering 28.8% of the country, which collectively explains why policymakers repeatedly treat biomass as the most immediately scalable domestic substitute for coal in heat and CHP.[61] The security challenge is that recent growth is increasingly wood driven: between 2004 and 2023 biomass wood use in professional power generation rose almost 150-fold to 5 million cubic metres in 2023, total wood burned in energy plus industry reached 9.1 million cubic metres, and this corresponded to 22% of annual forest harvest, with more than 70% of solid biomass burned in the energy sector being wood.[62] This links energy security to contested domestic supply chains, as the trajectory to policy incentives and competition with wood based industries, including large cumulative support via green certificates.

In parallel, Poland has a second biomass pillar that is security positive but underexploited: the agro stream, where a sector article citing estimates from Silesian University of Technology claims that 6 to 10 million tons of agricultural biomass are wasted annually, implying that decentralised heat and CHP could expand without deepening dependence on wood markets if the project pipeline and offtake logic are fixed.[63] Finally, the electricity contribution shows how policy design shifted outcomes: an analysis notes that biomass electricity including co firing was about 6.3 TWh in 2022, accounting for around 21% of renewable electricity and 3–4% of total generation, compared with roughly 9.5 TWh annually in 2012 to 2015 during the peak green certificate period, illustrating that biomass output and its security role have been highly sensitive to support rules.[64]

4.3 Coal

Status quo: coal as residual adequacy infrastructure

Coal remains the **single largest source of firm electricity generation capacity in Poland**, but its contribution to energy security has become increasingly conditional. In 2024, hard coal and lignite together accounted for approximately 53% of gross electricity generation, down from over 70% in 2015, while installed coal fired capacity declined to roughly 28 GW, including about 20 GW of hard coal units and 8 GW of lignite units concentrated primarily in Bełchatów and Turów.

Coal in Poland functions increasingly as **residual adequacy infrastructure (meaning that the electric system has sufficient resources to reliably meet demand under various conditions) rather than as the default energy source**, meaning that it is kept online to cover peak demand, low wind and low solar periods, and system services, even as its share in annual generation declines. Coal's share of electricity production fell to 53% in 2024, a record low, which signals that coal is losing energy volume but not system importance because adequacy is defined by deliverable capacity at stress hours, not by annual megawatt hours.

URE's electricity market characteristics show that at the end of 2024 total installed capacity was 72,188 MW, average annual demand was 22,882 MW, and maximum demand reached 28,494 MW, which helps to explain why large coal blocks still matter in decision-making. **Poland needs reliable capacity at a peak** that remains below the coal fleet's nameplate but is exposed to outages due to aging units, maintenance, and reduced availability in older units, making operational coal availability, not theoretical coal capacity, the binding security parameter.

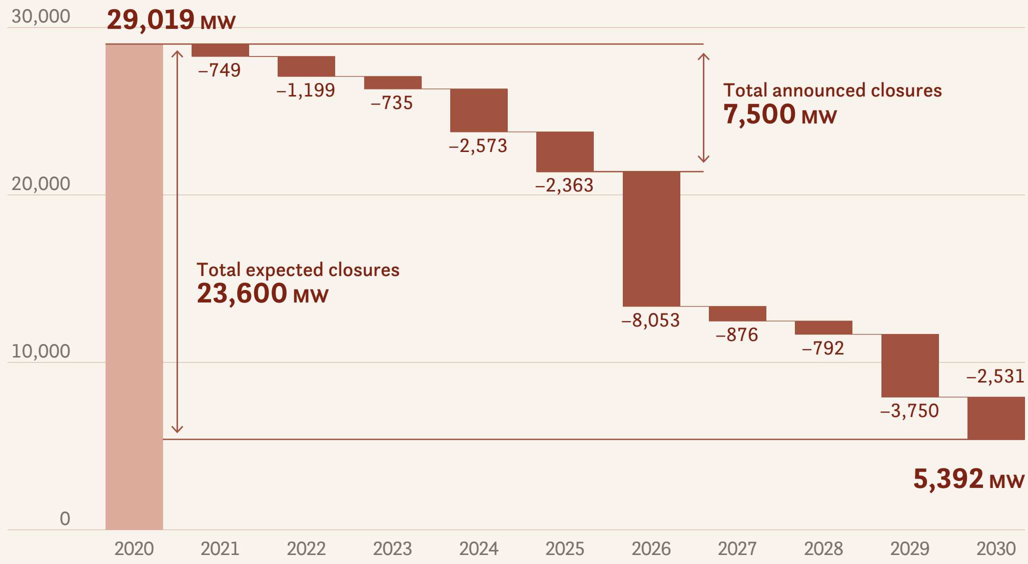
The security implication is that coal's residual role is becoming more expensive and more operationally constrained, but it is still the primary insurance layer while nuclear is absent and while grid and flexibility investments lag the pace of coal withdrawal. In practice, this pushes Polish energy governance toward a dual logic: accelerate renewables and networks for cost and decarbonisation, while maintaining coal units as reliability backstop even when they run fewer hours, because the system cannot yet replace coal's firmness with storage, demand response, and fast ramping capacity at scale.

Phasing out: security implications of managed withdrawal

Coal phaseout in Poland is not primarily a question of political intent but of whether withdrawal can be managed without creating an adequacy gap in the late 2020s and early 2030s, when coal units age out faster than firm replacements arrive. After 2025, up to 8 GW of coal capacity could leave the system as support contracts expire and cannot be renewed, followed by nearly 6 GW around 2029 to 2030 as five year capacity contracts conclude, which frames the phaseout as a discrete capacity cliff rather than a smooth decline.

The policy constraint behind that cliff: capacity payments for high emission energy sources would be banned from 2028 under current rules, and Polish utilities are already seeking a post 2028 support mechanism to avoid a supply gap from 2029, which highlights a central security

Yearly coal capacity retirements in Poland in 2020–2030



Source: Forum Energii, 2021

risk. Coal cannot stay online without revenue adequacy support, but replacing it requires new firm capacity, networks, and flexibility that are not yet delivered.

This creates a managed **withdrawal requirement with three operational tasks**. First, sequencing: retire the least reliable and most failure prone units while retaining those that still contribute materially to peak adequacy and system services. Second, realism about data and coal availability, as coal units are already operating in an environment where output shares fluctuate sharply month to month, and it shows hard coal stockpiles at power plants falling below 5 million tonnes in June 2025, the lowest level since August 2022, illustrating that fuel supply and inventory management remain a live constraint even before the main retirement waves. Third, credibility: as coal's energy share declines, the system becomes more sensitive to weather driven volatility, so managed withdrawal must be paired with measurable delivery of grid reinforcement, distribution upgrades, and flexibility procurement, otherwise phaseout accelerates import dependence at stress hours and converts decarbonisation progress into a security liability.

4.4 Gases

Natural gas & LNG

Poland's gas security baseline is built on the deliberate **replacement of single direction pipeline dependency with a portfolio of physically distinct entry routes and operational options**. The core diversification pillars are the Baltic Pipe connection to the Norwegian system, LNG import capacity on the Baltic coast, and bidirectional interconnection points that allow access to neighbouring markets in both normal and stress conditions. **Baltic Pipe** reached its target offshore transmission capacity of up to 10 bcm per year toward Poland in late 2022,[65] which anchors **the northern supply corridor and reduces the structural risk of supplier concentration**. Alongside this, Gaz System reports that bundled capacity is offered at multiple cross border interconnection points, including those with Germany, Czech Republic, Slovakia, Lithuania, and Denmark (the demand of which the company regularly assesses[66]), plus physical reverse flow arrangements where applicable, which matters because diversification is only operationally real when capacities can be contracted, scheduled, and physically delivered under congestion and emergency conditions.

LNG terminals and maritime logistics are the second pillar and also the main channel that converts global gas availability into domestic system resilience. Gaz System states that the current regasification capacity of the LNG terminal in Świnoujście is 8.3 billion Nm^3 per year, with three cryogenic storage tanks (insulated pressure vessels designed to store liquified gases) totalling 500,000 m^3 of LNG.[67] This combination of regasification throughput and on site storage creates a buffer that can smooth short term variability in cargo timing, but it also makes security sensitive to maritime conditions, port operability, and uninterrupted access to sea lanes. **The planned floating terminal in the Gulf of Gdańsk** is explicitly designed to add entry point redundancy and reduce geographic concentration risk. Gaz System's FSRU program progress assessment sets the assumed regasification capacity of the first FSRU unit at approximately 6.1 bcm, with a framework schedule targeting delivery for operation in 2027 and 2028,

LNG tanks at the Świnoujście Terminal

Source: Adobe Stock

and it notes that a second FSRU vessel could be contracted to add an additional 4.5 bcm per year if market demand justifies expansion.[68]

Storage capacity underpins seasonal security by turning imported volumes into winter deliverability and by supporting system balancing when demand spikes or import timing shifts. Gaz System reports underground gas storage working volume of 3.31 bcm, which is the key domestic flexibility reserve for the withdrawal season. Seasonal security, however, is not only a question of working volume. It depends on withdrawal rates, the interaction between pipeline inflows and LNG send out, and the ability of the European gas infrastructure to provide sufficient flexibility during both the storage withdrawal season and the injection season. The flexibility adequacy under different demand situations is crucial in this context, and is directly relevant to Poland because the system's post 2022 resilience depends on synchronizing LNG arrivals, pipeline imports, and storage operations within tight winter windows.

Distribution and protected customers is the layer where gas security becomes a social continuity obligation rather than an infrastructure problem. EU law requires Member States to define protected customers and design emergency planning to safeguard supply for vulnerable categories, with households as the core protected group and an option to include essential social services under national definitions.[69] The same framework requires Member States to specify consumption volumes for protected categories when they are included in the definition, which turns protection into a quantified planning obligation rather than a political declaration.

In practice, this means that crisis measures and load shedding rules are designed around prioritizing household and critical social demand while enabling curtailment of non-protected demand first. The operational interface with infrastructure is the distribution system and its operators,[70] because protection is delivered through continuity at the end user level, while system level balancing is executed through transmission and storage,[71] with entry points coordinated under emergency regimes defined by the competent authority and system operators.

Hydrogen

Hydrogen in Poland already has a **substantial industrial baseline that predates the clean transition**, which is critical for understanding both opportunities and constraints. Poland is among the world's largest hydrogen producers, with annual output estimated at around 1 to 1.3 million tonnes, almost entirely consisting of grey hydrogen produced from natural gas and used on site in refineries, ammonia plants, and chemical facilities. This places Poland within the global top five producers, alongside Germany and the Netherlands, even though in Poland hydrogen has historically functioned as an internal industrial feedstock rather than an energy carrier.

The security relevance of this legacy base is twofold. On one hand, it provides Poland with embedded technical know-how, existing demand centres, and industrial scale consumers that can anchor the transition to low emission hydrogen without having to create an end use market from scratch. On the other hand, it tightly couples hydrogen production costs and security to natural gas availability and pricing, which became visible during the 2022 gas shock.[72]

Against this backdrop, **clean hydrogen projects are being layered onto an already dense industrial ecosystem**. The most advanced investment is Orlen's green hydrogen programme in Gdańsk, centred around a 100 MW electrolyser integrated with storage and refinery demand, supported by EU approved state aid and National Recovery Plan financing.[73] In parallel, Poland is developing a decentralised portfolio of hydrogen valleys, with 11 projects recognised at national level, linking production to transport, industry, and local energy systems, but so far at modest scale relative to existing grey hydrogen volumes.[74]

Public financing has moved decisively into implementation, with the Polish Development Bank BGK contracting over PLN 2.1 billion in non-repayable support for five hydrogen projects under the Recovery Plan, covering a combined electrolyser capacity of 343 MW, including both renewable and low emission hydrogen pathways.[75] At the infrastructure level, Poland is positioning itself as a Baltic transit and offtake state through the Nordic Baltic Hydrogen Corridor, planned to connect Finland with Central Europe via the Baltic states and Poland and leading to Germany, with an indicative scale of 2,500 km of pipelines and up to 2.7 million tonnes per year of hydrogen by 2040.[76] Additional supply diversification is being explored through newly announced co-operation with Finnish partners on hydrogen and derivatives for Polish industry.[77]

Notwithstanding all of the above, the development of clean hydrogen in Poland remains hostage to its currently uncompetitive pricing. In the near to mid-term hydrogen will remain an industrial decarbonisation and diversification instrument rather than a pillar of power or heat system adequacy.

Biogas and biomethane

Biogas has unusually **strong decentralised potential in Poland** because the feedstock base is structurally widespread, including large numbers of agricultural and food processing facilities that already concentrate organic waste streams suitable for anaerobic digestion (a process through which bacteria break down organic matter). The gap is not substrate availability but project delivery and scaling. As of late 2023, Poland had 159 registered agricultural biogas plants with total installed electrical capacity of about 151.9 MWe, which is still small relative to the country's underlying potential.[78] Academic estimates place the feasible national scale far higher, with one analysis citing an indicative potential on the order of 10,000 to 13,000 agricultural installations, implying that current deployment remains well below 1% of what could be built under supportive investment and permitting conditions.[79] Biogas in Poland continues to attract foreign investment.[80]

Biomethane represents a qualitatively different opportunity within this landscape. Unlike biogas used on site for power and heat, **upgraded biomethane can directly substitute for natural gas in industry, heating, and transport** and can be injected into existing gas networks, giving it system level relevance beyond local energy self-sufficiency. By one account, with technical potential of up to 8 billion cubic metres per year, biomethane could in the future cover up to 40% of Poland's gas demand,[81] yet its current stage of development remains embryonic. As of 2024, only one biomethane installation was operational, with production below 1 million cubic metres annually, and grid injection, certification, and long term offtake arrangements remain rare.[82]

For energy security, the strategic value is that biogas and biomethane can distribute firm generation and heat across many nodes, reducing single point failure exposure and easing dependence on central grid stability in local stress scenarios. The security payoff is highest where projects are linked to predictable waste streams and local heat or power demand, while national level impact remains limited until biomethane upgrading and grid injection becomes routine.

4.4 Fuels

Pipelines and distribution

Poland's fuels logistics baseline is anchored in **PERN's integrated crude and product transport system, which combines long distance trunk pipelines with a nationwide storage and distribution footprint.** PERN states it operates 2,479 km of crude and fuel pipelines, with 23 storage bases nationwide, including over 4.1 million m³ of crude oil storage capacity and over 2.4 million m³ of fuels storage capacity, which sets the physical ceiling for how much disruption the system can buffer through storage and rerouting rather than through immediate imports. Within this system, the Pomeranian pipeline is the key internal resilience lever because it makes the maritime entry point in Gdańsk usable for inland refinery feeding and system rebalancing. PERN states that the pipeline can move about 30 million tonnes per year from Gdańsk to Płock and about 27 million tonnes per year in the reverse direction, which defines the credible substitution envelope if eastern inflows are constrained and seaborne crude becomes the marginal supply source.[83]

For refined products, PERN states that five major fuel bases are connected with the refinery in Płock by long distance fuel pipelines with a total length of about 620 km, which is the backbone for moving fuel from domestic refining into inland distribution without relying solely on road and rail.[84] A wartime oriented extension logic is now explicitly back on the agenda. **Poland plans to connect with NATO's Central Europe Pipeline System** through about 300 km of new pipelines at a cost of 20 billion zlotys, and the same Reuters reporting notes NATO committed 60 million zlotys for planning and design, illustrating that fuel distribution is being treated as a defence logistics asset, not only a commercial chain.[85]

Poland's fuels pipelines and storage system formally meets regulatory stockholding requirements, but its configuration exposes structural vulnerabilities when assessed against realistic crisis scenarios. Liquid fuels enter Poland predominantly via maritime routes through Naftoport in Gdańsk and fuel terminals in the Tri-City area, making the Baltic Sea a critical access corridor whose reliability cannot be assumed in a high intensity security environment. While the pipeline and storage system operated by PERN is technically modern, its spatial distribution is uneven, with a substantial share of storage capacity located in central and eastern Poland, including the Małaszewicze region near the Belarusian border, creating geographic and security exposure rather than strategic depth. The underground crude storage facility in Góra in the Kuyavian-Pomeranian region, operated by IKS Solino, accounts for nearly half of Poland's crude oil storage capacity and is therefore a single node whose integrity is system critical, particularly as its capacity has declined over time due to limited investment.

A further structural weakness is the **high degree of centralisation around the Płock refining and pipeline hub**, which maximises efficiency in peacetime but creates systemic risk under disruption, as most pipelines converge on a single production and distribution node. Current fuels pipelines also allow limited rerouting flexibility in crisis conditions, as refined products can realistically be injected into the pipeline system almost exclusively in Płock, while alternative delivery via rail or road is capacity constrained. Although fuels stocks formally sit at the interface of energy regulation and crisis management, they remain weakly integrated into national defence and resilience planning.

Existing regulations focus on maintaining stock volumes rather than defining access times, replenishment rates, or prioritisation of supply during conflict scenarios. As a result, the fuels storage system risks functioning as a nominal buffer rather than an operational resilience tool unless it is explicitly incorporated into defence planning, regionalised distribution logic, and infrastructure protection strategies designed for conditions of disruption rather than market normality.

Production & refining

Poland's liquid fuels security ultimately depends on whether domestic refining can convert crude availability into product availability at scale, because physical diversification of crude supply does not guarantee diesel and gasoline continuity if refinery throughput or product slate flexibility is disrupted. Orlen's consolidated financial results for 4Q 2023 explicitly attribute a year on year throughput decline to shutdowns in the Płock refinery and to lower throughput consolidation at the Gdańsk refinery, and quantify the quarterly throughput change drivers by site and segment, showing that maintenance and outages have immediate measurable impacts on processed volumes.[86] In parallel, Orlen's integrated reporting states the total production capacities of the group's refineries at 35.2 million tonnes and specifies that the Płock refinery has a production capacity of 16.3 million tonnes per year, which frames the scale of domestic processing that must remain resilient for the fuels system to function under stress.

On the demand side, a security relevant implication is that **Orlen's crude sourcing diversification has become tightly linked to the operational continuity of multiple refineries** in the group's regional footprint. Reuters reports that Orlen signed a 12 month contract with Equinor for over 6 million tonnes of crude oil covering about 15% of its annual demand, with deliveries shipped from Mongstad to refineries in Poland, Lithuania, and the Czech Republic.[87] This developments confirms that Poland's fuel security is increasingly embedded in a multi-site refining system rather than only domestic barrels and domestic plants.

Oil security

Poland's crude oil security baseline is built around the ability to switch between pipeline and seaborne entry while preserving internal transfer capacity to refineries and storage. The maritime gateway is structurally concentrated in the Gdańsk node. Naftoport states it is the exclusive owner of five handling jetties with capacity of 36 million tons of crude oil and 4 million tons of fuels annually, which makes this single terminal a national level choke point for seaborne diversification and a key resilience asset when eastern inflows are constrained. PERN reinforces the same capacity figures in its own communication describing Naftoport's potential to handle over 36 million tonnes of crude and 4 million tonnes of oil products annually.[88]

Oil security also depends on the stockholding regime that transforms import and refining volatility into continuity of supply. The International Energy Agency notes that Poland's oil stocks have consistently been above the 90 day IEA requirement and that public stocks are entirely held in Poland at facilities belonging to storage companies, because RARS does not have its own storage capacities, which matters operationally for accessibility and release logistics under crisis.[89] The legal obligation layer is codified domestically. Poland's compulsory stock logic is operationalised through the 53 day industry requirement described in Polish public reporting on the reserves regime, which reflects the domestic implementation design of mandatory stocks alongside agency held volumes.[90 91]

Ownership and remedy structure after consolidation is another security shaping variable because it influences who controls terminals, storage, and wholesale options during stress. In the refining and fuel value chain, concentration dynamics were materially altered through the Orlen and Lotos transaction, which the European Commission cleared subject to conditions,[92] embedding structural remedies in areas including refining and wholesale related assets, and creating downstream consequences for asset control and competitive structure that remain relevant to resilience because concentrated ownership can both accelerate coordination and amplify single point governance risk. Decisions by the Polish competition authority on transactions linked to fuel logistics remedies illustrate how concentration control and asset transfers are directly relevant to the security of supply architecture, not only to market competition.[93]

Other fuels

Beyond gasoline and diesel, Poland's fuels resilience depends on product streams whose logistics are concentrated in the Gdańsk hub and whose disruption effects are sector specific and immediate. At the terminal level, Naftoport's technical configuration shows that jetties are equipped with dedicated loading arms for crude oil, gasoline, diesel, jet fuel, and fuel oil, with jet fuel handled through the same deep water berthing infrastructure as other refined products, which operationally ties aviation continuity to the same port node that anchors crude diversification.[94] **The scale of that node is demonstrated by Port of Gdańsk data showing that in 2025 Naftoport handled 37.4 million tonnes of crude oil and received 84 additional vessels carrying petroleum products**, confirming that the same hub is routinely used for non-crude fuel flows, not only as a contingency option.[95] This matters because product imports function as the main balancing instrument when domestic refining output is temporarily constrained or when specific product categories are structurally short.

The centrality of oil and petroleum products in EU import sets the macro context for **Poland's dependence on seaborne and cross border flows for specific refined products** even when crude sourcing is diversified. Poland's oil industry chamber annual reporting documents that Poland routinely uses short term imports to close market gaps in several product lines, including during periods when refinery maintenance increases import reliance.[96] In security terms, the high exposure product is jet fuel, since demand cannot be substituted by road fuels and aviation supply chains rely on dedicated storage and rapid replenishment cycles, meaning a port level throughput shock produces a faster operational constraint than in diesel or gasoline markets where substitution and wider inland storage options exist.

A second stress sensitive category is heating oil and heavy fuel oil used by selected industrial and municipal consumers, which can become import reliant during cold snaps and refinery downtime, again pointing to a throughput and distribution problem rather than a crude availability problem. Finally, the broader European supply backdrop is relevant because refined products like jet fuel are part of an EU market that exhibits import dependence patterns and external sourcing concentration, which amplifies the risk that a regional shipping or refinery disruption tightens product availability across multiple member states simultaneously.[97]

4.5 Heating

Production

District heating security in Poland is defined by scale, fragmentation, and fuel transition pressure, because it is a mass service that depends on continuous fuel supply and plant availability through winter peaks. URE's English release on the 2023 heating market states that the number of licensed district heating companies increased from 392 to 398 between 2022 and 2023, and that units with installed capacity of 50 MW or less account for more than 55% of licensed generators, which indicates a structurally dispersed production base with many small sources.[98]

At the same time, URE's market characteristics page states that at the end of 2023, 398 enterprises held 815 licences for heating activity, including 354 for generation, 349 for transmission and distribution, and 112 for trade, showing that production security and network security are regulated through distinct concession categories and often separate entities.[99] **Large groups remain system relevant** because they control high capacity CHP nodes and can mobilise capital for fuel switching. PGE's non-financial reporting states that PGE Energia Ciepła operates 16 CHP plants with heat capacity of 6.8 GWt and electric capacity of 2.6 GWe, and is positioned as the largest producer of electricity and heat in high efficiency cogeneration, which makes its asset availability and transition sequencing directly relevant for urban heat continuity.[100] [101]

Distribution

Heat security is equally a network problem because even well supplied heat sources do not translate into consumer continuity if distribution networks are constrained, ageing, or operationally fragmented. URE's district heating sector reporting shows long run network expansion, with network length rising from 17,312.5 km to 22,223.0 km over two decades of monitoring licensed companies, which quantifies the physical scale of the distribution layer and the maintenance burden it implies.[102]

At the operator level, **distribution is institutionally fragmented** in a way that mirrors production: many entities hold transmission and distribution concessions, and URE's 2023 market characteristics data confirms that 349 licences were held for transmission and distribution alone, which matters for crisis response because operational coordination during extreme weather or fuel disruptions must pass through many local network operators. At the top end of scale, network control by large groups like PGE creates concentrated dependencies.

4.6 Nuclear: chasing the rabbit

Poland's nuclear programme is nascent in generation terms, but it is already institutionalised as a national industrial project with multiple moving tracks that advance and stall in alternating cycles, creating a "two steps forward one step back" logic that is now itself a security variable. The status quo is straightforward: Poland still operates no nuclear power plants, yet it has created an investor vehicle and a regulatory pathway for a first large scale plant in Pomerania, while simultaneously pursuing a parallel small modular reactor track and testing a second large plant pathway that has partly unravelled.

The core build is the **first NPP** at Lubiatowo Kopalino, structured as three Westinghouse AP1000 units, each indicated at 1,250 MW gross, which defines the intended scale at roughly 3.7 GW and the baseline ambition to replace retiring coal with firm low carbon capacity rather than to complement variable renewables only. Progress is real and measurable, but it is front loaded into permitting, engineering, and financing rather than concrete. The IAEA has acknowledged key steps such as the governmental approval of the three AP1000 units and the chain of preparatory decisions that enable site works and licensing preparation. Poland thus has built a formal governance path but remains in the long pre-construction phase where schedules are most vulnerable to drift.

The recent breakthrough is political economy rather than concrete, because the **European Commission approved state aid** for the first plant through a two way contract for difference structure designed to provide stable revenues for forty years, meaning Poland has moved from a declaratory nuclear policy into an EU compatible financing model that can unlock debt and begin the transition from engineering contracts toward an EPC commitment. At the same time, the same state aid decision embeds the risk that nuclear becomes hostage to prolonged negotiations over the strike price methodology, cost verification, and procurement integrity, which is where the two steps forward one step back dynamic usually emerges in European nuclear builds. A second layer of progress is financing pipeline building. In early 2026 World Nuclear News reports that PEJ signed a first loan agreement with the US export credit agency, showing movement from political announcement toward bankable project structuring, but also confirming that the project is still accumulating enabling instruments rather than locking in final delivery.

The **programme's internal risk profile is therefore shaped by three hard constraints**. First is **sequencing risk:** coal capacity is exiting faster than nuclear can realistically enter, and nuclear commissioning targets in the 2030s mean that near term adequacy pressures must be managed through grids, demand response, gas, and imports, creating a window where nuclear is strategically essential but operationally irrelevant. Second is **institutional volatility** and model churn. Poland has repeatedly adjusted nuclear governance and financing assumptions over the past decade, and each reset creates friction in supply chain mobilisation and regulatory preparation, even if the headline plan remains stable. Third is **industrial realism**: Poland can develop a fully-fledged nuclear industry only if localisation moves beyond construction subcontracting into qualified manufacturing, nuclear grade quality systems, and a durable workforce pipeline.

The Polish Nuclear Power Programme as presented by the National Atomic Energy Agency explicitly frames implementation through 2043 and includes a human resources development plan and associated investments, which signals intent for a domestic capability base, but that intent must be operationalised through certified suppliers, stable project cadence, and predictable regulatory demand. The forward looking opportunity is real because Poland is trying to build a fleet logic rather than a one off plant logic. The risk is equally real because the parallel track approach can dilute execution. The Pątnów

Suggested visualisation of Poland's first nuclear power plant

Source: PEJ

project, initially linked to a Korean technology path, illustrates fragility: reporting in 2025 shows that the Korean partner withdrew and that PGE moved to acquire full control of the joint venture, which implies a strategic rethink and likely schedule reset, reinforcing the pattern of advances followed by setbacks.

In contrast, the **SMR track** has recently tightened rather than loosened. In August 2025 Orlen and Synthos announced the first SMR site at Włocławek and agreed an operating model, with the project framed as a concrete step toward a BWRX 300 deployment, yet this remains an early stage pathway with licensing and supply chain hurdles and should be treated as optionality until firm regulatory milestones are achieved.

The **baseline conclusion for energy security is that nuclear can become a central stabiliser of Poland's power system** only if execution moves from approvals and models into locked contracts, predictable build cadence, and domestic capability development. Until then, the nuclear programme is best understood as a high consequence future pillar whose present day contribution is institutional, financial, and industrial mobilisation rather than electricity.

5 Infrastructure resilience, threats, and crisis management

5.1 Physical and cyber vulnerabilities

Poland's electricity security has a **structural vulnerability** that comes from concentration at transmission level. A relatively limited number of 400 kV corridors and major substations enable bulk power transfers, which makes them critical nodes whose damage, prolonged outage, or forced de-energisation can produce cascading constraints that are not easily compensated by alternative routing. In the **national critical infrastructure protection framework**, the logic is explicit: operators of critical infrastructure are expected to maintain reserve systems and continuity arrangements to sustain essential services until full restoration is possible, and the system is coordinated through institutionalised information exchange and joint exercises convened under the national programme. That architecture implicitly recognises that a small set of high value assets and operational choke points creates a disproportional system risk that cannot be managed only through market mechanisms or standard maintenance planning.[103]

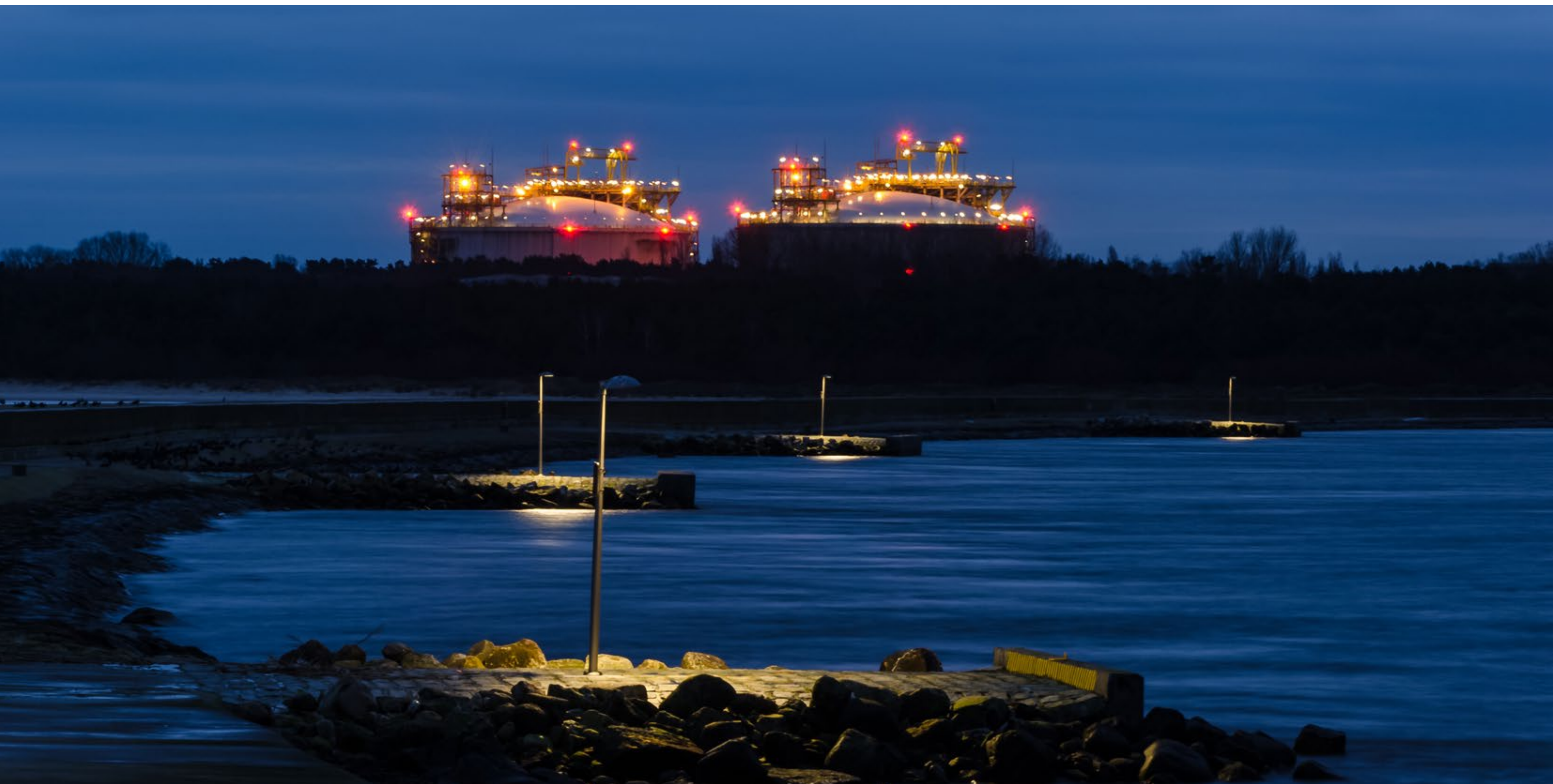
The single point of failure problem expands when physical concentration intersects with digital concentration. Energy operations depend on centralised dispatch, telecontrol, and protection automation, meaning that compromise of operational technology environments can translate quickly into physical disruption even when generation capacity is sufficient. ENISA's threat landscape for 2024 identifies ransomware and distributed denial of service as consistently dominant threat categories across the EU threat environment, and it stresses the recurring role of state nexus actors in high impact campaigns in periods of geopolitical tension. In Poland, it named a 2023 Russian cyberattack on a wastewater plant among important incidents.[104] In December 2025, a major cyberattack targeting wind and PV farms was averted.[105] In energy terms, this reinforces a baseline assumption that cyber operations are not episodic but persistent, and that adversaries can pursue both economic extortion and widespread disruption objectives against high consequence infrastructure.

The **cyber and cyber physical risk profile of energy infrastructure** is shaped by interdependence between IT and OT, and by the safety and availability constraints that limit how quickly operators can patch, segment, or re-engineer systems. ENISA's assessment of the sectors covered by the NIS2 directive[106] emphasizes that growing ICT dependence increases vulnerability, and it points to recurring threats such as DDoS and ransomware while emphasising the socioeconomic impact and speed of impact in subsectors like electricity. This is a direct indicator that system risk is not only about whether an entity can restore IT services, but whether it can sustain operational continuity when control and monitoring functions are degraded.

Protection of control systems depends on a governance chain that links civilian operators, sector regulators, national crisis management, and the security and defence community. In **Poland's national cybersecurity system**, the legal baseline under the 2018 cybersecurity law[107] is that entities in scope must manage cybersecurity risk and report incidents, while national level response and coordination functions are distributed across three CSIRT teams with defined constituencies, including CSIRT GOV for government related scope under the head of the Internal Security Agency, and CSIRT MON for the defence sphere. This structure matters for energy because a serious incident can shift from an operator technical issue into a national security issue, triggering vertical escalation, classified information handling, and crisis coordination pathways that are not available in normal commercial incident response.

Operationally, the most difficult coordination problem is that grid security sits at the intersection of military grade threat awareness and civilian continuity obligations. **The national critical infrastructure programme** explicitly embeds the expectation of multi-level cooperation, including roles for special services and crisis management bodies, and it treats information exchange mechanisms and joint exercises as core instruments for reducing vulnerability. When threat intensity rises, coordination with the armed forces can become part of the protection model for key sites such as substations and high voltage lines, because deterrence and rapid response require capabilities beyond private security. In practice, this requires institutional choreography between operators such as PSE, crisis management coordination through RCB mechanisms, cyber incident pathways under the national cybersecurity system, and defence domain involvement through the Ministry of National Defence and military structures when the threat is assessed as hostile state activity rather than criminality.[108]

At the technical layer, robust control system protection is defined by segmentation between enterprise IT and OT, strict management of remote access, secure engineering of safety and protection functions, and incident response procedures that can operate under degraded communications. One American guidance on OT security frames these measures as necessary because OT systems have unique availability, reliability, and safety requirements that make standard IT security approaches insufficient, and it provides a reference architecture for applying layered controls without destabilising industrial processes.[109] For Poland's energy infrastructure, this implies that resilience is achieved when operators can treat cybersecurity as an operational continuity function aligned with system dispatch and crisis planning, rather than as an IT compliance exercise.



5.2 Hybrid, maritime, and geopolitical threats

Poland's infrastructure resilience in the electricity domain is increasingly shaped by hybrid and maritime threat dynamics in the Baltic Sea, where the density of critical undersea assets intersects with intensified geopolitical friction. The regional baseline is not limited to deliberate sabotage. It includes ambiguous disruption patterns in which damage to power cables[110] and telecommunications links is plausibly deniable and often attributed to civilian shipping behavior, including anchor drag incidents, while still producing strategic effects through uncertainty, operational burden, and public anxiety. This ambiguity is itself a tool because it forces authorities to treat each incident as both an accident risk and a hostile action risk until attribution stabilises, raising the cost of response and complicating escalation control. The operational consequence is persistent demand for surveillance, rapid investigation, and protection measures across territorial waters and exclusive economic zones, increasingly coordinated among Baltic Sea states and EU institutions.

The Baltic Sea exposure is amplified by the coupling of maritime incidents with energy system constraints on land. **Undersea disruptions** can reduce cross border transfer capacity, tighten balancing margins, and increase the probability that inland bottlenecks become binding precisely when system stress is already elevated due to weather or market conditions. NATO and the EU have responded by emphasising deterrence by presence, improved situational awareness, and faster mechanisms for joint monitoring and response,[111] reflecting a view that repeated infrastructure incidents require a collective security posture rather than purely technical repairs. The institutional implication for Poland is that **threat management spans multiple chains of command**: maritime surveillance and incident response through coast guard and naval assets, intelligence assessment and counter sabotage functions through security services, and system stability through transmission and market operators.

Disruption scenarios therefore cluster around three actor categories that require different countermeasures. The first is hostile state linked activity, including covert operations and proxy behaviour, where the objective is cumulative erosion and strategic signalling. The second is commercial or shadow shipping behaviour that can produce damage without deliberate intent but still creates exploitable vulnerability, particularly when enforcement and jurisdiction are contested. The third is cyber enabled hybrid activity that targets operational decision points, such as dispatch, restoration sequencing, or public communication, to amplify the impact of a physical incident. The practical policy problem is that these categories can overlap in real cases, so Poland's response posture must treat attribution as a process, not a prerequisite for action, while still maintaining legal proportionality and escalation discipline.

5.3 Supply chain and repairability constraints

Resilience depends not only on preventing disruption, but also on the ability to repair and restore at speed, and this is increasingly constrained by global supply chains for critical electricity equipment. In the European market, lead times for large power transformers and cables have lengthened materially, which creates a structural repairability risk for Poland because the most consequential failures at transmission level often involve custom high voltage components with limited substitute options. The International Energy Agency reports that procurement times for cables are now typically two to three years and for large power transformers up to four years, with direct current cable waiting times extending beyond five years for some specialised components.[112] This converts high impact faults into extended duration risk, particularly when events are correlated, such as storm damage combined with sabotage risk or multi asset failures across the region.

Spare parts strategy becomes a core security variable under these conditions. The system faces a trade-off between cost efficiency and resilience because stockpiling large equipment is expensive and complex, yet relying solely on just in time procurement is no longer credible when supply backlogs and manufacturing capacity constraints dominate timelines. **The EU's Grid Action Plan** frames this as a systemic European challenge, pushing for better visibility of grid project pipelines and coordination with manufacturers to support investment in production capacity and secure supply chains.[113] For Poland, this implies that **national resilience planning** must treat procurement coordination and standardisation as security enablers, including through closer alignment between PSE, distribution system operators, and relevant ministries responsible for energy security and industrial policy.

Workforce availability and skills are the second repairability constraint. **Restoration and grid modernisation** require high voltage engineers, protection specialists, dispatch trained operators, and field teams with safety and authorisation credentials. The constraint is not only headcount but task critical experience, since high voltage works, protection settings, and restoration operations are not easily substitutable across sectors. Europe-wide roadmaps developed jointly by grid operators and the supply chain emphasise that delivery capacity is constrained by both manufacturing and skilled labour, which in practice means that even when equipment is available, installation, commissioning, and safe return to service can become the pacing item. For Poland this is an institutional challenge because responsibility is split between operators as employers, the education and training ecosystem, regulator driven investment incentives, and the security community's need for assured staffing during crisis operations.

5.4 Crisis management and emergency response

Poland's crisis management framework is defined by statutory allocation of roles across public administration and by planning instruments that standardise escalation and coordination. The Crisis Management Act sets the national architecture, defining crisis management as an element of managing national security and assigning tasks, planning duties, and financing rules across competent authorities. **The National Crisis Management Plan** functions as the planning matrix for all participating public bodies, providing the reference structure for ministerial and regional plans and thereby shaping how energy disruption scenarios are integrated into national civil planning. The operational implication is that electricity infrastructure incidents can move quickly from operator-led technical response to a multi-agency national security event, triggering crisis coordination bodies and formal information flows.

At operator level, **preparedness and restoration are anchored in formal defence and restoration planning aligned with EU requirements for electricity emergency and restoration**. Commission Regulation 2017/2196 establishes processes and obligations for TSOs regarding system defence and system restoration, and PSE reports that it maintains internal documents governing the review and release of its System Defence Plan and Restoration Plan, reflecting institutionalised readiness for low probability high impact events. This matters because restoration is not only technical. It is organisational. It depends on pre-defined sequences, roles, black start capable resources, communications redundancy, and coordination with distribution operators, generators, and critical customers. The boundary between operator action and state action becomes especially important when the incident is assessed as hostile, because protection, investigation, and attribution functions require security services and potentially military support, while restoration requires uninterrupted operator command over system operations.

Information sharing and public communication are part of resilience because they shape compliance, social stability, and operational freedom during a crisis. The **crisis management framework and national alerting practice** create channels for rapid public messaging, but energy incidents also demand targeted communication to critical sectors, local governments, and industrial consumers who may face curtailment. The challenge is that hybrid contexts deliberately attack trust and can weaponize uncertainty, so the state and operators need coordinated messaging that is timely but avoids over attribution or misinformation. Effective practice therefore depends on rehearsed coordination between operator communication teams, government crisis communication structures, and the security community's need to protect sensitive information while maintaining public confidence.

The Government Centre for Security (Rządowe Centrum Bezpieczeństwa – RCB) has a pivotal and central role in two key areas: coordination of crisis prevention processes and, in the event of a crisis, oversight of crisis management. RCB is responsible for conducting risk assessments of threats to national security (Krajowy Plan Zarządzania Kryzysowego), which is a planning document meticulously delineating all the types of threats and situations which can cause a crisis and assigns a risk assessment. It is an open source document and is updated biannually. The centre is also responsible for the preparation of another important document, namely the National Programme for Critical Infrastructure Protection. The objective of this document is to create conditions for enhancing the security of critical infrastructure, particularly with regard to:

1. Preventing disruptions to the functioning of critical infrastructure;
2. Preparing for crisis situations that may adversely affect critical infrastructure;
3. Responding to incidents of destruction or disruption of critical infrastructure operations;
4. Restoring critical infrastructure.[114]

As far as energy infrastructure is concerned, the National Plan for Crisis Management, recognises the following threats: disruptions in the supply of electricity and disrupting in the supply of energy fuels. The table below demonstrates some of the described threats.

In case of disruption of fuel supply, the National Crisis Management Plan mentions the following:

1. Failures of crude oil pipelines or associated infrastructure (including pumping stations), occurring within the national territory or outside the country.
2. Failures of terminals for the reception of crude oil and petroleum products;
3. Failures within the fuel logistics system;
4. Failures of, or deliberate attacks on, information systems;
5. Disruptions to the operation of the fuel distribution system, affecting the entire country or specific regions, resulting from restrictions on fuel imports from abroad;
6. Disruptions in crude oil processing and refining operations;
7. Adverse developments in the international environment, including political or economic conflicts in crude oil supplier countries or transit countries, leading to limitations or interruptions in crude oil supplies;
8. Failure to carry out threat analyses and process-technical risk assessments for existing facilities;
9. Terrorist, sabotage, or diversionary incidents.[115]

As for the responsible institutions, the matrix of roles and responsibilities is quite complex. The National Plan for Crisis Management recognises two levels of responsibility: leading authorities and auxiliary authorities. The table below demonstrates the responsibilities of leading authorities only in times of crisis.

Types of threats pertaining to the disruption in electricity supply

TYPE OF FAILURE (THREAT)	DESCRIPTION
System failure	an operational event as a result of which synchronous components of the National Power System (NPS) are disconnected from operation in an amount exceeding 5% of the current demand for power in the NPS.
Network failure	an operational event resulting in the disconnection of synchronous components of the NPS in an amount not exceeding 5% of the current demand for power in the NPS.
Widespread power outage	loss of voltage in the NPS electricity grid over a significant area as a result of a sequence of random or deliberate events (network failures, shutdowns of power plants, extreme weather conditions, events of a terrorist/sabotage/diversionary nature), causing critical exceedance of basic technical operating parameters of the NPS (frequency, voltage) and resulting in the automatic disconnection of system power plants connected to the NPS grid in the affected area.
Capacity deficit	insufficient generation capacity within the NPS.
Lack of analysis of threats and assessment of process and technical risks	related to existing facilities and during modernization processes or the construction of new facilities, beginning at the design stage.

Source: National Crisis Management Plan

Table indicating roles of different leading authorities in the preventative and preparatory phases of disruption to electricity supply.

ENTITY	ROLE
Ministry of Energy	• Prepare state energy policy projects and coordinate implementation. • Define detailed regulations for the operation of the electricity system considering safety and reliable functioning, including equipment, installations, and networks. • Supervise key service operators. • Monitor the functioning of the National Electricity System and security of electricity supply. • Define, by regulation, the level of mandatory fuel reserves in energy companies. • Define regulations concerning limits on electricity consumption. • Set rules for verifying qualifications of persons operating equipment, installations, and networks. • Monitor the functioning of the capacity market. • Prepare and update documents: • Reports on monitoring energy supply security. • Readiness plans for threats in the electricity sector.
TSO Polskie Sieci Elektroenergetyczne S. A. (PSE)	• Operate the transmission grid efficiently, ensuring the required reliability and quality of electricity supply. • Coordinate with distribution system operators and other transmission operators. • Manage connections with other electricity systems. • Purchase system services needed for proper electricity system operation. • Coordinate usage of services not related to frequency in the 110 kV network. • Balance the electricity system, ensuring adequate reserves and managing system constraints. • Manage electricity flows in the transmission system. • Purchase electricity to cover losses in the transmission network. • Prepare plans for major system failures and recovery.
DSOS	• Operate the distribution network efficiently. • Ensure the operation, maintenance, refurbishment, and development of the distribution network to guarantee its reliable functioning and meet justified future demand. • Cooperate with the TSO and other electricity system operators to ensure the coherent operation, coordinated development, and efficient functioning of the electricity system. • Manage electricity flows, network constraints, and reactive power, taking into account technical operating conditions and coordination with the transmission network. • Dispatch generation units connected to the distribution network. • Procure electricity to cover distribution network losses, applying transparent and non-discriminatory • Procure and use flexibility and ancillary services necessary for the secure operation of the distribution system. • Plan the development of the distribution network, taking into account: energy efficiency measures, demand-side management, new generation capacity, and publicly accessible electric vehicle charging infrastructure. • Comply with coordination arrangements with the TSO concerning the operation of the coordinated 110 kV network, including the use of non-frequency ancillary services and flexibility services.

Source: National Crisis Management Plan

In case of disruption to fuel supply, the Ministry of Energy is obligated to conduct the following in preventative and preparatory phases:

1. Ongoing monitoring of the national supply of crude oil and fuels, as well as the level and structure of crude oil and fuel stocks;
2. Supervision of operators of essential services;
3. Issuance of decisions concerning the transfer of a portion of agency stocks of crude oil to strategic reserves;
4. Issuance by means of a regulation of a detailed list of raw materials and petroleum products taken into account when determining the volumes of emergency stocks and mandatory stocks;
5. Approval of voivodeship-level action plans aimed at ensuring the implementation of restrictive measures;
6. Define the detailed procedures for reducing the volume of mandatory stocks of crude oil or petroleum products;
7. Issuance of decisions on the transfer of part of agency crude oil stocks to strategic reserves.
8. Preparation and regular update of crisis management plans.

Crucially, entrepreneurs conducting business activities in the field of production or processing, as well as import, of crude oil, petroleum products (fuels), and liquefied petroleum gas (LPG) are obligated to establish and maintain mandatory stocks of crude oil or fuels.[116]

As the above complication demonstrates, **Poland has a multi-tiered, robust and detailed crisis management system**, where preparedness, monitoring and exchange of information is key.

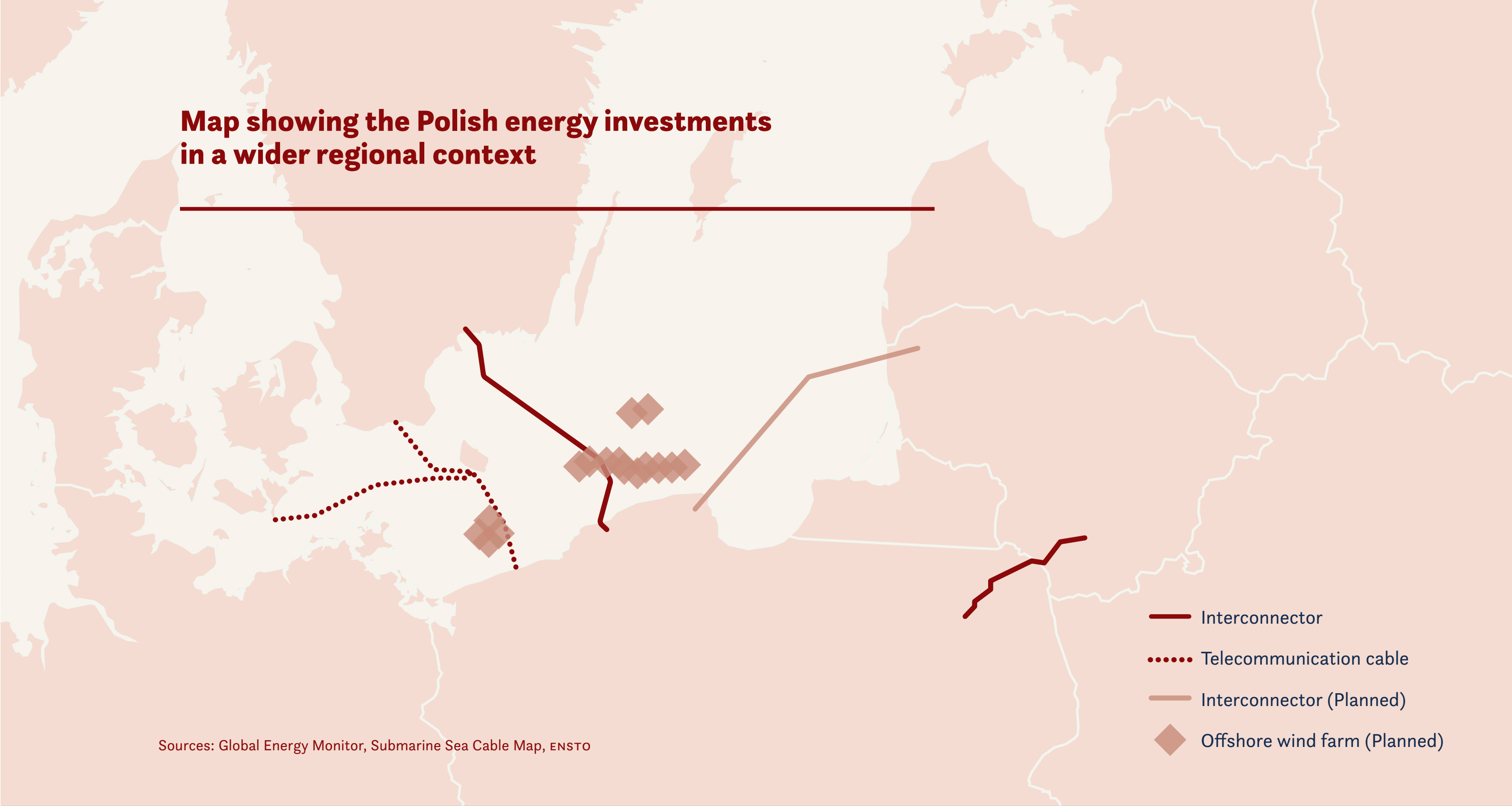
6 The Baltic Sea corridor as a strategic energy security axis

6.1 Role of the Baltic in national energy flows

The Baltic Sea has evolved into **a central logistical and strategic axis of Poland's energy system, underpinning security of supply across multiple carriers.** Approximately half of Poland's total energy needs, primarily fossil fuel imports, are delivered via the Baltic Sea corridor.[117] This includes gas supplied through the Baltic Pipe with a capacity of 10 bcm per year, LNG imports via the Świnoujście terminal at around 7.5 bcm per year, and crude oil and fuel imports through Naftoport in Gdańsk, which handled a record 24 million tonnes in 2022 and currently operates with an annual capacity of approximately 40 million tonnes. Electricity imports are integrated through the SWEPOL HVDC interconnector linking Poland with Sweden, with a total length of 254 km, including 239 km of submarine cable. These **maritime entry points** feed inland refineries, power plants, district heating systems, and the national transmission grid, making coastal infrastructure functionally indispensable for the stability of inland energy systems.

Beyond transit, the Baltic Sea also hosts limited upstream activity. Orlen Petrobaltic operates offshore exploration and production assets in the B3 and B8 fields, including two drilling platforms, three production platforms including the unmanned PG 1 platform, support vessels, and a tanker.[118] While this domestic production has operational relevance, it remains insufficient to confer strategic autonomy and reinforces the structural necessity of imports. Looking forward, **dependence on the Baltic corridor will increase further**. Offshore wind plans foresee 5.9 GW of installed capacity by 2030 and 11 GW by 2040, corresponding to roughly 13% and 19% of electricity generation.[119] This shift requires extensive development of transmission infrastructure, ports, and harbours adapted to offshore wind logistics.[120] Combined with the planned FSRU near Gdańsk with a capacity of approximately 6.1 bcm per year and the nuclear power plant at Lubiatowo Kopalino, northern Poland and the Baltic Sea could underpin close to 60% of national energy supply and generation, structurally transforming the coastline into a strategic energy hub.[121]

Map showing the Polish energy investments in a wider regional context



Sources: Global Energy Monitor, Submarine Sea Cable Map, ENSTO

6.2 Infrastructure concentration & vulnerability

The strategic concentration of energy infrastructure in the Baltic Sea region generates a dense vulnerability landscape driven by physical exposure, technological complexity, and governance fragmentation. Undersea pipelines, power and data cables, offshore substations, drilling platforms, and wind farms are geographically extensive and costly to monitor, while their repair is time consuming and capital intensive.[122] **These assets are vulnerable to interference by submarines, surface vessels, anchors, unmanned underwater vehicles, and diving teams, while increasing automation and digitalisation introduce additional cyber and cyber physical attack surfaces.** Although damage to a single offshore wind turbine with a capacity of around 15 MW would have limited systemic impact, disruption of an entire wind farm, typically around 1 GW in capacity, or of an offshore transformer substation could generate severe generation losses and destabilise the electricity system.

Hybrid threat[123] dynamics amplify these vulnerabilities. Since the start of Russia's full scale invasion of Ukraine, at least 13 incidents involving damage or suspected sabotage of undersea cables and pipelines in the Baltic Sea region have been identified by experts.[124] While earlier incidents primarily affected other Baltic states, Polish infrastructure has increasingly been targeted. In May 2025, the Russian shadow fleet vessel MV SUN loitered for several days above the SWEPOL interconnector without causing damage, an action widely interpreted as probing response thresholds and mapping vulnerabilities.[125] In September 2025, Russian fighter aircraft flew at low altitude near a Petrobaltic drilling platform,[126] followed shortly by the presence of a Russian fishing vessel slowing near the Petrobaltic pipeline, withdrawing only after Coast Guard intervention.[127] These actions illustrate a pattern of calibrated, deniable pressure designed to test preparedness, create uncertainty, and erode confidence.

Table showing costs of disruption of critical infrastructure

TYPES OF INFRASTRUCTURE	COST OF DISRUPTION PER DAY
electricity interconnectors	12 million euro
subsea telecommunication cable	24 million euro
oil pipelines	36 million euro
gas pipelines	75 million euro

Source: RAND Corporation

The economic implications of disruption are severe. RAND Corporation estimates show that daily disruption costs range from approximately 12 million euro for electricity interconnectors to 75 million euro for gas pipelines (*see* table 1)[128], while repair costs for major gas pipelines can reach between 11 and 20 billion euro.[129] This asymmetry between the low cost of interference and the high cost of repair and disruption explains the attractiveness of Baltic infrastructure as a hybrid target.

6.3 Protection, surveillance & recovery

Protection of energy infrastructure in the Baltic Sea relies on a multi layered system combining operator responsibility, national security instruments, and allied coordination. Under Polish law, primary responsibility for protecting critical infrastructure lies with operators, while the state exercises oversight and coordination functions.[130] Existing monitoring systems on pipelines and cables were largely designed for leak and malfunction detection rather than deliberate sabotage, leaving capability gaps in hostile scenarios. Legal complexity is heightened by the fact that much offshore infrastructure is located in the exclusive economic zone, where jurisdiction is governed by UNCLOS rather than full territorial sovereignty.

In response to escalating threats, **NATO and Poland have expanded surveillance and coordination mechanisms.** NATO established the Critical Undersea Infrastructure Coordination Cell in 2023, followed by the Maritime Centre for the Security of Critical Infrastructure and Task Force X, which employs autonomous systems for detecting underwater threats and supports attribution efforts.[131] Poland launched Operation Zatoka in 2022,[132] a continuous naval monitoring mission aimed at protecting critical infrastructure, though experts note that such deployments also risk diverting naval resources and prompting adaptive responses by adversaries.[133] Recent incidents involving shadow fleet vessels damaging undersea cables between Latvia and Lithuania and an interconnector near Bornholm illustrate the limits of deterrence based solely on monitoring. No wonder then that Orlen, arguably the most important Polish stakeholder of the Baltic's security of critical energy infrastructure, is doubling down on maritime drones and related technologies to monitor and safeguard its assets. One major development concerns its cooperation agreement with WB Group, a leading Polish producer of advanced drone tech.[134]

Domestically, **Poland has moved to strengthen the legal and institutional framework**. The Government Centre for Security has issued requirements for offshore wind developers to specify protection measures,[135] while the adoption of legislation known as Safe Baltic expands the Armed Forces' authority to protect infrastructure at sea, clarifies rules on the use of force, and enables operations beyond territorial waters within maritime zones.[136] [137] [138] Parallel plans to establish a Maritime Security Centre under the Coast Guard aim to centralise information sharing among civilian, military, and private actors, functioning as a coordination hub rather than a command authority.[139] Despite these advances, experts highlight the absence of a single overarching doctrine clearly delineating roles, command relationships, and escalation pathways in the event of a major maritime energy incident.[140]

A recurring concern raised by interlocutors is the absence of a holistic legal and operational framework governing incident response in the Baltic Sea. One interlocutor[141] pointed out that no single legal act clearly defines the roles, responsibilities, and command chains of relevant authorities and operators in the event of a maritime incident, including those affecting energy infrastructure. This gap is particularly visible in relation to offshore wind farms, where several operational scenarios remain legally undefined, partly because installations are still under construction and established practices have yet to emerge. For example, in the event of a fire at an offshore transformer station, the operator would formally be expected to notify civilian emergency services, highlighting the lack of tailored procedures for offshore energy assets. In this context, the planned Maritime Security Centre is seen as an important step, but primarily as a monitoring and threat-classification body rather than an operational command authority. Its intended role is to enable proportionate and appropriate responses by identifying the competent actor for a given situation, recognising that not every incident, such as the presence of a fishing vessel near subsea cables or wind farms, warrants a military response.

One interlocutor indicated that Orlen is advocating for establishing a broad cooperation format in the Baltic Sea, one that would encompass border guard services, naval forces, and regional security actors. According to the above plan, such a framework could materialise as the **Maritime Critical Infrastructure Resilience Council**, perhaps anchored at the Council of Baltic Sea States,[142] an international organisation headquartered in Stockholm whose one-year presidency Poland assumed in July 2025. The Council would bring together critical infrastructure operators, security ministries, armed forces, and specialized services. It would function as an advisory body for Baltic Sea region states, as well as for the European Commission, while simultaneously serving as a structured platform for information exchange and the dissemination of best practices related to the protection and resilience of maritime critical infrastructure. The initiative constitutes an original concept that is being developed by Orlen, aimed at strengthening coordinated resilience governance across the Baltic Sea region.

Several interlocutors noted that Poland and the Baltic states are actively advocating within the European Commission for a broader use of **Connecting Europe Facility** funding to cover not only cross-border interconnectors, but also offshore cabling, transformer stations, key components, and the physical protection of energy infrastructure, including monitoring equipment. The Commission has signalled openness to this approach, including proposals to finance surveillance tools such as drones from common EU funds. Protection of critical energy infrastructure is also increasingly framed within EU–NATO cooperation, underscored by the participation of a NATO Deputy Secretary General in recent meetings of the EU Energy Council.

In parallel, under the Commission's so-called omnibus initiative, environmental permitting procedures are expected to be simplified through a presumption of approval for strategic investments, with a six-month deadline for environmental authorities, after which consent would be deemed granted. One interlocutor stressed that greater emphasis must be placed on the protection of distribution networks and on cyber security cooperation.[143] At the same time, a structural legal constraint remains, as Polish law does not permit the construction of offshore wind farms within territorial waters, shaping both project siting and security planning in the Baltic Sea.

All in all, technical mitigation is progressing alongside institutional change. Offshore wind export cables and substations are being designed with enhanced physical protection and monitoring tailored to Baltic conditions.[144] Nonetheless, consensus among practitioners is that no single measure is sufficient. Effective protection requires a combined legal, military, technological, and organisational approach, integrated across national and allied levels, to manage a threat environment characterised by ambiguity, deniability, and cumulative pressure.[145]

7 Role of the private sector and market dynamics

7.1 Private ownership and foreign capital

Private participation in Poland's energy system is concentrated in **three layers that behave differently under security stress: competitive generation and supply, regulated networks, and strategic energy logistics**.

Competitive segments such as renewable generation, corporate PPAs (Power Purchase Agreements), and retail supply are structurally open to private and foreign capital, and this is increasingly visible in **offshore wind where investment scale, supply chain access, and project finance capacity are often anchored in international developers and joint ventures**. A practical implication is that a growing portion of future capacity additions, especially in offshore wind, is driven by private balance sheets and foreign risk appetite, which strengthens delivery potential but also relocates key decisions on timelines, procurement, and risk tolerance outside the state's direct ownership perimeter. This is not inherently a vulnerability, but it increases the importance of regulatory credibility and credible protection architecture in maritime zones where projects and export cables will sit.

In practice, however, **the bulk of committed offshore wind capacity remains led by state owned groups such as Orlen and PGE,** with foreign partners primarily contributing capital, technology, and execution capacity rather than displacing domestic ownership control. At the same time, the outcome of the first competitive offshore wind auction, in which Equinor secured support ahead of domestic bidders, illustrates that the government is prepared to open strategic energy infrastructure to foreign investors when expertise and price competitiveness outweigh ownership considerations.

Regulated electricity distribution is institutionally different because it is a critical service delivered by a small set of DSOs under concessions and tariff regulation. The Energy Regulatory Office's tariff decision for 2025 explicitly identifies the five largest distribution companies, including Stoen Operator alongside the major state linked DSOs.[146] This matters because it illustrates that critical network functions include an operator embedded in a foreign capital group rather than the legacy state utility ecosystem.[147] This creates a dual governance reality: security sensitive assets can be privately controlled even when the state retains strong regulatory and crisis powers. In parallel, strategic sensitivity rises at interfaces where market actors touch system critical nodes such as ports, LNG and fuel logistics, and the transmission control layer. In those domains, ownership concentration and merger remedies become a security issue, not only a competition issue, because they shape who controls chokepoints, how redundancy is financed, and how fast decisions can be executed during stress.

7.2 Market incentives vs. security obligations

Energy security delivery in Poland relies on a structural tension between market incentives, which optimise for cost and risk adjusted returns, and security obligations, which require redundancy, spare capacity,[148] and investments whose value is realised mainly during crises. In electricity, this tension is managed through a layered policy stack: EU market rules that require unbundling, third party access, and competitive dispatch, plus national instruments that pay for adequacy and flexibility when the energy only market does not deliver sufficient investment signals.[149] **Poland's capacity market is the clearest example of this security overlay**. The European Commission's state aid decision approving the planned Polish capacity mechanism explains why the instrument exists, how it is designed to ensure security of supply, and how foreign capacity participation is meant to be handled over time.[150] The security logic is that the state explicitly buys readiness and availability, even when energy market revenues are insufficient to keep dispatchable assets online or to incentivise new resources with system value.

Regulatory risk becomes the pivotal constraint in this model because private investors price policy credibility directly into the cost of capital. When regulatory changes are frequent, retrospective, or politically contested, investors demand higher returns or delay commitment, which in infrastructure systems translates into slower buildout, lower redundancy, and a higher probability that security margins tighten under stress. In Poland, this risk is not theoretical. It emerges from the interaction of multiple rule sets: tariff regulation and allowed returns for networks, auction design and eligibility rules for capacity and renewables support, and system operator constraints that can create curtailment risk for variable generation. At the European level, ACER's monitoring work on electricity market integration tracks how congestion, cross border constraints, and market coupling affect price signals and the conditions for investment.[151] For Poland, the security implication is that the market can be integrated and still fail to deliver resilience investments unless national and EU rules make flexibility, grid investment, and dispatchable capacity bankable at scale.

Energy security in electricity also differs from other critical sectors in that it relies disproportionately on market based investment signals to deliver assets with public security value. In other domains, such as oil logistics or cross border fuel connections, resilience investments are routinely justified and financed through public budgets, including defence related expenditure, because their value lies almost entirely in contingency rather than commercial return. As defence spending increases and energy infrastructure is increasingly recognised as a security asset, the absence of comparable public financing instruments for electricity system resilience places an unrealistic burden on markets to deliver redundancy and preparedness that they would not be expected to provide in other strategic sectors.

7.3 Public private coordination in crisis conditions

Crisis coordination in Poland's energy system is built on a statutory premise that operators own and run most critical assets, while the state provides oversight, planning, and coercive tools for emergency management. The Government Centre for Security frames this explicitly: critical infrastructure protection is embedded in crisis management practice and depends on cooperation among public bodies and the business sector, which is necessary precisely because critical infrastructure is often privately owned.[152] **The coordination reality is therefore institutional rather than rhetorical.** It requires stable interfaces between operators such as PSE, DSOs, fuel and gas infrastructure entities, and state bodies responsible for crisis management, internal security, and defence, because a hostile incident quickly becomes a multi domain event spanning technical restoration, law enforcement, and potentially military protection tasks.

Legal obligations and limitations shape what information can be shared, how quickly measures can be ordered, and who bears liability for actions taken under emergency conditions. **The Crisis Management Act provides the backbone for crisis planning** and the organisation of crisis management across public administration, which is the framework that is activated when an energy disruption escalates beyond routine operator response.[153] In parallel, EU resilience law has been tightened. **The Critical Entities Resilience Directive requires Member States to identify critical entities in sectors including energy,** ensure risk assessments, and impose resilience measures and supervisory expectations.[154] This shifts coordination from voluntary good practice toward structured obligations that have legal force, including expectations around incident handling, continuity planning, and cooperation with competent authorities.

Information sharing and liability are where public private coordination tends to fail in real incidents if rules and expectations are not clear in advance. Operators can hesitate to disclose operational data if legal exposure, reputational risk, or confidentiality constraints are unclear, while security services can restrict information in ways that reduce operator's situational awareness. The solution is not only technical platforms but governance design: clear thresholds for notification, protected channels for sensitive information, and liability safe harbours for good faith sharing during crises. The CER framework is relevant here because it assumes that resilient operation depends on structured interaction between critical entities and public authorities, including supervision and support, which implicitly requires resolving the information sharing dilemma in a way that does not punish transparency in the middle of an incident.

Conclusion: the long way out, and the longer road ahead for Poland's energy security

Poland's energy security story is no longer about whether fuel can be sourced, but about whether the system can hold together under pressure. The country has largely escaped direct dependence on Russian oil and gas, yet the infrastructure that made it possible has concentrated risk in new places, especially along the Baltic coast. What once looked like diversification has become a test of resilience, repair capacity, and institutional readiness.

Electricity sits at the centre of this shift. Renewables have grown faster than grids, flexibility, and governance have adapted. Congestion, curtailment, and tight adequacy margins are no longer warning signs but everyday operating conditions. Strategic documents struggle to keep up, while repeated revisions and moving ministerial boundaries weaken confidence among operators and investors alike. Law still treats sectors separately, even as failures increasingly cascade across electricity, heat, fuels, and digital systems.

The system relies heavily on a small group of state controlled operators and companies that both manage assets and shape policy assumptions. This gives the state leverage, but it also blurs responsibility and exposes technical decisions to political pressure. Coal continues to act as an insurance policy against failure, not because it is efficient or future proof, but because alternatives are not yet ready at scale. Storage, demand response, and grid forming technologies remain treated as supplements rather than foundations.

Markets are asked to deliver resilience that would be publicly financed in other security domains, leaving electricity exposed to regulatory uncertainty and delayed investment. At the same time, the Baltic Sea has become inseparable from national energy security, linking power generation, fuel imports, subsea cables, and maritime protection into a single risk space.

Endnotes

1 International Energy Agency (2025), World Energy Outlook 2025, https://iea.blob.core.windows.net/assets/dfe5daf4-dbc1-4533-abeb-fafb1faee0f9/WorldEnergyOutlook2025.pdf.

2 World Bank. (3 November 1995). *Poland power transmission project: Staff appraisal report* (Report No. 15068-POL). The World Bank, p. 2. https://documents1.worldbank.org/curated/en/369241468780937785/pdf/multi0page.pdf.

3 World Bank. (2000). *Implementation completion report on the Heat Supply Restructuring and Conservation Project for Poland* (Report No. 20394). The World Bank, p. 7. https://documents1.worldbank.org/curated/en/550781468146689071/pdf/multi-page.pdf

4 International Energy Agency. (2011). *Energy policies of IEA countries: Poland 2011 review*. International Energy Agency. https://www.iea.org/reports/energy-policies-of-iea-countries-poland-2011-review.

5 Gawlikowska-Fyk, A., & Godzimirski, J. M. (August 2017). *Gas security in the pipeline: Expectations and realities*. Polish Institute of International Affairs, p. 1. https://pism.pl/upload/images/artykuly/legacy/files/23483.pdf
European Commission. (28 May 2014). *European Energy Security Strategy*. European Commission, pp. 22 to 24. https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52014DC0330.

6 Supreme Audit Office of Poland. (26 April 2022). *The Supreme Audit Office on the preparation and implementation of natural gas infrastructure investments*. https://www.nik.gov.pl/najnowsze-informacje-o-wynikach-kontroli/inwestycje-infrastrukturalne-dla-gazu-ziemnego.html (in Polish).

7 Ministry of Climate and Environment of Poland. (2021). *Poland's Energy Policy until 2040*. Warsaw, p. 7. https://www.gov.pl/web/climate/energy-policy-of-poland-until-2040-epp2040.

8 International Energy Agency (2022). *Poland 2020. Energy Policy Review*, International Energy Agency, p.11

9 Slomeń, M. (2023). *Minor update of Poland's Energy Policy post mortem*. Instrat. https://instrat.pl/pep2040-post-mortem/ (in Polish).

10 European Commission. (11 December 2018). *Regulation (EU) 2018/1999 of the European Parliament and of the Council on the Governance of the Energy Union and Climate Action*. European Union. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32018R1999.

11 Ministry of Climate and Environment of Poland. (2025). *National Energy and Climate Plan*. Warsaw, p. 22. https://www.gov.pl/web/klimat/krajowy-plan-na-rzecz-energii-i-klimatu.

12 Ibid., p.103

13 Gogolewski, K. (2025). *Energy demand in the country will increase because immigrants will move to Poland*. WysokieNapiecie.pl. https://wysokienapiecie.pl/110901-popyt-na-energie-w-kraju-wzrosnie-bo-do-polski-masowo-rusza-imigranci/ (in Polish).

14 Semi-structured interview with interlocutor G.

15 Poland's white certificates scheme is a market based energy efficiency obligation mechanism that requires electricity, heat, and gas sellers and large energy consumers to achieve defined energy savings targets. Obligated entities must either implement energy efficiency measures themselves or purchase tradable white certificates that confirm verified final energy savings from approved projects such as industrial upgrades, building retrofits, or efficient lighting. The scheme is overseen by the Energy Regulatory Office and is designed to reduce final energy consumption in a cost effective way while supporting Poland's EU level energy efficiency commitments.

16 Semi-structured interview with interlocutor M.

17 Act of 10 April 1997. *Energy Law*. Journal of Laws of the Republic of Poland. https://isap.sejm.gov.pl/isap.nsf/DocDetails.xsp?id=WDU19970540348 (in Polish).

18 Act of 20 February 2015. *Act on renewable energy sources*. Journal of Laws of the Republic of Poland. https://isap.sejm.gov.pl/isap.nsf/DocDetails.xsp?id=WDU20150000478 (in Polish).

19 Act of 16 February 2007. *Act on stocks of crude oil, petroleum products and natural gas*. Journal of Laws of the Republic of Poland. https://isap.sejm.gov.pl/isap.nsf/DocDetails.xsp?id=WDU20070520343 (in Polish).

20 Republic of Poland. (2009, April 24). *Act on investments in the LNG terminal in Świnoujście*. Journal of Laws of the Republic of Poland, No. 84, item 700. https://isap.sejm.gov.pl/isap.nsf/DocDetails.xsp?id=WDU20090840700 (in Polish).

21 Act of 8 March 1990. *Act on municipal self government*. Journal of Laws of the Republic of Poland. https://isap.sejm.gov.pl/isap.nsf/DocDetails.xsp?id=WDU19900160095 (in Polish).

22 Act of 26 April 2007. *Act on crisis management*. Journal of Laws of the Republic of Poland. https://isap.sejm.gov.pl/isap.nsf/DocDetails.xsp?id=wdu20070890590 (in Polish).

23 Council of the European Union. (16 June 2025). *Presidency conclusions on strengthening the Energy Union through reinforcing energy security*. Brussels. https://www.consilium.europa.eu/en/press/press-releases/2025/06/16/presidency-conclusions-on-strengthening-the-energy-union-through-reinforcing-energy-security/.

24 Semi-structured interview with interlocutor K.

25 Ministry of Climate and Environment of Poland. (n.d.). *Memorandum on the protection of energy infrastructure in the Baltic Sea*. https://www.gov.pl/web/klimat/memorandum-w-sprawie-ochrony-infrastruktury-energetycznej-morza-baltyckiego (in Polish).

26 Regjeringen (2025) *Declaration of Polish-Norwegian Partnership on Energy Security, Green Transition and Security of Critical Energy Infrastructure*, https://www.regjeringen.no/contentassets/521806d5c3cd4fcebe4c9707b5cd27fe/16052025-energipartnerskap.pdf.

27 Government of the Republic of Poland. (9 May 2025). *Poland and France sign historic security and cooperation treaty in Nancy*. https://www.gov.pl/web/primeminister/poland-and-france-sign-historic-security-and-cooperation-treaty-in-nancy.

28 Council of the Baltic Sea States (2025) *Polish Presidency 2025-2026*, https://cbss.org/about-us/presidencies/polish-presidency-2025-2026/.

29 *See* e.g. Council of the European Union. (19 May 2025). *Security and defence partnership between the European Union and the United Kingdom of Great Britain and Northern Ireland* (Document 8709/25). https://www.consilium.europa.eu/media/3w3hhlxz/eu-uk-summit_sdp.pdf.

30 Żuk, P., & Szulecki, K. (2022). *The Turów brown coal mine in the shadow of an international conflict: Surveying the actions of the European Union Court of Justice and the populist policies of the Polish government.* Energy Research & Social Science, 95, 101054. https://doi.org/10.1016/j.exis.2022.101054.

31 Semi-structured interview with interlocutor G.

32 Kosek, W. (2025). *Baltic Sea and Polish ports as key elements in energy security and transition*. *Energies, 18*(21), 5806. https://doi.org/10.3390/en18215806.

33 Energy Regulatory Office. (28 November 2025). *The President of the URE publishes the 2024 Heating Energy Market in Numbers Report*. https://www.ure.gov.pl/en/communication/news/481%2CThe-President-of-the-URE-publishes-the-2024-Heating-Energy-Market-In-Numbers-Rep.html.

34 Sejm of the Republic of Poland. (1997). *Act of 10 April 1997 on municipal economy*. Journal of Laws of the Republic of Poland, 1997, No. 90, item 43. https://isap.sejm.gov.pl/isap.nsf/download.xsp/WDU19970090043/O/D19970043.pdf (in Polish).

35 Clean Energy Wire. (26 January 2026). *Dispatch from Poland: Electricity mix trends in 2025*. https://www.cleanenergywire.org/news/dispatch-poland-january-26.

36 Ember. (n.d.). *Poland*. Ember. https://ember-energy.org/countries-and-regions/poland/.

37 Szulecki, K. (2020). *Securitization and state encroachment on the energy sector: Politics of exception in Poland's energy governance*. Energy, 136, p. 3. https://www.sciencedirect.com/science/article/pii/S0301421519306536.

38 Ceglarz, A. (2020). *Polska polityka energetyczna. Zmiany klimatu, energia i środowisko*. Friedrich Ebert Stiftung, p. 2. https://collections.fes.de/publikationen/ident/fes/17099.
39 Polskie Radio. (2025). *EU countries back new 2040 climate target despite Polish opposition*. https://www.polskieradio.pl/395/7786/artykul/3603519,eu-countries-back-new-2040-climate-target-despite-polish-opposition.
40 More in Common. (2026). *Energetyka i polityka klimatyczna*. https://www.moreincommon.pl/fokus-na-klimat/artykuly/energetyka-i-polityka-klimatyczna (in Polish).
41 PSE. (2025). *Guardian and Architect: PSE Strategy 2040*. https://strategia.pse.pl/PSE_Strategy_2040_Brochure.pdf
42 Ceglarz, A. (2020). *Polska polityka energetyczna. Zmiany klimatu, energia i środowisko*. Friedrich Ebert Stiftung, p. 2. https://collections.fes.de/publikationen/ident/fes/17099.
43 Cydejko, J. (23 September 2025). *Motyka on the future of the Polish energy sector* [Audio podcast episode]. Spotify. https://open.spotify.com/episode/5OGV8crppUHvj8rv3dLnP6 (in Polish).
44 Polish Power Grid Company. (12 November 2024). *Assessment of resource adequacy at the national level 2025 to 2040*. Polish Power Grid Company, pp. 17–18. https://www.pse.pl/documents/20182/32109/Ocena%2Bwystarczalno%C5%9Bci%2Bzasob%C3%B3w%2Bna%2Bpoziomie%2Bkrajowym%2B2025%2B%E2%80%93%2B2040/2d5d0ec2-2fba-4687-81d5-9a575f22655e.
45 Polskie Sieci Elektroenergetyczne. (2 January 2025). *Draft new transmission network development plan for 2025 to 2034 agreed*.. https://www.pse.pl/-/projekt-nowego-planu-rozwoju-sieci-przesylowej-na-lata-2025-2034-uzgodniony
46 Energy Regulatory Office. (11 April 2025). *URE Report: 1.5 million RES microinstallations operational in Poland*. Energy Regulatory Office. https://www.ure.gov.pl/en/communication/news/427%2CURE-Report-15-million-RES-microinstallations-operational-in-Poland.html.
47 Energy Regulatory Office. (17 November 2025). *Electricity market: The 2024 report on redispatching mechanisms from the President of URE*. Energy Regulatory Office. https://www.ure.gov.pl/en/communication/news/477%2CElectricity-market-The-2024-Report-on-Redispatching-Mechanisms-from-the-Presiden.html.
48 European Commission. (2 June 2025). *EU guidance on ensuring electricity grids are fit for the future*. European Commission. https://energy.ec.europa.eu/news/eu-guidance-ensuring-electricity-grids-are-fit-future-2025-06-02_en.
49 ENTSO E. (30 June 2025). *HVDC utilisation and availability statistics 2024*. ENTSO E, p. 33. https://www.entsoe.eu/Documents/SOC%20 documents/Nordic/2024/HVDC_Utilisation_and_Availability_Statistics_2024.pdf.
50 ENTSO E. (1 November 2024). *Winter Outlook 2024 to 2025*. ENTSO E, p. 4. https://eepublicdownloads.entsoe.eu/clean-documents/sdc-documents/seasonal/WOR2024/Winter%20Outlook%202024-2025_Report.pdf.
51 Instytut Energetyki Odnawialnej. (2025). *Summary: Photovoltaic market in Poland 2025*. Instytut Energetyki Odnawialnej. https://ieo.pl/en/pv-report/1713-summary-photovoltaic-market-in-poland-2025.
52 Energy Regulatory Office of Poland. (11 April 2025). *URE report: 1.5 million RES microinstallations operational in Poland*. Energy Regulatory Office of Poland. https://www.ure.gov.pl/en/communication/news/427%2CURE-Report-15-million-RES-microinstallations-operational-in-Poland.html.
53 Gramwzielone.pl. (29 October 2025). *Operators disconnect photovoltaics. Curtailments increased by 2362 percent*. Gramwzielone.pl. https://www.gramwzielone.pl/energia-sloneczna/20338935/operatorzy-wylaczaja-fotowoltaike-redukcje-wzrosly-o-2362 (in Polish).
54 Polskie Sieci Elektroenergetyczne. (2024). *Information on the operation of the power system*. Polskie Sieci Elektroenergetyczne. https://www.pse.pl/informacje-o-pracy-systemu-elektroenergetycznego (in Polish)
55 International Energy Agency Wind Technology Collaboration Programme. (2025). *Poland annual report 2024* (M. Wójcik and H. Ghaemi). IEA Wind TCP. https://iea-wind.org/wp-content/uploads/2025/09/Poland.Annual.Report.2024.Publish.pdf.
56 Domański Zakrzewski Palinka. (27 April 2023). *Amendment to the 10H Act*. https://www.dzp.pl/en/alerts/194-amendment-to-the-10h-act.
57 Energy Regulatory Office of Poland. (17 November 2025). *Electricity market: The 2024 report on redispatching mechanisms from the President of URE*. https://www.ure.gov.pl/en/communication/news/477%2CElectricity-market-The-2024-Report-on-Redispatching-Mechanisms-from-the-Presiden.html.
58 Baltic Power. (2025). *About the project. Baltic Power*. https://balticpower.pl/about-the-project/.
59 Reuters. (19 May 2025). *Equinor, Polenergia agree on Polish offshore wind project*. https://www.reuters.com/sustainability/climate-energy/equinor-polenergia-agree-polish-offshore-wind-project-2025-05-19/.
60 Energy Regulatory Office. (2025, December 22). *Offshore: First auction for offshore wind farms concluded. Office of the Energy Regulatory Office*. https://www.ure.gov.pl/en/communication/news/486%2COffshore-First-auction-for-offshore-wind-farms-concluded.html.
61 Elektroenergetyka. (2006). *Biomass in Poland*. Elektroenergetyka, p. 601. https://elektroenergetyka.pl/upload/file/2006/8/elektroenergetyka_nr_06_08_e2.pdf.
62 Mikos, A. (18 September 2025). *Woody biomass in energy: A threat to energy sovereignty, the timber industry, and nature*. Pracownia na rzecz Wszystkich Istot, p. 4. https://pracownia.org.pl/media/14344/download/biomasa-w-energetyce.pdf?v=1.
63 Magazyn Biomasa. (23 October 2025). *In Poland, 10 million tonnes of agricultural biomass are wasted every year*. Magazyn Biomasa. https://magazynbiomasa.pl/w-polsce-kazdego-roku-marnuje-sie-10-milionow-ton-biomasy-agro/.
64 GRC. (9 October 2025). *Biomass potential in Poland's energy transition: GRC analysis*. GRC. https://www.grc.pl/potencjal-biomasy-w-transformacji-energetycznej-w-polsce-analiza-grc/.
65 Gaz System. (30 November 2022). *Baltic Pipe has reached its maximum capacity*. Gaz System. https://www.gaz-system.pl/en/for-media/press-releases/2022/november/31-11-2022-baltic-pipe-has-reached-its-maximum-capacity.html.
66 Gaz System. (27 October 2025). *GAZ SYSTEM publishes joint reports on market demand assessment for incremental capacity. Gaz System*. https://www.gaz-system.pl/en/for-media/press-releases/2025/october/27-10-2025-gaz-system-publishes-joint-reports-on-market-demand-assessment-for-incremental-capacity.html.
67 Gaz System. (31 January 2026). *Information on the LNG Terminal*. Gaz System. https://www.gaz-system.pl/pl/terminal-lng/informacje-o-terminalu-lng.html (in Polish).
68 Gaz System. (25 October 2025). *FSRU program progress status*. Gaz System. https://www.gaz-system.pl/dam/jcr%3Afc388dd7-f3c3-4e21-a51c-dbe9a004f1ce/11_fsru_program_progress_status.pdf.
69 European Parliament and Council of the European Union. (25 October 2017). *Regulation (EU) 2017/1938 concerning measures to safeguard the security of gas supply*. EUR Lex. https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX%3A32017R1938.
70 President of the Energy Regulatory Office. (2025). *National report of the President of URE 2025*. Energy Regulatory Office, p. 122. https://www.ure.gov.pl/download/2/778/NationalReport2025.pdf.
71 Gaz System. (31 January 2026). *National transmission system*. Gaz System. https://www.gaz-system.pl/en/transmission-system/transmission-infrastructure/national-transmission-system.html.
72 Smoleń, M. (2024). *International dimension of the Polish hydrogen strategy* (in M. Smoleń, Ed.). In International Hydrogen Strategies and Energy Transition, p. 106. https://link.springer.com/chapter/10.1007/978-3-031-59515-8_5.
73 Orlen. (17 June 2025). ORLEN Group secures over PLN 1.7 billion in National Recovery Plan funding for its hydrogen projects. ORLEN. https://www.orlen.pl/en/about-the-company/media/press-releases/current/2025/june-2025/ORLEN-Group-secures-over-PLN-17-billion-in-National-Recovery-Plan-funding-for-its-hydrogen-projects-; European Commission. (12 April 2023). *Commission approves EUR 158 million Polish measure to support renewable hydrogen production by PKN ORLEN in Gdańsk*. European Commission. https://ec.europa.eu/commission/presscorner/api/files/document/print/en/ip_23_2143/IP_23_2143_EN.pdf.
74 Industrial Development Agency. (2026). *Hydrogen valleys. Industrial Development Agency*. https://arp.pl/en/what-we-do/energy-transformation/hydrogen-valleys/.

75 Bank Gospodarstwa Krajowego. (7 October 2025). *KPO: Over PLN 2 billion for five companies for hydrogen production installations*. Bank Gospodarstwa Krajowego. https://www.bgk.pl/aktualnosc/kpo-ponad-2-mld-zl-dla-pieciu-spolek-na-instalacje-do-produkcji-zielonego-wodoru-1/.
76 GAZ-SYSTEM. (22 January 2026). *Nordic Baltic Hydrogen Corridor call for interest*. GAZ-SYSTEM. https://www.gaz-system.pl/en/for-media/press-releases/2026/january/22-01-2026-nordic-baltic-hydrogen-corridor-call-for-interest.html.
77 Orlen. (27 January 2026). *Hydrogen from Finland for Polish industry. ORLEN signs key agreements* [Press release]. Grupa ORLEN. https://www.orlen.pl/pl/o-firmie/media/komunikaty-prasowe/biezace/2026/Styczen-2026/wodor-z-finlandii-dla-polskiego-przemyslu-orlen-podpisuje-kluczowe-porozumienia.
78 National Support Centre for Agriculture. (15 November 2023). *Domestic production of agricultural biogas*. KOWR, p. 6. https://go4biogas.ios.edu.pl/wp-content/uploads/2024/01/2_GreenDeal_KOWR_Domestic-production-of-agricultural-biogas_EN.pdf.
79 Łukomska, A. (2024). *Demand-driven biogas plants in Poland*. Journal of Ecological Engineering, p. 238. https://yadda.icm.edu.pl/baztech/element/bwmeta1.element.baztech-d2af793a-72ee-494e-b2e0-b08f1d9b083d/c/21_Lukomska_Demand_JEE_25_2024.pdf.
80 TotalEnergies. (14 May 2025). *TotalEnergies sells 50 percent stake in Polish biogas company to HitecVision*. Reuters. https://www.reuters.com/business/energy/totalenergies-agrees-sell-50-polish-biogas-firm-pgb-norways-hitecvision-2025-05-14/.
81 Piechota, G., & Igliński, B. (2024). *Biomethane in Poland: Untapped potential*. Green Energy Poland. https://www.green-en.pl/en/biomethane-in-poland-untapped-potential/.
82 Rödl & Partner. (2025). *Poland launches its first biomethane plant: A market breakthrough on the horizon*. Rödl & Partner. https://roedl.kz/en-gb/de/insights/Pages/renewable-energy/2025/October/poland-launches-its-first-biomethane-plant-a-market-breakthrough-on-the-horizon.aspx.
83 PERN S.A. (n.d.). *Crude oil transport*. PERN. https://www.pern.pl/en/services/crude-oil/crude-oil-transport/.
84 PERN. (2026). *Fuel transport*. PERN. https://www.pern.pl/en/services/fuels/fuel-transport/.
85 Reuters. https://www.reuters.com/business/energy/polish-link-with-nato-pipeline-system-cost-20-billion-zlotys-2025-10-03/.
86 PKN Orlen S.A. (27 February 2025). Consolidated financial results of ORLEN Group Q4 2024 (Wyniki_4Q24_ENG_FINAL.pdf). PKN ORLEN S.A., https://www.orlen.pl/content/dam/internet/orlen/pl/en/investor-relations/reports-and-publications/financial-results/2024/4q2024/Wyniki_4Q24_ENG_FINAL.pdf.coredownload.pdf.
87 Reuters. (29 August 2025). *Orlen signs 12 month deal with Equinor for supply of 15 percent of the oil it uses*. Reuters. https://www.reuters.com/business/energy/orlen-signs-12-month-deal-with-equinor-supply-15-oil-it-uses-2025-08-29/.
88 Naftoport. (n.d.). *About us*. Naftoport. https://naftoport.pl/en/about-us/ PERN. (8 February 2023). *Naftoport ready for maximum crude oil transshipments*. PERN. https://www.pern.pl/en/2023/02/08/naftoport-gotowy-na-maksymalne-przeladunki-ropy-naftowej/ (in Polish)
89 International Energy Agency. (2022, June 16). *Poland oil security policy*. https://www.iea.org/articles/poland-oil-security-policy.
90 Government Strategic Reserves Agency. (n.d.). *Mandatory stocks*. https://www.gov.pl/web/rars/zapasy-obowiazkowe.
91 Polskie Radio. (21 August 2025). *Poland's president vetoes oil and gas reserves overhaul and plant protection records bill*. Polskie Radio. https://www.polskieradio.pl/395/7784/artykul/3571248%2Cpoland%E2%80%99s-president-vetoes-oil-gas-reserves-overhaul-and-plantprotection-records-bill.
92 European Commission. (14 July 2020). *Mergers: Commission clears Lotos' acquisition by PKN Orlen, subject to conditions*. European Commission. https://ec.europa.eu/commission/presscorner/detail/SK/ip_20_1346.
93 President of the Office of Competition and Consumer Protection. (7 July 2022). *Decision DKK 1.421.4.2022.MAB.ES UNIMOT Investments Lotos Terminale*. UOKiK, https://tinyurl.com/2n98yx4n (in Polish)
94 Naftoport Sp. z o.o. (2026). *Technical potential*. Naftoport Sp. z o.o. https://naftoport.pl/en/technical-potential/.
95 Port of Gdańsk Authority. (29 January 2026). *Cargo handling at the Port of Gdańsk: liquid fuels in the lead while containers hit a record high*. Port of Gdańsk Authority. https://www.portgdansk.pl/en/events/cargo-handling-at-the-port-of-gdansk-liquid-fuels-in-the-lead-while-containers-hit-a-record-high/.
96 Polish Organisation of Oil Industry and Trade. (September 2023). *Consumption of liquid fuels after the first half of 2023*. POPiHN. https://popihn.pl/wp-content/uploads/2023/09/Konsumpcja-paliw-plynnych-po-I-polroczu-2023.pdf.
97 FuelsEurope. (2023). *Statistical report 2023*. FuelsEurope. https://fuelseurope.eu/uploads/files/modules/publications/1689693562_DEF_2023_FE_2023SR_LR.pdf.
98 Energy Regulatory Office of Poland. (12 February 2025). *The President of URE publishes the report Heating energy market in numbers 2023*. URE. https://www.ure.gov.pl/en/communication/news/416%2CThe-President-of-URE-publishes-the-report-Heating-energy-market-in-numbersquot.html.
99 Energy Regulatory Office of Poland. (31 January 2025). *2023 characteristics of the heating market*. URE. https://www.ure.gov.pl/pl/cieplo/charakterystyka-rynku/12447%2C2023.html.
100 PGE. (2022). *Non financial report of PGE Group 2021*. PGE. https://www.gkpge.pl/en/content/download/1c08e1c7eeede3c0d242a0341dc2f74c/file/sprawozdanieniefinansowe_gkpge2021_eng.pdf.
101 Energy Regulatory Office of Poland. (4 November 2025). *Heating energy in numbers 2024*. Energy Regulatory Office of Poland. https://www.ure.gov.pl/download/9/15797/Raport-Energetykacieplna2024.pdf.
102 Energy Regulatory Office of Poland. (11 January 2023). *District heating sector in numbers latest URE report*. URE. https://www.ure.gov.pl/en/communication/news/339%2CDistrict-heating-sector-in-numbers-latest-URE-report.html.
103 Government Centre for Security. (2018). *National programme for the protection of critical infrastructure: Consolidated text*. https://archiwum.rcb.gov.pl/wp-content/uploads/Dokument-G%C5%82%C3%B3wny-1.pdf, pp. 13–14.
104 European Union Agency for Cybersecurity. (19 September 2024). *ENISA Threat Landscape 2024*. ENISA. https://www.enisa.europa.eu/sites/default/files/2024-11/ENISA%20Threat%20Landscape%202024_0.pdf, p. 83.
105 Gov.pl. (2026, January 30). Cyberattack on the energy sector infrastructure in Poland. Detailed CERT Polska report published. https://www.gov.pl/web/cyfryzacja/cyberatak-na-infrastrukture-sektora-energii-w-polsce-opublikowano-szczegolowy-raport-cert-polska (in Polish).
106 European Commission. (n.d.). *NIS2 Directive: securing network and information systems. Shaping Europe's digital future*. https://digital-strategy.ec.europa.eu/en/policies/nis2-directive.
107 Sejm of the Republic of Poland. (2018, July 5). *Act on the National Cybersecurity System*. Journal of Laws 2018, item 1560. https://isap.sejm.gov.pl/isap.nsf/DocDetails.xsp?id=WDU20180001560
108 Reuters. (2025, December 3). *Polish army to help power grid protect key infrastructure*. Reuters. https://www.reuters.com/business/aerospace-defense/polish-army-help-power-grid-protect-key-infrastructure-2025-12-03/.
109 Stouffer, K., Pease, M., Tang, C., Zimmerman, T., Pillitteri, V., & Lightman, S. (2023). *Guide to Operational Technology (OT) Security* (NIST Special Publication 800-82 Revision 3). National Institute of Standards and Technology. https://doi.org/10.6028/NIST.SP.800-82r3.
110 See e.g. Reuters. (21 February 2025). *Sweden investigates suspected sabotage of Baltic Sea telecoms cable*. Reuters. https://www.reuters.com/world/europe/sweden-investigates-possible-breach-undersea-cable-baltic-sea-prime-minister-2025-02-21/.
111 Reuters. (26 January 2026). *Finland teams up with EU, Baltic Sea states to enhance undersea infrastructure monitoring*. Reuters. https://www.reuters.com/world/finland-teams-up-with-eu-baltic-sea-states-enhance-undersea-infrastructure-2026-01-26/
112 International Energy Agency. (25 February 2025). Building the future transmission grid. IEA. https://iea.blob.core.windows.net/assets/744ff0bb-905a-4f9f-83e3-2d04ce99e09c/BuildingtheFutureTransmissionGrid.pdf, p. 8.

113 European Commission. (November 2023). *EU Action Plan for Grids* (Factsheet). Publications Office of the European Union. https://ec.europa.eu/commission/presscorner/api/files/attachment/876888/Factsheet_EU%20Action%20Plan%20for%20Grids.pdf.
114 Rządowe Centrum Bezpieczeństwa (no date) 'Narodowy Program Ochrony Infrastruktury Krytycznej' https://www.gov.pl/web/rcb/narodowy-program-ochrony-infrastruktury-krytycznej (accessed 20.01.2026)
115 Ibid. Rządowe Centrum Bezpieczeństwa (no date) 'Narodowy Program Ochrony Infrastruktury Krytycznej'
116 Ibid. Rządowe Centrum Bezpieczeństwa (no date) 'Narodowy Program Ochrony Infrastruktury Krytycznej'
117 Nowak, Z., & Maj, M. (2024). *The Baltic Sea as a space of strategic energy activity*. In Z. Nowak (Ed.), *Will the sea help? The Baltic Sea and Poland's energy security* (pp. 30 to 43, p. 33). Opportunity Institute for Foreign Affairs (in Polish).
118 Orlen (n.d.). *Orlen PetroBaltic*. https://www.lotos.pl/163/poznaj_lotos/nasze_spolki/orlen_petrobaltic.
119 op. cit. Ministerstwo Klimatu i Środowiska (2021) Polityka Energetyczna Polski 2040, Warszawa, 2021, p. 7
120 Miętkiewicz, R. (2023). *Maritime energy infrastructure facilities: An attempt to identify vulnerability to unmanned platform attacks*. Alcumena, 3(15), 206 to 225, p. 207. https://share.google/uhJaidLGAlQxoviXm (in Polish).
121 Miętkiewicz R. (2025) "Zagrożenia hybrydowe na Morzu Bałtyckim. Wyniki analizy możliwości przeciwdziałania', Terroryzm – studia, analizy, prewencja, wydanie specjalne, p.37. https://ejournals.eu/czasopismo/terroryzm/artykul/zagrozenia-hybrydowe-na-morzu-baltyckim-wyniki-analizy-mozliwosci-przeciwdzialania.
122 ibid. Miętkiewicz R. (2025), p. 56.
123 Hybrid threats can be defined as "an hostile actor deliberately combines and synchronises action, specifically targeting the systemic vulnerabilities in democratic societies in ways that have roots in tactics with which authoritarian states, revisionist powers, rogue states and non-state networks that are seeking to undermine democratic state system have been trying to maintain their power, exert control and weaken opponents". Giannopoulos G, Smith H., Theocharidou, M. (2020) *The Landscape of Hybrid Threats. A Conceptual Model.* Public Version, European Commission, Ispra, 2020, PUBSY No. 123305, p. 11.
124 Wojciechowski, P. (2025). *"Controlled chaos" the Russian way. Intelligence officer: "Russia is already carrying out military tasks in the Baltic Sea"*. Gazeta Wyborcza. https://trojmiasto.wyborcza.pl/trojmiasto/7,35612,32377160,rosja-werbuje-agentow-wsrod-marynarzy-floty-handlowej-w-naszych.html.
125 Ibid. Wojciechowski P. (2025)
126 Jakóbik, W. (22 September 2025). *Russia tests Poland with provocation involving the Petrobaltic oil platform*. https://wjakobik.com/2025/09/22/rosja-mysliwce-platforma-petrobaltic-polska-przepisy-ud245-reakcja-nato-turcja-zestrzelenie/ (in Polish).
127 Border Guard of Poland. *Russian cutter over a pipeline in the Baltic Sea immediate reaction of the Border Guard*. https://www.strazgraniczna.pl/pl/aktualnosci/14838,Rosyjski-kuter-nad-rurociagiem-na-Baltyku-natychmiastowa-reakcja-Strazy-Graniczn.html.
128 van Soest H., Black J., Fine H. & Retter L. (2025) Evolving threat to critical undersea infrastructure: implications for European security and resilience, RAND Corporation, p.18. https://www.rand.org/pubs/perspectives/PEA3800-1.html.
129 ibid. van Soest H. et al. (2025)
130 Ustawa z dnia o ochronie infrastruktury krytycznej – Semi-structured interview with interlocutor C.
131 NATO. (2024). *NATO officially launches new Maritime Centre for Security of Critical Undersea Infrastructure*. https://mc.nato.int/media-centre/news/2024/nato-officially-launches-new-nmcscui.
132 Information acquired at a conference in the Polish senate on 13th November 2025 about the Baltic Sea Security.
133 Semi-structured interview with interlocutor H.
134 Bankier.pl. (2025, December 23). *ORLEN and WB Group sign cooperation agreement to strengthen protection of critical infrastructure* [in English]. Bankier.pl. https://www.bankier.pl/wiadomosc/Orlen-i-WB-podpisaly-umowe-o-wspolpracy-w-celu-wzmacniania-ochrony-infrastruktury-krytycznej-9060249.html (in Polish).
135 Semi-structured interview with interlocutors E and F.
136 Information acquired during the hearing of the National Defence Committee in the Polish Sejm, 6.11.2025
137 Semi- structured interview with interlocutor H.
138 Semi-structured written interview with interlocutor I.
139 Semi-structured interview with interlocutor H.
140 The same observation was shared by interlocutors H and M.
141 Semi-structured written interview with interlocutor I.
142 Semi-structured interview with interlocutor L.
143 Semi-structured interview with interlocutor K.
144 Semi-structured interview with interlocutors E and F.
145 Information acquired at a conference in the Polish Senate on 13 November 2025 about the Baltic Sea Security.
146 Energy Regulatory Office. (4 January 2026). *Electricity market: President of URE approves distribution tariffs for 2025*. Energy Regulatory Office. https://www.ure.gov.pl/en/communication/news/408%2CElectricity-market-President-of-URE-approves-distribution-tariffs-for-2025.pdf.
147 Stoen Operator. (6 March 2024). *Stoen Operator allocates record investment for the expansion and development of the capital's energy network and infrastructure*. Stoen Operator. https://www.stoen.pl/pl/biuro-prasowe/stoen-operator-przeznaczy-rekordowe-naklady-na-rozbudowe-oraz-rozwoj-sieci-i-infrastruktury-energetycznej-stolicy.
148 Sejm of the Republic of Poland. (4 January 2018). *Act of 8 December 2017 on the capacity market*. ISAP. https://isap.sejm.gov.pl/isap.nsf/download.xsp/WDU20180000009/T/D20180009L.pdf.
149 European Parliament and Council of the European Union. (5 June 2019). *Directive (EU) 2019/944 on common rules for the internal market for electricity*. Official Journal of the European Union. https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX%3A32019L0944.
150 European Commission. (7 February 2018). *State aid SA.46100 (2017/N) Poland: Planned Polish capacity mechanism*. European Commission. https://ec.europa.eu/competition/state_aid/cases/272253/272253_1977790_162_2.pdf.
151 Agency for the Cooperation of Energy Regulators. (2024). *Progress of EU electricity wholesale market integration 2024*. ACER. https://www.acer.europa.eu/monitoring/electricity_market_integration_2024.
152 Government Centre for Security. (2024). *Critical infrastructure systems*. Gov.pl. https://www.gov.pl/web/rcb-en/critical-infrastructure-systems.
153 Sejm of the Republic of Poland. (26 April 2007). *Act of 26 April 2007 on crisis management*. ISAP. https://isap.sejm.gov.pl/isap.nsf/download.xsp/WDU20070890590/U/D20070590Lj.pdf.
154 European Parliament and Council of the European Union. (14 December 2022). *Directive (EU) 2022/2557 on the resilience of critical entities*. Official Journal of the European Union. https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX%3A32022L2557.