REPORT 2026

Poland's Strategy for the Development of the Onshore Wind Industry. Key findings.

PWEA

WIND INDUSTRY HUB

CEE Energy Group

POLAND’S STRATEGY FOR THE DEVELOPMENT OF THE ONSHORE WIND INDUSTRY. KEY FINDINGS.

Key findings

This document is a comprehensive analytical study on the development of the onshore wind energy industry in Poland, prepared by a team of experts from the Wind Industry Hub, the Polish Wind Energy Association and the CEE Energy Group.

The document is based on a wide range of market, technological and regulatory analyses, as well as consultations with market participants covering both the demand and supply sides of the value chain. The study is cross-cutting in nature and consists of several complementary sections. The first part outlines the significance of onshore wind energy in the energy transition and its impact on the competitiveness of the economy and energy costs. Subsequent sections analyse the European context, including the European Union's industrial policy directions and the wind sector within the context of the global supply chain.

The remainder of the document presents a detailed analysis of the country's industrial potential, covering individual elements of the value chain, identifying barriers to development and areas of potential specialisation. A key element of the study is the strategic recommendations and a set of implementation measures aimed at increasing the domestic industry's share in the sector's development and maximising economic benefits in Poland.

A summary version of the document, presenting the most important conclusions and recommendations, is publicly available. The full version of the study, comprising nearly 200 pages of detailed analyses, data and recommendations, serves as an elaboration and justification of the presented theses and a basis for formulating public policies and investment decisions.

The overarching aim of the document is to provide public decision-makers and other stakeholders with coherent, data-driven material to support the design and implementation of a national industrial strategy for the onshore wind energy sector, as one of the key pillars of economic transformation.

The energy transition is the path to a resilient, innovative economy

An effective industrial policy does not begin with subsidies, but with the market. It is the existence of stable, predictable demand for specific technologies that determines whether companies are prepared to invest in production capacity, develop expertise and build competitive advantages. **In this sense, the state's key tool is not merely to support supply, but to consciously shape so-called lead markets – segments of the economy where the scale and continuity of investment and activity create space for the development of domestic industry.** According to various estimates, Poland spends over 100 billion zlotys annually on imports of fossil fuels. This is equivalent to 15–25 GW of installed capacity in renewable energy sources. Although it is not possible to replace these fuels with RES overnight, this gives an idea of the scale of capital flowing out of our economy, creating neither new jobs nor any impetus for the development of local industry. The transition to RES can not only provide a stimulus for development, but also have a positive impact on the trade balance and macroeconomic stability.

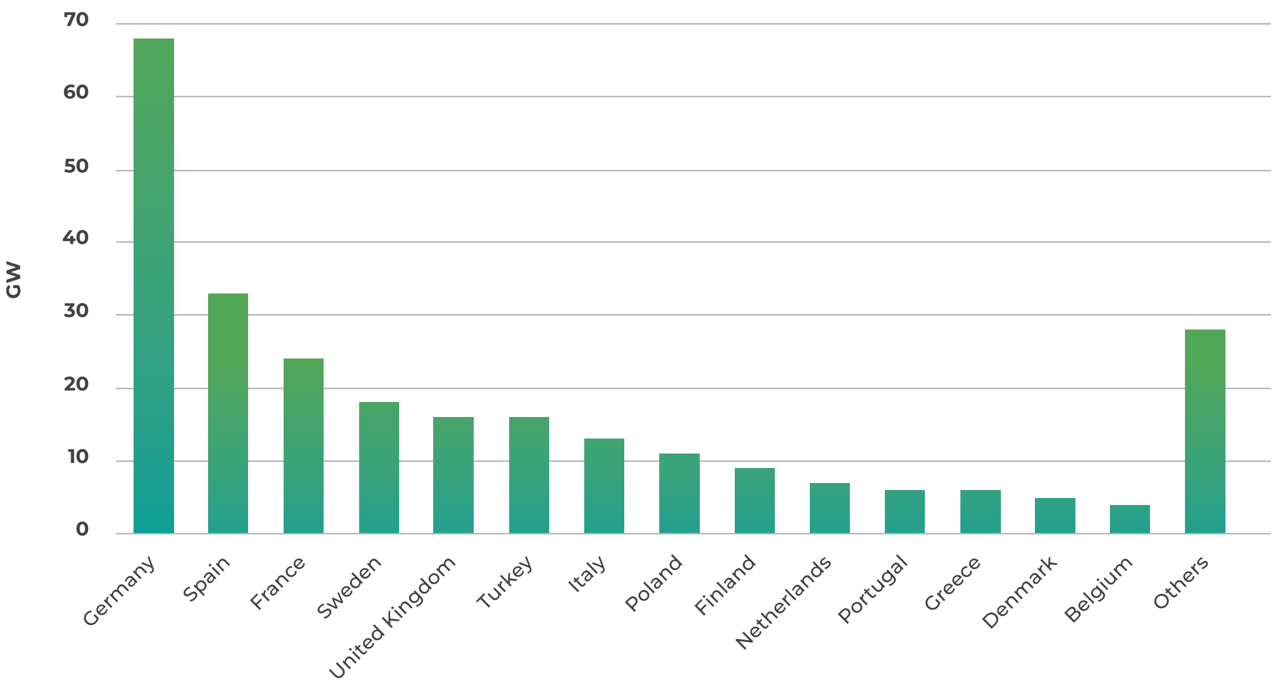
Figure 1. EU policy on supporting the development of RES – an overview

2001	2009	2018	2023
Directive 2001/77/EC	**Directive 2009/28/EC**	**Directive 2018/2002/EU**	**Directive EU/2023/2413 (RED III)**
☑ 12% RES by 2010 ☑ 22.1% RES in electricity	☑ 20% RES by 2020 ☑ 10% RES in transport ☑ Binding targets	☑ Directive 2018/2002/EU ☑ Min. 32% RES by 2030	☑ **At least 42.5% RES** by 2030 **Wind Power Package** ☑ Onshore & offshore support ☑ Accelerating investment
The start of the common RES policy	**A strong investment boost**	**Revision of the target**	

Source: own analysis

Economic activity focused on the energy transition is currently one of the leading segments of the European market. It generates a sustained and growing demand for modern energy technologies, which simultaneously deliver wide-ranging economic and social benefits: lower energy costs, improved energy security, reduced emissions, and the development of innovation and local supply chains.

Figure 2. Installed capacity of wind farms in individual European countries (as at the end of 2025)



Source: WindEurope: Wind energy in Europe: 2025 Statistics and the outlook for 2026–2030

A properly designed transition can therefore serve a threefold purpose – as a tool for energy security policy, social policy (through improvements to the climate, quality of life and new jobs) and as a catalyst for reindustrialisation.

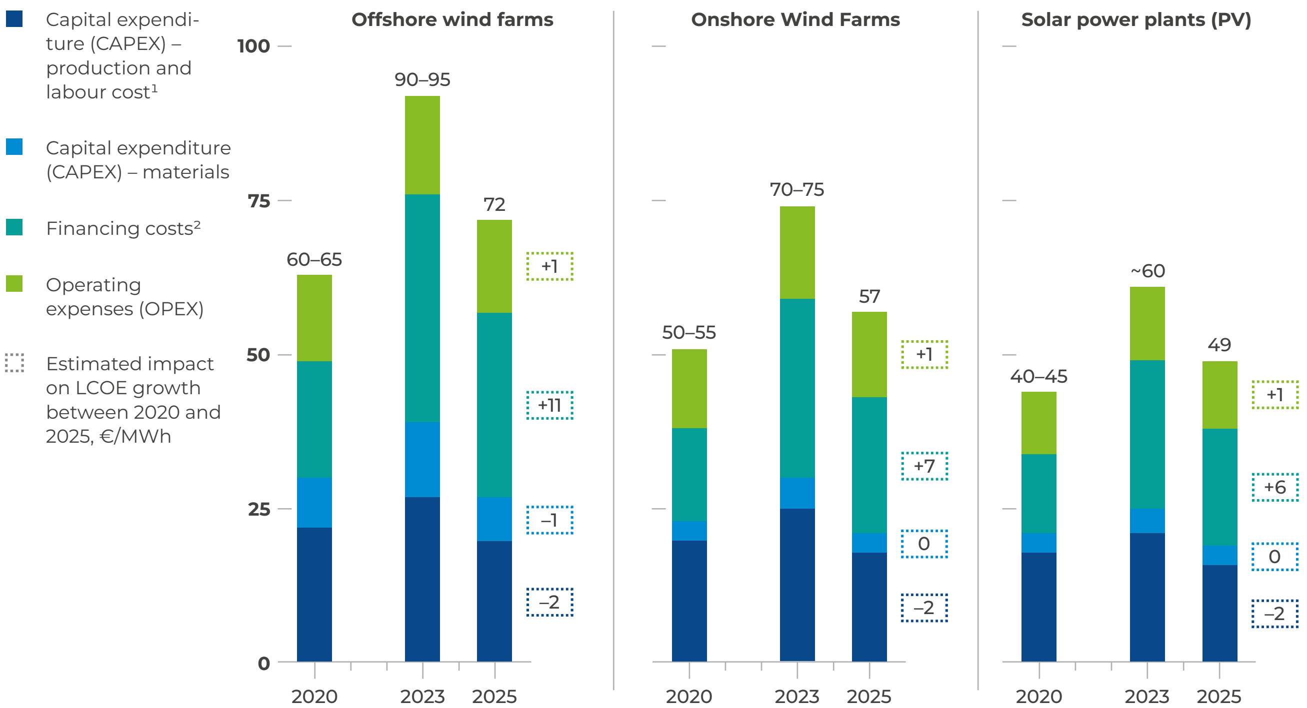
In this context, **the state's ability to link the development of the renewable energy market with the development of domestic industry is of key importance.** This means further shifting the perception of the energy transition from a cost to a model in which it becomes a strategic mechanism for building added value in the economy – through the development of Local content, strengthening technological capabilities and creating long-term and attractive jobs.

Poland is gradually moving in this direction, developing an approach based on increasing the domestic industry's share in the value chain of strategic energy investments. Programmes and initiatives focused on local content represent an attempt to consciously link the development of the renewable and zero-emission energy market with the development of domestic manufacturing and service capabilities. Their effectiveness, however, will depend on the scale and predictability of the market, as well as on the ability to translate general objectives into specific market and investment mechanisms. Local content is not protectionism. It is about broadening the industrial and service base in Europe so that we can build innovative, resilient supply chains. In this broader sense – European content – it is an expression of the Polish economy's participation in Europe's development and future, and a way to implement 'Made in Europe' within the borders of the Republic of Poland as well.

Poland needs energy from onshore wind farms

Onshore Wind Energy is one of the most mature and competitive energy technologies currently available on the market. Over the last fifteen years, the cost of generating energy from onshore wind farms has fallen by over 70%. In the Polish context, it is the cheapest source of electricity. Depending on the scenario, over the next five years, starting from 2026, up to 8 GW of coal-fired generation capacity could be phased out of the system, with a further 4 GW in the first half of the 2030s. As a country, we will likely maintain a strategic reserve in fossil fuel-based sources, but realistically their share will decline, regardless of whether decarbonisation targets are tightened or not.

Figure 3. Levelised cost of energy (LCOE) for renewable energy sources in 2020–2025 (€/MWh)

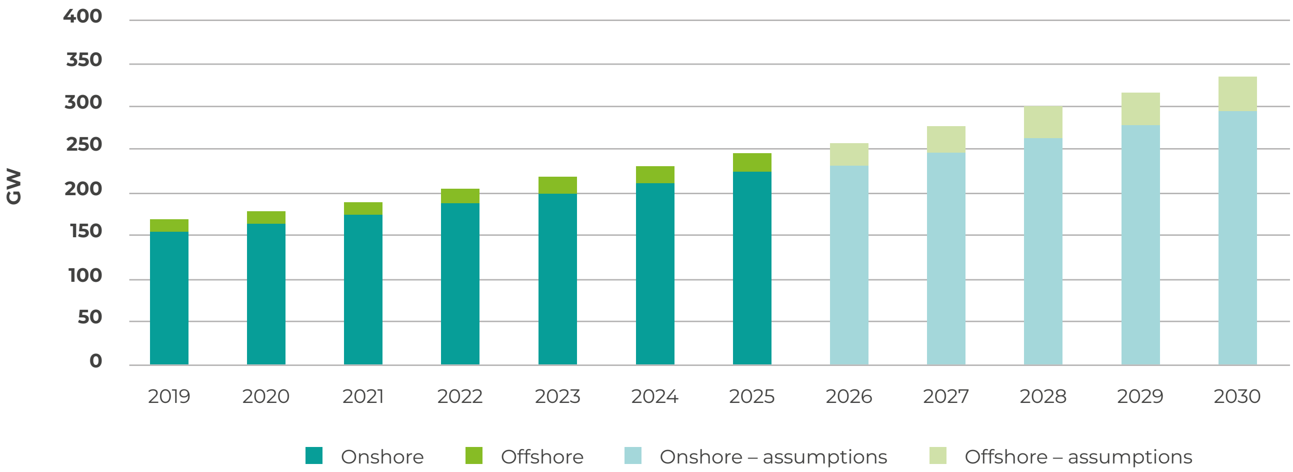


Source: McKinsey & Company, Levelised cost of energy (LCOE) for renewable energy sources, 2024. Based on data from: IEA, IRENA, Wood Mackenzie

¹ Includes land costs for onshore wind and solar power plants and development expenditure for all technologies.
² Includes the nominal weighted average cost of capital (4.5% in 2020, 9.0% in 2023 and 6.0% in 2025), as well as an internal rate of return threshold of 150 basis points.

In the context of our European alliance, **wind technology is a fundamental element of the Union's decarbonisation strategy, playing a key role in the pursuit of climate neutrality and energy security.** In 2025, 90% of the wind power capacity built in Europe was onshore, and it is expected that around 75% of new wind installations in Europe between 2026 and 2030 will be built using this technology[1]. Globally, 2025 was a record year in terms of the global increase in wind power capacity. As part of this historic growth, the wind energy sector added 164.6 GW of new capacity, of which 155.3 GW came from onshore installations[2]. This momentum is driven by the synergistic interaction of several factors: continuous technological innovation, the growing competitiveness of solutions, and the strategic drive by nations to reduce their dependence on fossil fuel imports. The economic aspect is also of fundamental importance – in 2024, as much as 91% of newly commissioned industrial-scale RES projects were more cost-effective than their fossil fuel-based counterparts[3].

Figure 4. Forecast for the development of installed wind power capacity in the European Union by 2030



Source: WindEurope, Wind energy in Europe: 2023 Statistics and the outlook for 2024–2030

Creating demand for the construction of onshore wind farms will increase Local content

In Poland, increasing the installed capacity of onshore wind farms to around 16–18 GW by 2030 will involve launching investments worth tens of billions of zlotys. If this process is properly designed and coordinated, it could become one of the most significant drivers of reindustrialisation in the Polish economy. Crucially, it can be launched almost immediately. In the longer term, i**n a scenario assuming accelerated development of onshore wind energy, the total market value for the period 2026–2040 exceeds PLN 200 billion, of which approximately PLN 150 billion is accounted for by capital expenditure and nearly PLN 60 billion by operating costs. Based on the assumptions regarding the cost structure and the level of domestic companies' market share, this means that approximately PLN 110 billion could be absorbed by the domestic supply chain.** These figures relate solely to the Polish market – the potential for sales products and services on the EU market are several times higher[4].

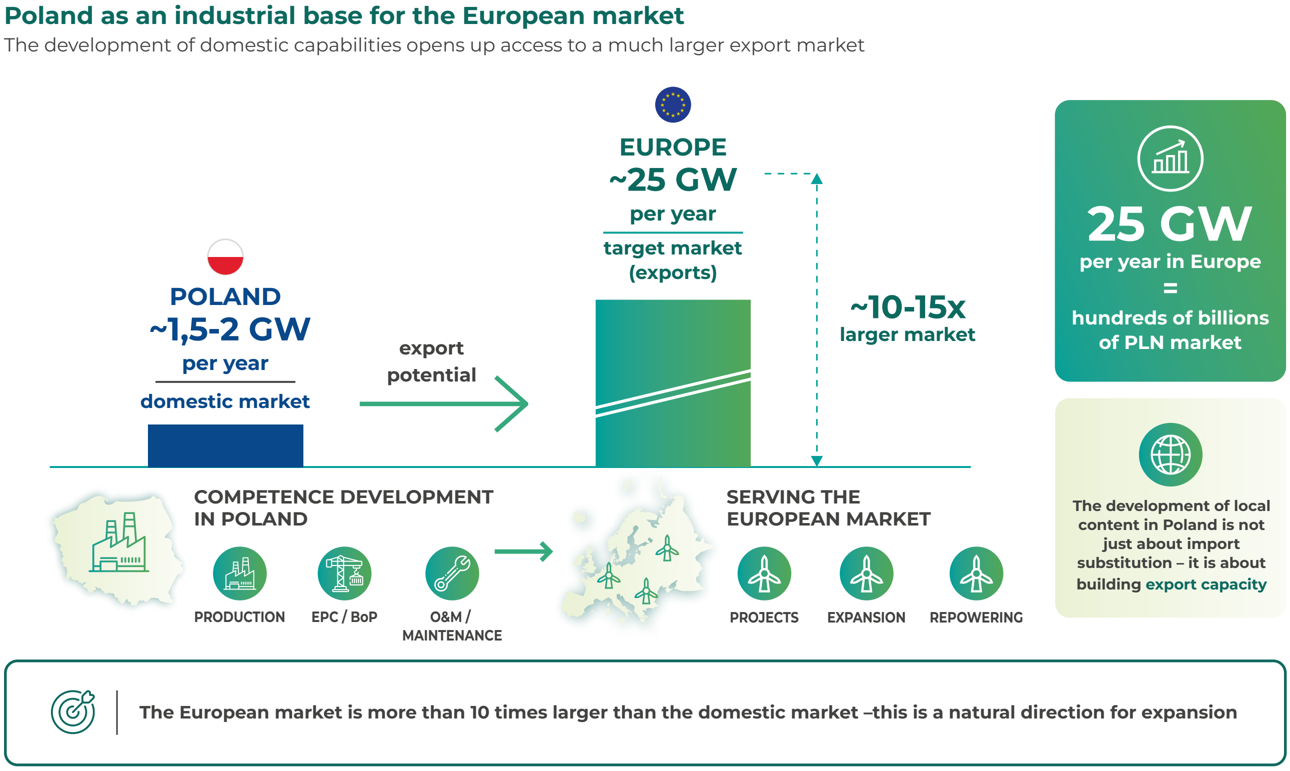
1 *Wind Europe 2025 Trends and Statistics*

2 *GWEC | GLOBAL WIND REPORT 2026*

3 *IRENA Renewable Power Generation Costs in 2024*

4 *According to estimates, the scale of investment in Europe will be at least 10 times greater*

Figure 5. Poland as an industrial base for the European market



Source: own analysis

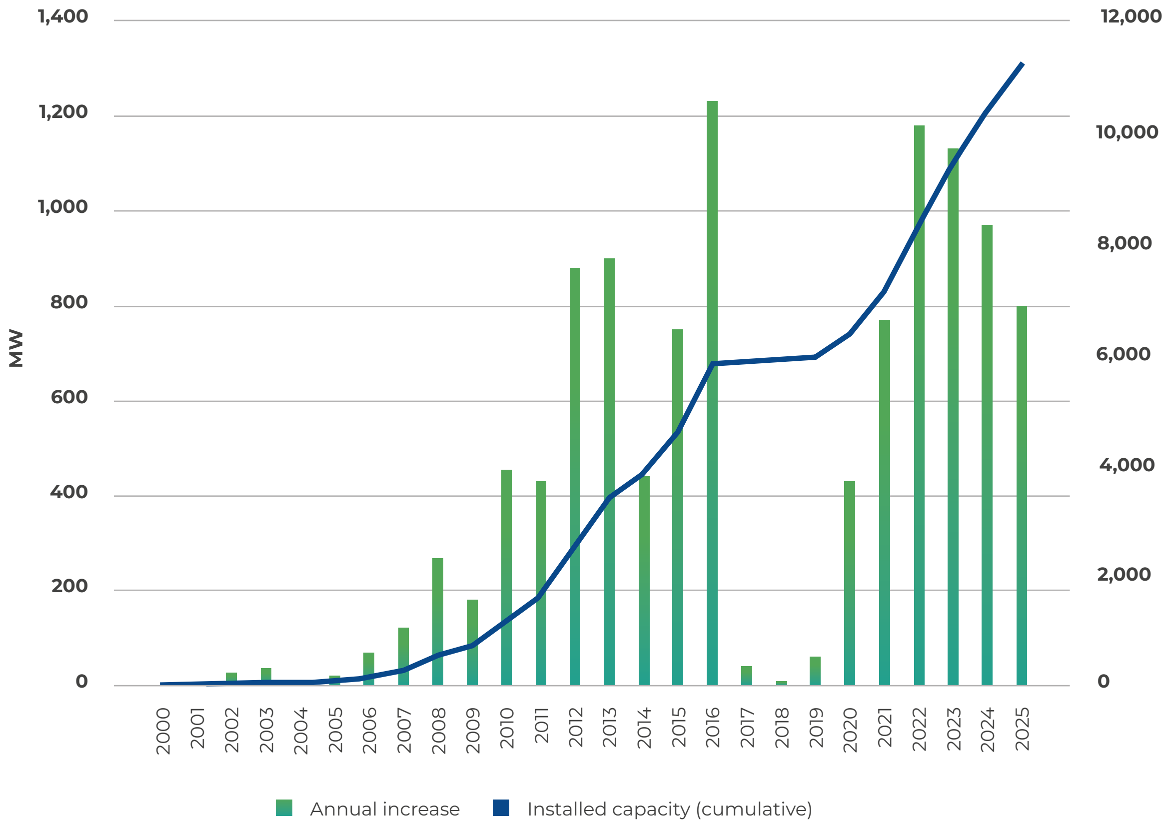
Figure 6. Stages of wind energy development in Poland

2005-2015	2012	2016	2017-2020	2023	2024-2025
☑ **Dynamic growth 5.1 GW of capacity** ☑ 6–7% of domestic production energy	☑ **The green certificate crisis** ☑ Oversupply and falling prices	☑ **Act 10H and tax changes** ☑ Stagnation of the new market	☑ **Slowdown in development** ☑ Completion of projects started before 2016	☑ **Liberalisation of the 10H rule** ☑ Distance 700 m	☑ **11 GW** ☑ Disputes over further changes to the rules ☑ Further restrictions

Source: own analysis

For Poland, the development of the onshore wind energy sector is of particular importance. In the past, however, the development of onshore wind energy was hampered by regulatory instability, in particular by the introduction of the 10H rule, which stifled new investment for many years. The partially implemented and further planned liberalisation of planning regulations is reopening the market, but regulatory change in this area alone is not sufficient. Further regulatory and administrative barriers are effectively hampering the development of wind technology in Poland. **Measures are therefore needed to speed up the permit-granting process so that it meets the standards required by EU regulations** (the process of obtaining the necessary consents and permits should not take more than two years, yet in Poland it still takes five to seven years, and often more than ten years). This is particularly evident at the stage of obtaining an environmental decision.

Figure 7. Installed capacity in onshore wind farms in Poland between 2000 and 2025



Source: own analysis

The authors of this strategy recognise that the development of wind energy should be treated not merely as an infrastructure project, but as a comprehensive industrial programme aimed at building sustainable manufacturing, technological and service capabilities in Poland.

Poland has significant experience within the wind energy supply chain, but the potential is much greater

Wind energy technology originated in Europe, but currently, from a global perspective, the market for wind energy components is highly concentrated geographically. Over the last decade, there has been a clear dominance of manufacturers from Asia, particularly China, who control the vast majority of global production of nacelles, generators, gearboxes and components containing rare earth metals.

As a result, the European wind energy sector is increasingly feeling the pressure of costs and risks related to security of supply. In response, the European Union has begun implementing a new industrial policy for net-zero technologies, which includes initiatives such as the Net Zero Industry Act, reform of state aid rules, and measures to streamline administrative processes for energy investments. **Growing global competition and the dominance of Asian manufacturers of wind energy components necessitate an active state approach to shaping national and European supply chains.** Reducing dependence on external fuel and energy supplies (improving energy security) must not, however, lead to dependence on supplies of equipment and components necessary for generating energy from RES. From 2026, the European Union is taking further steps to support demand for local industry – through the Industrial Accelerator Act and the creation of space for new production capacity – in line with the 'buy European' rule.

Figure 8. Support for the decarbonisation of industrial sectors

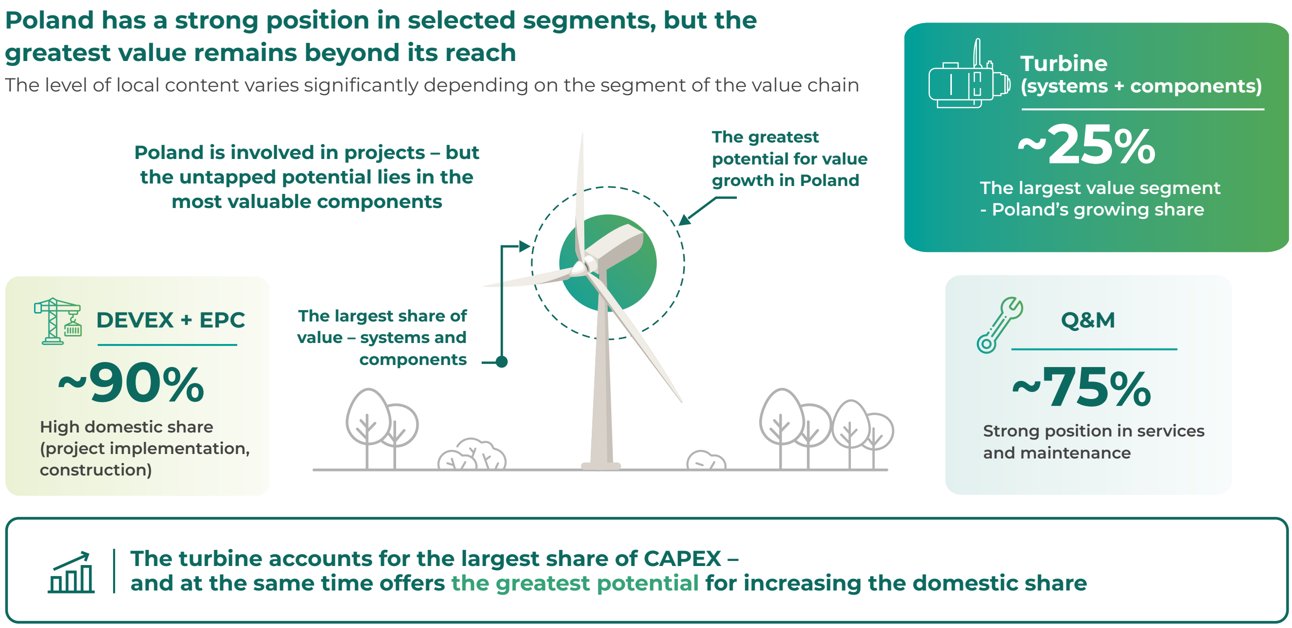
Support for the decarbonisation of industrial sectors	
Stimulating and accelerating investment in Europe	Supporting industrial competitiveness and productivity
Streamlining procedures and facilitating investment	Creating markets for decarbonised products

Source: own analysis

Polish industry offers enormous potential for Europe in terms of new production capacity for the reindustrialisation process. It is Poland, with its significant industrial potential that can be harnessed for the European reindustrialisation process, that should play a key role in this process and build a strong position in the European wind energy supply chain, thereby supporting the "Made in Europe" plan. This applies to both the production of components and services related to project implementation, logistics and the operation of wind farms.

It is estimated that, with appropriate industrial policy support, the share of domestic companies across the entire value chain of onshore wind farm investments could reach around 55–60% in the coming years, with the potential to grow to around 75% over the next decade.

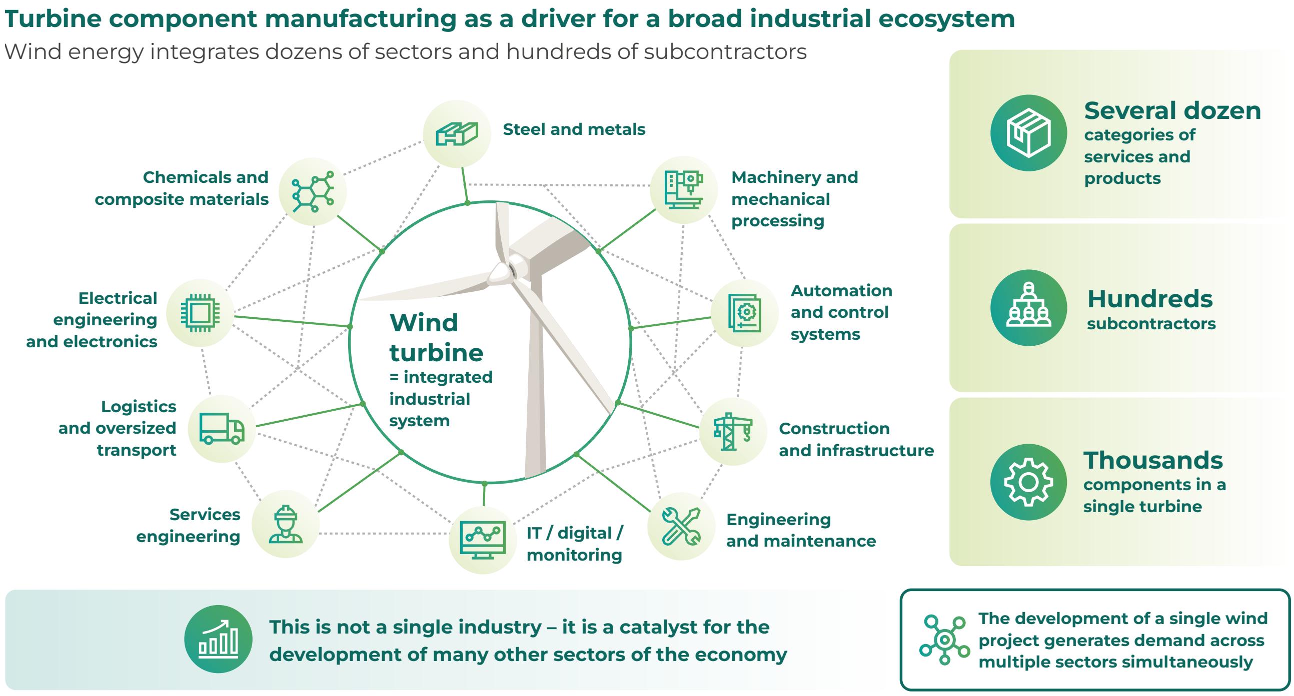
Figure 9. Share of Local content in individual segments of the value chain



Source: own analysis

Onshore Wind Energy generates demand for products and services that form the basis of every industry – from construction, transmission and energy management systems, and the design and construction of technologically complex power sources, right through to their long-term maintenance and operation. A single turbine comprises over 30 secondary components, which translates into hundreds of sub-suppliers of these components across the entire supply chain. Manufacturers of wind turbine components form an extensive and diverse industrial ecosystem that naturally integrates many key sectors of the economy. Structural elements such as the nacelle base, main shaft and wind tower rely on the expertise of the steel, foundry and heavy machining industries. These are sectors of strategic importance for defence as well. In 2025 and 2026, Poland became a model example of how a facility of strategic importance to the defence industry – the steelworks in Częstochowa – can be utilised on market terms for the production of wind towers in Gdańsk. Precision components draw on the advanced capabilities of the bearing sector and the production of high-precision components. Key functional systems, such as gearboxes, generators and power collection systems, combine the expertise of the mechanical and electrical engineering industries, whilst control, monitoring and auxiliary systems provide a direct field of application for the IT, automation and industrial electronics sectors. **The development of turbine component manufacturing is not an isolated activity, but acts as a powerful driver of growth for many industries, enabling the scaling of expertise, the diffusion of technology and the building of competitive advantages in other sectors of the economy. Poland has an established position in several key segments of the Onshore Wind Energy supply chain.**

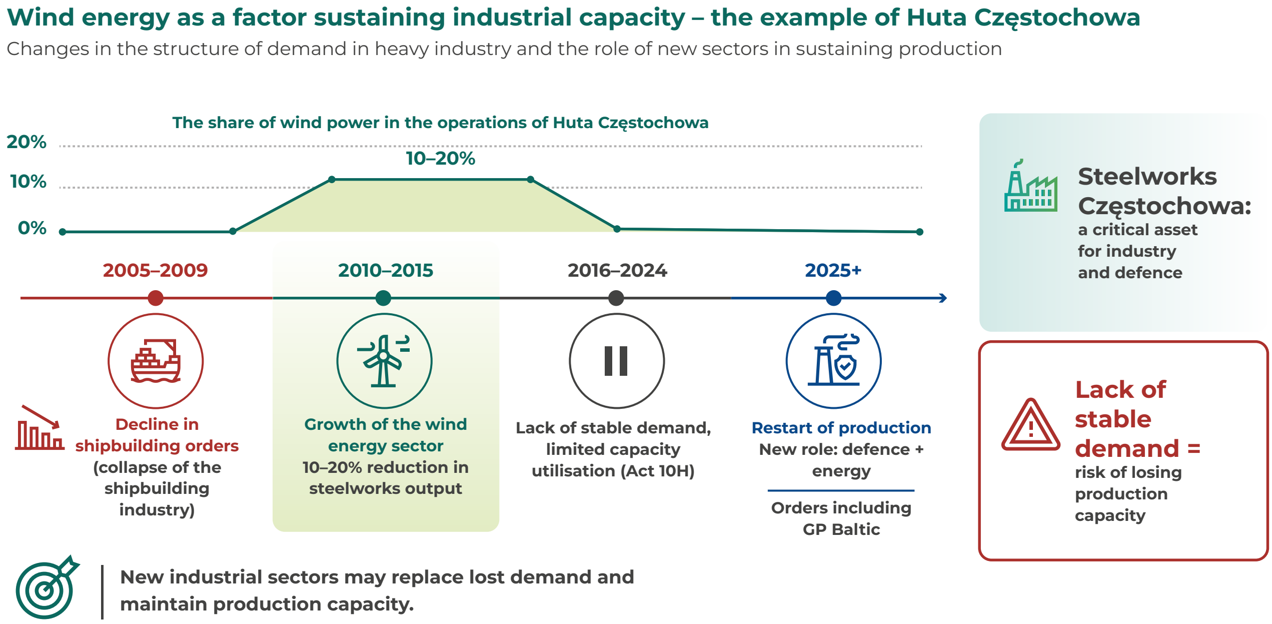
Figure 10. Turbine component manufacturing as a driver for a broad industrial ecosystem



Source: own analysis

The first of these is the steel construction sector and the production of large-scale infrastructure components. Poland has a well-developed steel industry and experience in the production of large-scale structures, which constitutes a significant advantage in the production of wind towers, foundation elements and other structural components. **It is already estimated that the share of domestic companies in the production of wind turbine towers may reach 80%.** At the same time, Poland is currently the European leader in steel imports – over 11 million tonnes annually, of which the flat products segment alone accounts for a 5 million-tonne trade deficit – meaning that a significant quantity of raw material for this key construction segment is imported. Stable demand from the onshore (and offshore) wind farm industry could provide the impetus to rebuild production capacity in Poland and reduce the trade imbalance in this area.

Figure 11. Wind energy as a factor sustaining industrial capacity – the example of Huta Częstochowa

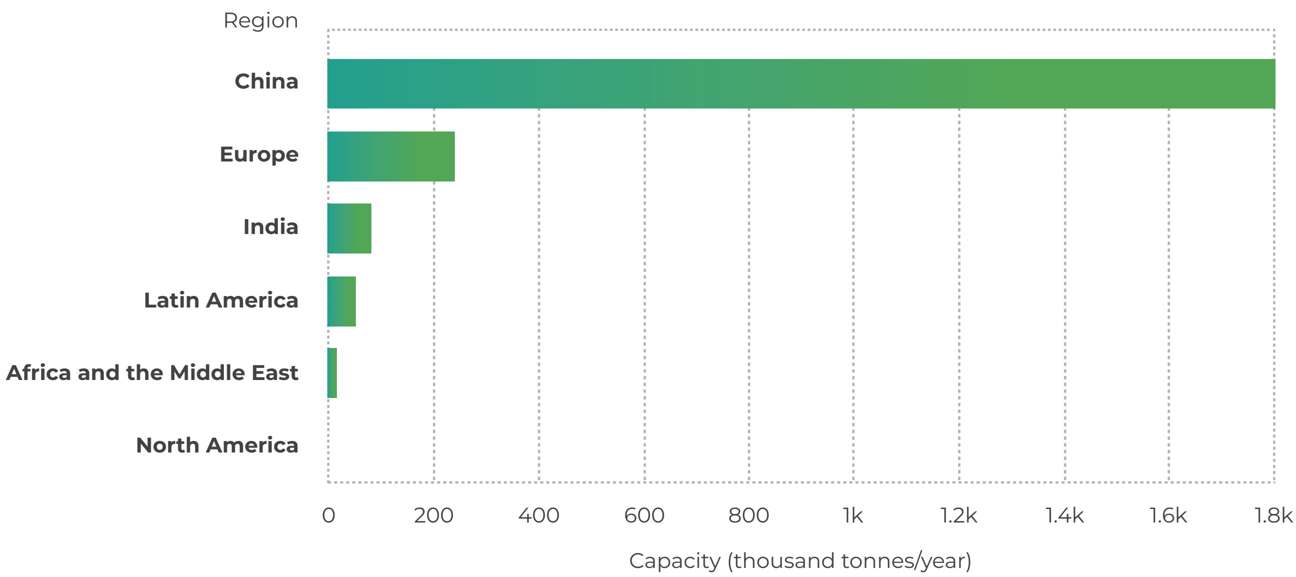


Source: own analysis

The global market for ductile iron castings for the wind sector is highly concentrated, with around 60 suppliers worldwide. However, the situation differs significantly between the onshore and offshore segments.

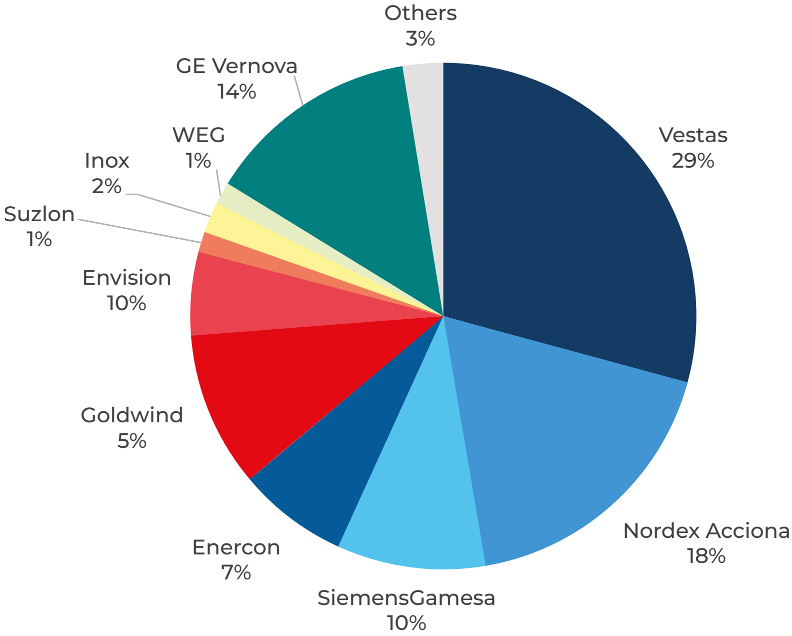
The total annual global production capacity for wind energy castings stands at **2.7 million tonnes**. Of this, the onshore market has a production capacity of over **2.1 million tonnes per year**.

Figure 12. Analysis of the regional concentration of global casting production capacity for the wind sector (onshore)



Source: own analysis based on GWEC

Figure 13. Manufacturers' shares of the global onshore wind turbine market in 2024 (excluding China)



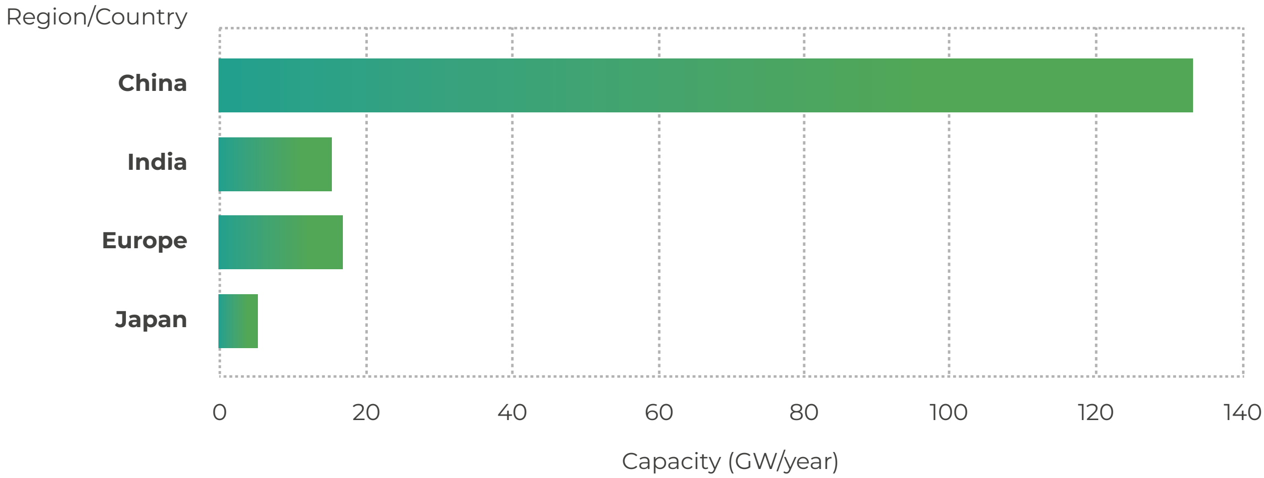
Source: JRC based on GWEC and Rystad 2025

The second segment is general contracting for energy projects. Polish construction and infrastructure companies possess significant expertise in the implementation of energy projects, earthworks, the construction of connection infrastructure and the installation of wind turbines. **In many cases, the share of domestic companies in these stages of investment already exceeds 90%.**

In this service sector, the manufacture of cables and components is a key area. Poland is one of the major European centres for the production of power cables, and domestic companies possess advanced expertise in the design and manufacture of transmission systems. Taking into account the value chain from the raw material, namely copper, to cable systems, the share of domestic companies may exceed 80%.

There is also significant growth potential in the wind farm operation and maintenance (O&M) segment. Unlike the construction phase of a project, which is time-limited, operational services cover the entire lifespan of a wind farm, which is typically between 25 and 35 years. As a result, this segment generates a stable and long-term revenue stream and enables the development of specialised technological services. Taking into account the replacement of key components, the target share of domestic companies is estimated to be in the range of 50–75%.

Figure 14. Global gearbox production capacity in GW/year, 2023–2026



Source: own analysis based on GWEC

Figure 15. Analysis of the regional distribution of wind turbine generator production capacity

China — 73% (115 GW)
The undisputed global leader; 85% of production is accounted for by local manufacturers, with 15% by European firms with factories in China. This results in the rest of the world being heavily dependent on imports.

Europe — 16% (25 GW)
Production capacity is mainly located in Germany, Finland, Spain, Serbia, Bosnia, France and Austria.

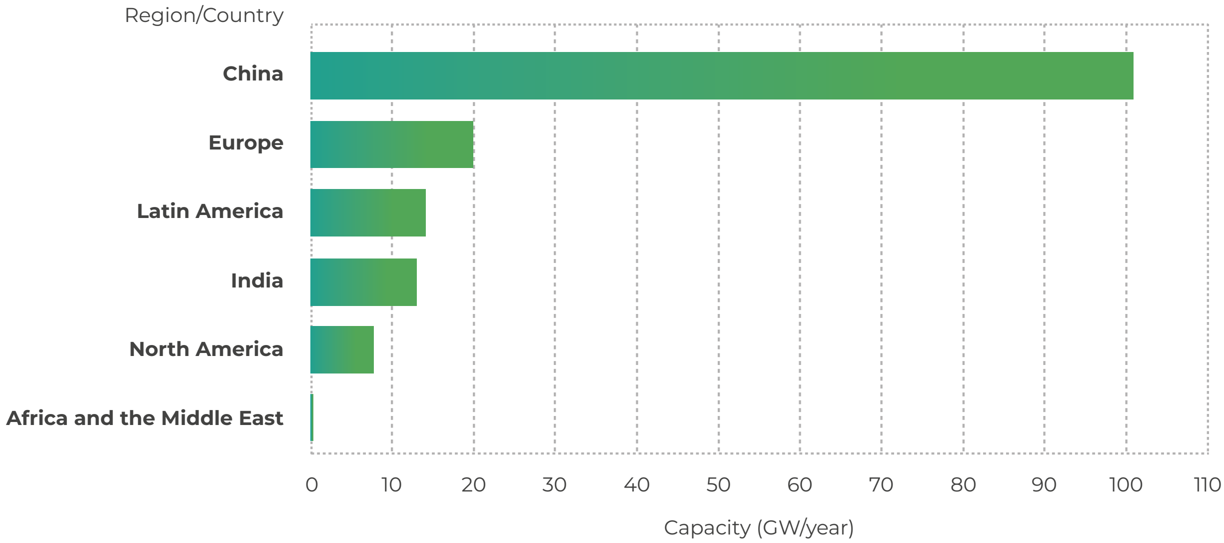
India — 5,3%
A significant share of global production in Asia.

South America — 2% (3,5 GW)
Production capacity located mainly in Brazil.

North America — 1%
The smallest share of global generator production capacity.

Source: own analysis based on GWEC

Figure 16. Blades — global production capacity and its concentration



Source: own analysis based on GWEC

A strategically fundamental area is the domestic technology ecosystem covering key components of wind turbines (understood as the nacelle with the rotor). To date, the involvement of Polish companies in the sector has focused mainly on the supply of steel, the manufacture of towers, the production of blades, rotorhouses and control systems.

However, given that long-term added value in the global wind energy supply chain is generated primarily in the development segments of this energy technology, this is the area that should be a strategic focus for significantly increasing the share of Polish companies.

Key barriers to the sector's development can be overcome

Despite significant industrial potential, the development of the domestic supply chain in the onshore wind sector faces a number of systemic barriers.

The most important of these is a lack of domestic demand – **regulatory instability, the slowness and complexity of administrative processes are hampering demand for new generation facilities.** In many cases, the process of obtaining planning and environmental decisions takes between five and seven, or even ten years, which significantly slows down the pace of new project development. Another constraint on project development is the overly slow modernisation of the grid infrastructure.

Another significant challenge to the industry's development is the limited availability of skilled personnel. The dynamic growth of the renewable energy sector is generating a growing demand for engineers, technicians and specialists in automation, digital systems and project management. A shortage of technical skills could become one of the main barriers to the implementation of new investments in the coming years.

Another barrier, from the perspective of the potential for developing domestic technologies, is the insufficient effectiveness of the innovation support system. Despite the availability of research and development funding programmes, such as initiatives by national funding bodies or European funds, the wind energy sector makes limited use of these instruments. As a result, many innovative projects are not being implemented, and the technological potential of domestic companies remains untapped. Furthermore, large-scale projects, such as the deployment of new-generation turbines, lack their own support system to create demand for innovative solutions (e.g. auctions with an innovation bonus).

The strategic roadmap is our proposed course of action within the emerging industrial policy framework, organised around the concept of Local content

To fully exploit the development potential of the onshore wind sector, it is necessary to implement a coherent industrial strategy based on several mutually complementary pillars.

The first of these is a stable and predictable market policy. A key element is ensuring a long-term development plan for new wind projects, which will enable investors and component manufacturers to plan their production investments. Market growth – at a rate of around 1.5–2 GW of new capacity per year – will drive the establishment of industrial facilities and help maintain the competitiveness of domestic suppliers.

The second pillar – namely the development of financial instruments supporting domestic industry, including innovation – will be crucial for advancing to a higher technological level. It is essential to establish a system of guarantees and working capital financing instruments for manufacturing companies participating in energy projects. Such mechanisms can be implemented using domestic financial institutions and European instruments.

Mechanisms for Financing and Supporting the Development of the Supply Chain

The development of the Polish supply chain for Onshore Wind Energy requires a coordinated system of financial and non-financial support. The mechanisms below are designed to mobilise capital, minimise investment risk and build the capabilities of domestic companies.

Figure 17. Catalogue of funding sources and support programmes for enterprises in the onshore wind energy supply chain

Grant Schemes

Support for innovative projects through programmes such as **NCBiR-NTE, NFOŚiGW "Innovations for the Environment"** (with a proposed fixed budget of PLN 500 million per year until 2035) and the equivalent to the previous instrument, **the TCTF "Government Grant"** (PLN 500 million per year).

Revenue from the EU ETS

Allocating part of the revenue from the **EU ETS** to the development of production capacity for clean technologies within the supply chain.

Public-private partnerships

Mobilising private investment through equity funds (e.g. **Polish Development Fund/BGK**) and public guarantees (**EBI**) for commercial banks.

Support for internationalisation

Programmes funding companies' participation in international trade fairs and the establishment of foreign partnerships in cooperation with **PAIH** and diplomatic missions.

Dedicated Investment Fund

The Polish Green Fund ARP (PZF ARP) as a key element of support for infrastructure and innovation in the onshore wind, with an emphasis on sustainable development and market rates of return.

Funding for Industrial Consortia

Supporting the formation of industrial consortia for the joint implementation of projects (e.g. through **the Polish Development Fund** and **NCBR**), sharing risks and costs.

Cooperation with the EU

Improving access to **the Innovation Fund** and establishing **a Sovereign Fund**, increasing Poland's involvement in EU support programmes.

Training and Advisory Programmes

Launching training courses on risk management, improving production quality and preparing applications for funds (e.g. the Innovation Fund), in cooperation with financial institutions.

Source: own analysis

The third pillar of the strategy is the full utilisation of the European Union's industrial policy framework and the objectives of the "Local content. For the benefit of Poland" programme. **New European regulations enable the introduction of mechanisms supporting the development of local supply chains, including through the streamlining of administrative procedures and the implementation of non-price criteria.** The programme to increase the domestic content of investments in onshore wind energy will facilitate informed procurement decisions – in full compliance with European law.

The long-term development of the wind energy sector also requires a systematic approach to skills development. In particular, it is necessary to create dual education programmes, competence centres dedicated to the renewable energy sector, as well as dedicated programmes to enhance the skills of companies wishing to enter the supply chain.

Priority Programmes for Polish Industry

A key element of the strategy is to focus activities on **four priority programmes**, which have been identified based on the competitive advantages of Polish industry. The following proposals for Priority Programmes stem from an analysis of the structure of the onshore wind energy value chain and Poland's industrial potential to take over further segments of this value chain. In the four priority programmes identified, in the authors' view, it is possible to simultaneously increase the domestic industry's share in the implementation of wind projects, build sustainable technological capabilities, and create export capacity within the European region.

These programmes do not cover the entire sector's supply chain, but focus on selected segments of the greatest economic significance and with the greatest potential for building Poland's competitive advantage.

The identification of priority programmes was based on the following criteria:

Figure 18. Criteria for the selection and identification of priority programmes for the development of the onshore wind sector

- The scale and repeatability of demand arising from national and regional onshore wind development plans.
- The potential for the actual localisation of added value in Poland.
- Synergies with existing industrial sectors (steel, concrete, energy, IT).
- Export potential to the markets of and the EU.
- Capacity to absorb industrial policy instruments (CAPEX, R&D, guarantees, expertise).

Source: own analysis

As a result, four Priority Programmes have been identified, which together cover the key areas of value creation at onshore wind.

The authors of the strategy identified the following programmes:

Priority Programme I.

National Base of Components and Steel Structures for the onshore wind

Materials. The first of these is the development of a domestic production base for structural components, including wind towers, steel elements and other large-scale infrastructure components. The programme for the construction of domestic wind towers effectively supports the resilience of industry in Poland, utilising heavy plate from the Częstochowa Steelworks. This has a positive impact on the country's defence potential – the Częstochowa Steelworks is a strategic national asset. Similarly, this potential should be utilised in the production of castings (for turbine components) and forgings (for flanges), as well as bearings.

Figure 19. Strategy for strengthening domestic production of steel and concrete components for the onshore sector

Support programme for the Polish onshore wind energy supply chain – heavy industry

Scope of the Programme	Strategic Objective	Recommended Support Instruments
→ Production of wind turbine tower segments → Castings and flange components → Support structures (platforms, ladders) → Foundation bolts and anchoring components → Prefabricated steel and hybrid structures	→ Reducing dependence on imports → Stable utilisation of domestic production capacity → Increase in the degree of steel processing → Development of mass, automated production	→ Investment support (CAPEX) → Funding for certification and OEM qualifications → Mechanisms for long-term framework agreements → Preference for EU components

Source: own analysis

Priority Programme II.

EPC services for onshore wind farms

General contracting. The second programme aims to strengthen domestic contractors in the energy sector, including companies carrying out projects under the EPC model and logistics firms involved in the construction of wind farms.

Support programme for the Polish onshore wind energy supply chain – general contracting

A significant portion of the value of onshore wind energy (OWE) projects is generated during the investment implementation phase. The development of domestic contractors and EPC (Engineering, Procurement, Construction) firms is key to maintaining margins, expertise and jobs within the country.

Figure 20. Building domestic construction capacity for onshore wind farms – objectives and support instruments

Scope of the Programme	Strategic Objective	Support Instruments
→ Turbine installation and heavy logistics → Earthworks and infrastructure works → Electrical works and connection works → General contracting for wind farms	→ Creating national EPC champions → Professionalisation and scaling of construction companies → Building export capacity for services → Increasing the market's resilience to economic fluctuations	→ Financing and leasing of heavy equipment → Contract and insurance guarantees → Certification and safety programmes → Market consolidation support → Support for staff development and retention

Source: own analysis

Priority Programme III.

Maintenance, operation and repowering – the long-term value of the onshore wind sector

Maintenance, operation and repowering. The third area is the development of independent maintenance services and diagnostic technologies, which will enable a gradual increase in the lifespan of investments and the operational reliability of turbines. The programme also covers the development of power systems, automation and digitalisation, including the integration of wind farms with energy storage systems and digital solutions supporting energy infrastructure management.

Figure 21. Priority areas for support and development of O&M services

Key Areas of the O&M Programme

Mechanical and Electrical Maintenance: Routine inspections and repairs of turbine components (gearboxes, generators, control systems) using specialist teams.	**Diagnostics and Monitoring**: Development of monitoring systems, predictive diagnostics and digital wind farm management to enhance efficiency.
Repowering and Modernisation: Replacement of older turbines with more modern ones, increasing the power and energy efficiency of existing sites.	**Logistics and Service Support:** Establishment of regional centres and spare parts warehouses to enable a rapid response to breakdowns.

Source: own analysis

Priority Programme IV.

Development of the domestic wind turbine technology ecosystem

The wind turbine ecosystem and the Polish onshore technology programme. The strategy envisages the gradual development of industrial and technological capabilities in the field of turbine components, such as drive systems, nacelle components, control systems and advanced electrical and digital solutions. In the longer term, the aim is to create an ecosystem in Poland enabling the production of key turbine technology components, and in selected scenarios also to build the capacity to integrate complete turbine systems in cooperation with technology partners. The development of this segment is of strategic importance for several reasons. Firstly, it allows for a significant increase in the share of domestic value added in wind energy projects, whilst focusing on products and services with synergies for other sectors. Secondly, it strengthens the technological sovereignty of the European energy sector in the face of growing competition from Asian manufacturers. Thirdly, it enables the development in Poland of highly specialised engineering and research and development capabilities, which can form the basis for the further development of net-zero technologies.

Structure of the Strategy and key recommendation packages

The strategy for accelerating the development of the domestic onshore wind energy industry is the central element of this document. It is based on **so-called strategic packages**, each of which defines specific actions and objectives aimed at developing a stable, competitive and integrated domestic onshore wind energy sector. These packages address the key challenges facing the onshore wind energy market, taking into account its technological maturity, the scale of potential investments and its significance for energy security and the competitiveness of the economy. **Each package addresses different needs of the sector – ranging from**

regulatory and planning foundations, through mechanisms to ensure predictable demand trajectory, financial and investment instruments, to technological innovation and skills development.

The first element of the strategy is **the 'Programme Package'**, the overarching aim of which is for the Council of Ministers of the Republic of Poland to adopt the Wind Energy Industry Development Strategy, thereby giving it formal status and ensuring coherent, long-term systemic support at the national level (a comprehensive strategy for the development of the wind energy industry following the prior integration of the assumptions of this document and the Polish Strategy for the Development of the Offshore Wind Farm Industry, prepared in 2025).

The next is **the "Market Package"**, focused on ensuring a reliable and sustainable demand pathway for energy from onshore wind farms, so that it becomes one of the key elements of the decarbonisation of the Polish economy and the stabilisation of the electricity system. A predictable demand trajectory provides not only an investment stimulus but also the basis for the sector's economic stability, enabling long-term planning for both investors and technology and service providers.

The "European Package" aims to define Poland's role in the European onshore wind energy market and to identify those product and service areas in which domestic entities can achieve the status of competitive players at regional or European level. The integration of Polish companies into European onshore wind energy supply chains will help to increase their scale of operations, facilitate the transfer of know-how and improve competitiveness in international markets.

The "financing package" encompasses a strategy for utilising public and market funds to develop enterprises, infrastructure and guarantee mechanisms supporting the implementation of onshore wind energy projects and the onshore wind energy industrial base. Systematic financial support, combined with appropriately designed guarantee instruments, is key to building the sector's investment capacity and ensuring the financial stability of projects under implementation. Long-term financing and preferential credit terms will help to reduce investment risk and increase the sector's attractiveness to private capital.

The 'Innovation Package' and **the 'Education and Employment Package'** address the need for long-term skills development and the building of a technological advantage in the Onshore Wind Energy sector. Innovation remains a key factor in increasing the economic efficiency of onshore wind energy projects, particularly in areas such as farm design optimisation, integration with the electricity grid, digitalisation of O&M, and the repowering of existing installations. Investments in research and development will contribute to increased productivity within the domestic supply chain and further reductions in energy generation costs. The education and employment package includes the development of tools – training programmes – and cooperation with technical universities and research centres, enabling the training of personnel for the needs of the rapidly growing onshore wind energy market. Building competence is a prerequisite for ensuring high-quality services, operational safety and domestic production capacity.

Finally, **the "Institutional Package"** provides for the establishment of an Executive Council (an inter-ministerial team) responsible for overseeing the implementation of the Onshore Wind Farm Industry Development Strategy and coordinating inter-ministerial activities. The aim of this package is to ensure the coherence and effectiveness of the Strategy's implementation over the long term. The Executive Council will be responsible for monitoring progress, assessing the effectiveness of the measures taken and adapting them to changing market and regulatory conditions. Effective coordination between public administration, industry and the scientific sector is a key condition for the success of the Strategy and the full exploitation of the potential of Onshore Wind Energy in Poland.

Figure 22. Programme pillars for the implementation of the Polish Strategy for the Development of the Onshore Wind Farm Industry

Polish Strategy for the Development of the Onshore Wind Farm Industry

Market Package
Adoption of the updated PEP2050 with a target of 1.5–2 GW per year for Onshore Wind Farms.

European Package
The strategy's contribution to the country's activities within EU institutions and international cooperation.

Investment and Production Financing
Announcement of grant and loan schemes to support investment.

Institutional Package
Strengthening the regulatory framework and supporting cross-sectoral coordination.

Innovation Package
A central onshore wind laboratory and R&D competitions for companies.

Education and Employment
Adoption and implementation of the Wind Energy Skills Development Programme.

Policy Package
Adoption by the Council of Ministers of the Republic of Poland of the Wind Energy Industry Development Strategy, giving it a formal status and ensuring consistent, long-term systemic support at the national level.

Implementation Programmes
Four programmes targeting specific areas of the supply chain.

Source: own analysis

Education and Employment Package

The dynamic development of the wind energy sector also requires a systematic approach to skills development. Several initiatives necessary to fully exploit the sector's development potential are outlined below.

→ **Establishment of a national system for forecasting workforce demand for onshore wind energy.** The government should implement a permanent mechanism for forecasting skills demand in the onshore wind energy sector, linked to the National Energy and Climate Plan (KPEiK), investment plans, auction schedules, grid development and regional industrial strategies. The aim is to move away from reactive workforce training towards planning the supply of skills several years in advance, so that labour shortages do not become a major barrier to project implementation.

Figure 23. The State's role in shaping the labour market

The State's Role in Shaping the Skills Market Technical and Vocational Education as an Infrastructure Function

In the model of an active state role, key strategic functions include:

Demand Forecasting
Identifying skills needs in the medium and long term (workforce forecasting).

Inter-ministerial Coordination
Coordinating the activities of the ministries responsible for education, development, infrastructure and the labour market.

Synchronisation of Investment
Linking major infrastructure investments with staff training and development plans.

Risk Mitigation
Mechanisms to guarantee demand for specific skills within the education system.

Source: own study

→ **Construction of 4–5 regional 'Wind Skills Hubs'.** In provinces with the greatest investment and industrial potential, specialised training hubs should be established, equipped with height training halls, rescue tracks, mini-gondolas, tower sections, HV/MV stations, SCADA/OT laboratories, NDT zones, and facilities for training in composites and blade repairs. The centres should operate as a shared infrastructure for schools, universities, EPC companies, manufacturers, service providers and local authorities.

→ **Implementation of modular learning pathways and micro-credentials.** The education system should be supplemented with short, practical courses lasting from 2 to 16 weeks, leading to certification and capable of being combined into full professional qualifications. Priority pathways should include, among others, turbine maintenance technician, MV/110 kV electrician for RES, oversized cargo logistics operator, NDT and QA/QC specialist, blade repair technician, SCADA/OT specialist, and project development & permitting.

→ **Linking education to the real-world working environment.** Training for the onshore wind sector should be based on a dual model, combining theoretical learning with work placements in companies, internships, industrial projects and training on actual infrastructure components. Demonstration farms, field laboratories, physical turbine components, failure simulators, work stations at height and digital twins are of key importance, as they reduce the time taken to achieve professional independence and improve workplace safety.

Figure 24. Competence and employment map across the wind farm project lifecycle

Job demand and competency profiles in the wind farm lifecycle

1. DEVELOPMENT AND DESIGN

Profiles:
project manager, development & permitting, GIS, hydrology/geotechnical, wind analysts, lawyers (environmental/contract), financiers, planners/urban planners, environmentalists.

Key competencies:
environmental law, due diligence, energy production modelling, PPAs, stakeholder management.

2. CONSTRUCTION (EPC)

Profiles:
site managers, engineers (electrical, automation), surveyors, heavy equipment operators, foundation installers, HV/MV teams, health and safety officers, logisticians, installers, steel fixers, fitters, grid quality testing.

Qualifications:
SEP E/D, UDT, live working, W@H, machine operators.

3. OPERATIONS AND MAINTENANCE (O&M)

Profile:
turbine technicians (mechanical/electrical/electronic), SCADA/OT, drone inspectors, quality specialists/CMMS, HSE.

Certifications:
GWO (BST/BTT), first aid, rope access, working at height.

4. SUPPLY CHAIN / INDUSTRY

Profile:
welding technologists, NDT (VT/UT/MT/RT), CNC operators, laminate/composite specialists (blades), quality control, oversized logistics.

Key competencies:
Lean/TPM, metrology, ISO standards, traceability.

Source: own analysis

→ **Launch of reskilling programmes and sectoral bridges.** Accelerated reskilling pathways should be created for workers in sectors with high potential for skills transfer, in particular mining, conventional energy, construction, shipbuilding, metalworking, automation and telecommunications. The programme should include mapping of entry-level skills, validation of prior experience, training vouchers, training leave and fast-track certification pathways.

→ **Standardisation of qualifications and inclusion of wind energy roles in the Integrated Qualifications System (ZSK).** It is necessary to develop common industry-specific syllabuses for key roles in the onshore wind energy sector and integrate them into the Integrated Qualifications System. The system should enable the recognition of competences acquired outside formal education, compatibility with the European Qualifications Framework, and the rapid validation of skills among experienced workers.

→ **Introduction of competency-based contracts with industry.** Companies in the wind energy sector, including manufacturers, EPCs, O&M operators and component suppliers, should declare their annual demand for specific job profiles, and educational institutions should provide agreed cohorts of graduates. Such a model will reduce the risk for schools and universities, increase the predictability of employment, and better align programmes with the real needs of the market.

Sector Bridges: skills transfer

Building so-called sectoral bridges enables a smooth transition of workers to new areas, utilising their existing skills. It is crucial to identify sectors with the greatest potential for skills transfer and to design accelerated reskilling pathways.

Figure 25. Skills transfer

Mining
Health and safety, working in difficult conditions, mechanics

Conventional Energy
Maintenance, electrical engineering

Construction
Foundations, structures, prefabricated elements

Shipyards and Metal
Welding, large-scale assembly

Automation and Telecoms
SCADA, networks, diagnostics

Source: own analysis

→ **Development of industry-sponsored classes, industrial academies and the train-the-trainer programme.** Systematic support should be provided for industry-sponsored classes, work placements, in-house training programmes and academies run by manufacturers, EPC firms and service providers. In parallel, a "train-the-trainer" programme should be established, funding instructor placements in companies and the development of industry trainers, as a shortage of training staff could become a bottleneck for the entire system.

→ **Funding for infrastructure and participation in training.** The state should launch dedicated CAPEX grants for training infrastructure, training vouchers for employees and the unemployed, tax relief for companies funding work placements and industry-sponsored classes, and instruments supporting mobile training units. Funding should be linked to recognised qualifications and measurable employment outcomes.

→ **Introduction of an outcomes monitoring system.** The effectiveness of the education and employment package should be assessed on the basis of clear KPIs, such as the number of people with GWO/SEP/UDT certificates, graduate employment within 6 months, reduced recruitment time for key positions, the number of active hubs, the number of implemented syllabuses, the number of SMEs integrated into the supply chain, and the proportion of women and reskilled individuals in new jobs.

Figure 26. Stages of the implementation plan

0–6 months:

- programme board
- standardisation of syllabuses
- audit of training equipment
- launch of training vouchers

6–12 months:

- launch of 2–3 Wind Skills Hubs
- first cohorts of MV technicians and electricians
- SCADA/OT pilot

12–24 months:

- scaling to 4–5 hubs
- train-the-trainer programme
- introduction to NDT/composites
- patronage classes

24–36 months:

- integration of micro-credentials with the National Qualifications Framework and academic programmes
- ongoing skills-based contracts from industry

Source: own analysis

Innovation Package

It is essential to establish a coherent ecosystem of collaboration between onshore wind farm investors, service and component providers, and research centres and technical universities. At present, this collaboration is largely fragmented, bilateral and ad hoc. It is most often limited to educational activities – teaching support, the organisation of internships or the implementation of individual student projects – rather than systematic, joint work on technological, digital and operational solutions that address the real challenges facing the onshore wind energy sector.

Figure 27. Key areas of innovation in the Polish wind energy supply chain

Innovation: the key to Poland's energy security

Innovative solutions in the Polish onshore wind energy supply chain are particularly needed in the following areas:

Production Automation
Implementation of advanced automation systems in turbine component manufacturing processes.

AI Solutions
The use of artificial intelligence to optimise operations, maintenance and forecasting in the wind energy sector.

Digitalisation and Cybersecurity
Development of digital ecosystems for wind turbines, secured against cyber threats.

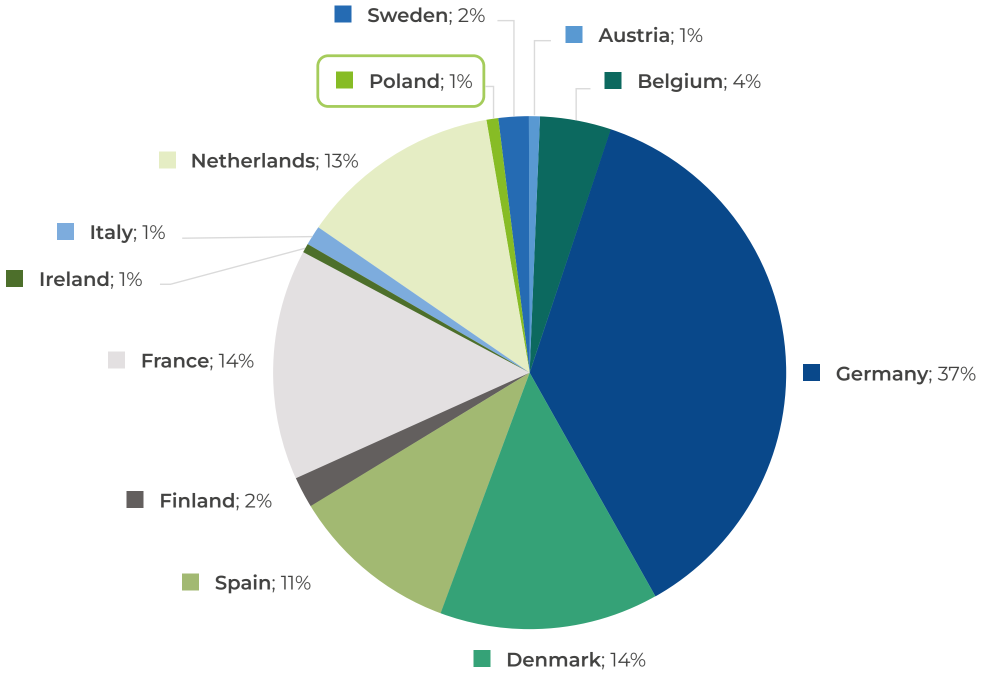
System Integration
Effective integration of wind farms with the national transmission and distribution system.

Circular Economy
Initiatives in component recycling, materials engineering and repowering, extending the life cycle of turbines.

Source: own analysis

→ **The role of the Ministry responsible for development and the economy.** The Ministry should act as a system coordinator, responsible for creating a transparent, coherent national R&D agenda for onshore wind energy. This agenda would form the basis for public programmes and serve as a reference point for cooperation with the European Commission and its research agencies, ensuring alignment with EU priorities.

Figure 28. Public investment in research and innovation (shares) in wind energy in the EU, 2013–2022



Source: own analysis based on data from: JRC – Wind Energy in the European Union 2024, p. 19

→ **The role of the National Centre for Research and Development.** The NCBiR should develop dedicated programmes for the wind sector, co-funding research and implementation projects directly linked to market needs. Particular emphasis should be placed on areas arising from the EC's recommendations (including Cybersecurity, grid integration and system resilience), which require continuous innovation.

→ **Developing the role of PARP.** PARP can strengthen the sector's innovation capacity by better targeting existing instruments (e.g. SMART) at the needs of companies in the onshore wind supply chain – in particular component manufacturers, service providers and suppliers of digital solutions (AI, automation, O&M).

→ **The Polish Development Fund ecosystem.** The Polish Development Fund can play a growing role in financing innovation by launching (or utilising the existing one within ARP TFI) – in cooperation with developers – a dedicated RES fund. Its aim would be to support the commercialisation of technologies key to the energy transition, including in the onshore wind sector.

→ **A sharp increase in the involvement of Polish entities in EU programmes.** R&D activities should lead to a significant increase in Poland's participation in European programmes (e.g. Horizon Europe, the Innovation Fund). It is crucial to identify national specialisations and actively involve companies and research institutions in projects worth billions of euros, which will translate into the permanent anchoring of expertise within the economy.

→ **R&D Council at the Ministry responsible for development.** It is recommended that a permanent R&D coordination council for onshore wind be established, integrating the activities of the ministries, the National Centre for Research and Development (NCBiR), the Polish Agency for Enterprise Development (PARP) and the Polish Development Fund (PFR). The council should be responsible for ensuring consistency with EU policies and for developing relations with the EC and the ETIP Wind platform, thereby increasing access to funding.

ETIPWind Priority Areas for Investment in Innovation

The European Technology and Innovation Platform for Wind Energy (ETIPWind) identifies five key areas for investment in innovation, designed to accelerate the development of the wind sector in the EU, enhance its competitiveness, and improve its environmental and social impact.

Figure 29. Strategic innovation directions and investment priorities of the ETIPWind platform

Industrialisation and Competitiveness
Mass production supported by automation, modular solutions, advanced materials and transport optimisation.

Digitalisation and Optimisation
AI for fault prediction, robotics, weather forecasting, digitalisation of QHSE and cybersecurity in farm management.

System Integration and Storage
Solutions for energy storage, grid optimisation, system stability and 'black start' scenario modelling.

Sustainable Development and Circular Economy
Biodegradable materials, component recycling, repowering and decommissioning projects for offshore wind farms.

Skills and Coexistence
Collaboration between academia and industry, skills development, reskilling programmes and community education.

Source: own analysis

The total value of public funds allocated to these areas is €1.8 billion, representing a significant opportunity for Polish research centres to join international consortia.

→ **Strategic Innovation Agenda for the onshore wind.** A Strategic Innovation Agenda should be developed, defining research and implementation priorities as well as a map of national specialisations. The document should support the participation of Polish entities in international consortia and EU-funded R&D projects.

→ **Use of AI in supply chain and operational optimisation.** Investments in AI should focus on farm design, turbine siting optimisation, project portfolio management, predictive O&M, and logistics and supply chain optimisation, as a key source of competitive advantage.

→ **Dedicated funds for research and development.** The National Centre for Research and Development (NCBiR) should launch annual grant programmes (min. PLN 100 million) for onshore wind technologies, covering, among other things, productivity, cybersecurity, carbon footprint and digitalisation. In parallel, the Polish Development Fund should develop financing for start-ups and scale-ups through VC and CVC instruments.

→ **Innovative framework for the development and construction phases of wind farms.** Clear rules for risk allocation within the supply chain should be introduced, enabling a fair distribution among project participants. This will allow for the implementation of more innovative solutions whilst maintaining control over costs and schedules.

Policy Package

It is essential to include wind energy in the government's Local Content programme as one of the key areas of the state's industrial policy. This sector can become a tool for building national expertise, jobs, and economic and energy resilience.

→ **A new approach to the role of domestic industry.** The Local content programme should be treated not as protectionism, but as a modern industrial policy in line with the European 'Buy European' initiative. Its aim is to increase the share of Polish enterprises in strategic segments of the supply chain and to strengthen national economic sovereignty, and ultimately to export components and services.

→ **The role of the Ministry of State Assets.** The Ministry has given the domestic content policy an operational dimension by defining the Council of Ministers' Priority P12 and implementing the Code of Good Practice for investments carried out by companies with State Treasury shareholding.

→ **A shift in procurement philosophy.** In energy projects, there should be a move away from the dominance of the lowest-price criterion towards an assessment of the total economic value of the investment, taking into account, amongst other things, local maintenance, security of supply, the impact on the economy, and the development of domestic expertise. The State Procurement Policy for 2026–2029 is intended to support this process.

→ **Soft criteria and TOTEX.** The procurement system should make greater use of criteria relating to carbon footprint, shortening supply chains, local employment and total investment life-cycle costs (TOTEX).

→ **Definition of the domestic component.** The Code of Good Practice introduces a measurable model for assessing the 'domesticity' of enterprises, based, among other things, on the location of operations, tax residence, employment structure and the level of turnover generated in Poland.

→ **Support for domestic firms and SMEs.** Key measures include: earlier publication of procurement plans, technical dialogue with the market, breaking down large contracts into smaller packages, and reducing formal barriers hindering the participation of Polish enterprises.

→ **Financial and contractual mechanisms.** The programme should support domestic companies through advance payments, milestone payments, contract indexation, and faster settlement of work and subcontractors.

→ **ESG, Cybersecurity and innovation.** Wind energy could become a key area for the development of AI, digitalisation, Cybersecurity and industrial technologies developed in collaboration with Polish universities and research institutes.

→ **Leveraging offshore wind experience.** The experience gained in offshore wind energy – in terms of supplier market analysis and policies to increase the domestic content – should be utilised in the development of the onshore sector, which can more strongly engage local companies and regional supply chains.

→ **Operationalisation of the programme.** Increasing the local content should be incorporated into companies' strategies, procurement procedures, management KPIs and reporting systems, so that local content becomes a tangible element of investment management – which is currently a component of government policy.

→ **Wind energy as an instrument of industrial policy.** The consistent implementation of the Local content programme could make the wind sector one of the main tools for building a modern, resilient and competitive industry in Poland.

Market Package

It is essential to recognise Onshore Wind Energy as one of the main pillars of the energy transition and the development of a competitive economy based on affordable electricity. The sector's development should be based on stable regulations, a predictable auction system and long-term investment planning.

→ **The importance of onshore wind energy for the economy.** Onshore wind energy remains the cheapest and fastest-to-deploy electricity generation technology in Poland, crucial for lowering energy prices, increasing industrial competitiveness and decarbonising the economy.

→ **Regulatory stability and investment continuity.** The sector's development requires a move away from periods of sporadic investment surges and investment gaps, as well as frequent regulatory changes, in favour of a predictable project development path consistent with updates to PEP2040/2050 and KPEiK. A stable auction schedule and continuity in the supply of new projects are key to reducing the cost of capital and developing the domestic industry.

→ **Coordination of planning, auctions and grid development.** The auction system should be synchronised with planning policy and the expansion of electricity grids, so as to enable the smooth development of projects and fuller utilisation of the potential of the domestic supply chain.

→ **Accelerating investment and permitting processes.** Administrative procedures should be simplified by recognising wind energy projects as public-interest investments, developing tacit consent mechanisms, and standardising the interpretation applied by the administration responsible for environmental and consultation decisions.

→ **Repowering as a component of the long-term market.** The modernisation of existing wind farms should become one of the pillars of the sector's development after 2030, ensuring long-term demand for component manufacturers, service providers, engineering firms and logistics companies.

→ **Electrification as the foundation of economic policy.** The energy market strategy should treat electrification as a key element of the economy's competitiveness, supporting the development of industry, digitalisation and new energy-intensive sectors, including AI.

→ **Development of grid infrastructure.** It is crucial to expand transmission and distribution networks in parallel, prioritise mature projects and eliminate the blocking of connection capacity by projects that are not being implemented.

→ **Non-price criteria in the auction system.** Auctions for Onshore Wind Energy should gradually incorporate criteria related to sustainable development, infrastructure safety, Cybersecurity, system integration and supply chain resilience.

→ **System integration and market flexibility.** Preference should be given to projects integrating wind farms with energy storage, cable pooling and DSR mechanisms, thereby increasing the flexibility and operational security of the electricity system.

→ **Long-term investment security.** The future of the auction system after 2027 requires the rapid definition of new support rules, including the scope of implementation of non-price criteria, to limit regulatory risk and maintain the continuity of investment in the sector.

→ **Effectiveness of the auction system.** The existing auction system has effectively supported the development of RES, in particular wind power and photovoltaics, ensuring the implementation of investments with high cost-effectiveness and significant private sector participation.

European Package

Poland should treat European law as a tool for building a national value chain for Onshore Wind Energy, rather than merely as an external regulatory constraint. EU regulations present an opportunity to combine the energy transition with reindustrialisation, skills development and the strengthening of security of supply.

→ **RED III as a tool to accelerate investment.** It is crucial to streamline administrative procedures for RES through accelerated development zones, the digitisation of procedures, the "one-stop shop" and binding deadlines for the administration.

→ **NZIA as support for Local content.** The Net Zero Industry Act should be used to overhaul RES auctions and public procurement by introducing non-price criteria, such as supply chain resilience, Cybersecurity, environmental footprint, service quality and the share of European components.

→ **A domestic content requirement compliant with EU law.** Poland's local content methodology should be based on measurable value created domestically: production, employment, taxes, R&D, service and a lasting presence in the European supply chain.

→ **A new support system post-2027.** Poland should develop a financing mechanism based, among other things, on contracts for difference, PPAs and revenue stabilisation, linked to industrial requirements and the development of the domestic supply chain.

→ **Clean Industrial Deal and state aid.** Support programmes should be launched for manufacturers of components and services for onshore wind, covering investments in production capacity, automation, certification, service centres and R&D facilities.

→ **EU funding 2028–2034.** Poland should prepare a portfolio of projects ready for funding from new EU instruments, including those involving: plant modernisation, the construction and equipping of laboratories, component recycling, the digitalisation of farms and grid integration technologies.

→ **CRMA and raw material security.** The strategy should include securing strategic access to steel, rare earth metals, magnets, copper, aluminium and electronic components, as well as the development of recycling and diversification of supply.

→ **CBAM and heavy industry.** Demand from the wind energy sector should be linked to the modernisation of the Polish steel and metal industries, including the production of low-carbon steel and the traceability of materials' origin.

→ **The EU Grids Package as an industrial stimulus.** Grid expansion should support the development of domestic capabilities in transformers, cables, automation, energy storage, cybersecurity and digital grid management.

→ **The Industrial Accelerator Act and 'Buy European'.** Poland should utilise European industrial preferences to attract investment, facilitate technology transfer, develop local R&D, and integrate Polish companies into global OEM supply chains.

→ **Security and resilience of supply.** Criteria relating to security, Cybersecurity, service independence and data control should limit the risks of excessive dependence on suppliers from outside the EU.

→ **Workforce for the wind energy industry.** European legislation should be linked to national training programmes for technicians, engineers, automation specialists, electricians, logistics specialists, service technicians and project managers.

→ **The European package as a tool for reindustrialisation.** Active implementation of EU regulations could transform the development of Onshore Wind Energy into a programme for building a domestic industry, technological expertise and a sustainable position for Poland within European supply chains.

Financing Package

It is essential to create a stable and predictable financing model for onshore wind energy and the domestic supply chain. The package should reduce the cost of capital, mobilise private investment and support the development of Polish companies in the components, services, maintenance and technology sectors.

→ **Financing of investments in production capacity.** Investment grants, preferential loans, dedicated funds and guarantee mechanisms for companies should be developed – increasing their production capacity in the onshore wind energy sector.

→ **Grant schemes.** It is recommended that annual support programmes for the wind energy sector be launched, including instruments from the National Fund for Environmental Protection and Water Management (NFOŚiGW), the National Centre for Research and Development (NCBiR) and government grants, with budgets allowing for the realistic scaling of industrial investments.

→ **Investment development programme up to 2035 (in line with the Polish Development Strategy up to 2035).** A new multi-year government programme should support strategic domestic and foreign investments, particularly technological, manufacturing, R&D and service projects – strengthening economic security and technological sovereignty.

→ **Public-private partnerships and de-risking.** Poland should utilise capital funds, public guarantees and EBI/BGK/Polish Development Fund counter-guarantees to mitigate investment risk and mobilise private capital within the supply chain.

→ **Support for exports and internationalisation.** Programmes supporting companies' participation in trade fairs, trade missions and foreign partnerships should be strengthened, with an active role for PAIH, diplomatic missions and economic diplomacy.

→ **Capital investments.** The ARP Green Fund should be utilised as a tool for financing projects in wind energy, RES, green industry, decarbonisation and infrastructure technologies.

→ **Funding for industrial consortia.** Support should encourage the formation of consortia bringing together large companies, SMEs, investors and research organisations, enabling the joint implementation of larger projects and the sharing of risks and costs.

→ **Better use of EU funds.** Poland should increase its participation in the Innovation Fund and other EU instruments – through training, consultancy, support for preparing applications and the development of projects meeting high innovation criteria.

→ **Advisory and skills programmes.** Companies in the supply chain should receive support in the areas of risk management, structuring financing, performance guarantees, production quality and the preparation of documentation for national and EU programmes.

→ **Financing package for production and contract execution.** It is essential to launch instruments supporting working capital, performance guarantees, quality guarantees and the liquidity of companies executing contracts for the onshore sector.

→ **Guarantee scheme for manufacturers.** A national guarantee fund should be established to support manufacturers of wind energy components, securing the participation of Polish companies in tenders and the execution of auction contracts.

→ **Working capital financing.** Preferential credit lines implemented with the participation of BGK and the banking sector should support companies in purchasing materials, fulfilling deliveries, maintaining liquidity and scaling up production.

Adopting a sectoral strategy is crucial

It is essential to adopt a government Strategy for the Development of the Wind Energy Industry covering both the onshore and offshore sectors. The dynamic development of onshore wind energy could become one of the most significant economic drivers for Poland, provided that regulations are permanently simplified and permitting processes are accelerated.

The sector's economic potential. Investment expenditure in onshore wind energy could reach PLN 148 billion by 2040, with additional operating expenditure of PLN 66 billion. The sector's development will generate long-term economic benefits linked to the construction of new capacity, maintenance and the repowering of wind farms. Capital expenditure on offshore wind energy over a comparable time horizon could be up to three times higher.

The role of the Wind Energy Industry Development Strategy. The strategy should set out a clear vision for the sector's development, ensure a stable legislative framework and lay the foundations for systemic support for investment and the domestic industry.

Link to local content policy. The Strategy could be developed within the framework of the local content policy of the Ministry of State Assets and support the development of the domestic supply chain, services, industrial expertise and the expansion of Polish companies into foreign markets.

Implementation document and monitoring. In parallel with the Strategy, a detailed implementation plan should be drawn up, setting out a timetable for actions, resource allocation and a system for monitoring progress towards the objectives.

Building national industrial specialisations. The EU's growing ambitions regarding the development of wind energy and the potential for the reconstruction of Ukraine's energy sector justify the development of Polish industrial and technological specialisations in the sector.

Regional and European competitiveness. The lack of a long-term strategy may limit Poland's ability to exploit the sector's potential and weaken the country's position as a regional leader in wind energy within the European supply chain.

Impact on the economy and regions. The sector's development can support employment growth, regional development, the diversification of industrial expertise, and an increase in Poland's investment attractiveness.

Utilisation of EU funds and private capital. The formal recognition of wind energy as a strategic sector of the economy will increase the potential for effectively securing EU funding and attracting capital investment.

Wind energy as a component of a modern economy. The Wind Energy Industry Strategy should become a tool for building a modern, competitive and low-carbon economy, and for strengthening Poland's position in the European energy and industrial sectors.

Summary

The development of onshore wind energy in Poland is not only an energy transition project but also a unique opportunity to provide impetus for the creation and implementation of the state's industrial policy. A properly designed strategy can form the basis for the creation of a strong domestic industrial ecosystem, encompassing component manufacturing, engineering services, logistics and advanced digital technologies. There is also a particularly strong synergy effect here with the offshore wind energy sector, the development of which further strengthens the industrial sector in Poland and enhances the capabilities of domestic companies.

However, success depends on coordinated action by the state, the industrial sector and financial institutions. The current public debate and the plan to implement measures centred on the concept of Local content are a step in the right direction. But local content will not be created solely on the basis of procurement regulations – it is also a matter of moderating readiness and stimulating supply chains. The operationalisation of the proposed industrial policy will be crucial to its success. Regulatory stability, access to finance and skills development will determine whether Poland becomes one of Europe's leading centres for the wind energy industry and, more broadly, for modern industry.

About the authors

This document was prepared under the editorial supervision of Maciej Mierzwiński and Krzysztof Tomaszewski, with a team of experts comprising Dominik Taranko, Oliwia Mróz-Malik, Piotr Czopek, Piotr Maciołek and Michał Forycki.

CEE Energy Group analytical team: Ewa Małek-Laska, Paulina Kordas, Kamil Kamiński, Wiktoria Aszyk.

MACIEJ MIERZWIŃSKI

Market, business management and finance expert. Since 2003, he has been involved in supply chain projects for the energy sectors (primarily for the wind energy sector), implementing new products and services in the industry. Expert in national studies and strategies for market stakeholders – at regional, central and European levels. Areas of expertise: corporate development, restructuring and financial management, industrial strategies, human resources development, with experience as an international management consultant, CEO and co-owner of CEE Energy Group, a Polish consultancy specialising in the development of companies in the renewable energy supply chain. Co-founder of the Industrial Academy of Development, whose activities since 2017 have been focused on developing personnel for industry in Poland, particularly for the RES supply chain. Economist, graduate and collaborator of the Warsaw School of Economics and the University of Cologne.

KRZYSZTOF TOMASZEWSKI

An expert with over 25 years' experience in corporate finance, restructuring, investment, project management, and skills development and recruitment. He specialises in project implementation, primarily in the industrial sector, holding key roles in Strategy, Development and Finance departments at various corporate levels. An experienced project coordinator in the management and supervision of initiatives covering education, business collaboration, social and civic engagement, relationship building, and coordination of cooperation with stakeholders from the business and services sectors. An expert in producing studies and reports for stakeholders at regional and central levels. A frequent speaker and trainer at conferences and industry events. His main professional experience covers heavy industry, steel structures, shipbuilding and the industrial services sector. He currently serves as Chairman of the Management Board of the Industrial Academy of Development – a company dedicated to workforce development for Polish industry, with a particular focus on the supply chain in the RES sector. He is also a Member of the Management Board and co-owner of CEE Energy Group.

DOMINIKA TARANKO

Managing Director and Vice-President of the Wind Industry Hub Foundation, established by the Polish Wind Energy Association, which has been in existence since 1999 and is the largest industry organisation in Poland and a member of WindEurope. The mission of Wind Industry Hub is to develop a strong supply chain for the wind sector and to support the involvement of domestic industry in Polish and European wind investments. Dominika Taranko has been involved in the energy market for 15 years. In the past, she worked within the ORLEN S.A. group, where she focused on the exploration, appraisal and production of hydrocarbon deposits. She subsequently worked for the operator of the LNG import terminal in Świnoujście – Polskie LNG – as well as for the gas transmission operator Gaz-System and the Finnish Fortum Group. She also served as Director of the Energy and Climate Forum at the Union of Entrepreneurs and Employers, one of the three largest business organisations in Poland. A graduate of three faculties at the University of Warsaw and Łazarski University, including an MBA in Energy.

DR INŻ. OLIWIA MRÓZ-MALIK

Offshore Wind Energy, Investment and Development Manager at the Polish Wind Energy Association and Vice-President of the Management Board at Wind Industry Hub. She primarily deals with regulatory issues related to offshore wind energy, the supply chain and safety. Previously worked at Enea Operator, where she was responsible for implementing the company's policy on developing publicly accessible electric vehicle charging infrastructure. She has been involved in the energy sector for 16 years. She holds a PhD in social sciences, specialising in economics (her doctoral thesis focused on the analysis of the social and economic benefits associated with the development of offshore wind farms in Poland). Author of academic publications in the field of energy, primarily on renewable energy sources with a focus on offshore wind energy. Member of the Scientific Council for Offshore Wind Energy at the Szczecin Maritime University. Involved in educational activities promoting RES and wind energy.

PIOTR CZOPEK

A graduate in political science specialising in European studies from the Świętokrzyska Academy in Kielce, and postgraduate studies at the University of Warsaw and Collegium Civitas in the fields of Globalisation and Energy Security. Since 2008, he has worked at the Ministry of Economy, and subsequently at the Ministry of Energy, where, in the Department of Energy and later the Department of Renewable and Distributed Energy, he dealt with issues related to the development of RES and distributed, prosumer energy. Since 2019, as Director of the Department of Renewable Energy (Department of Renewable Energy Sources) at the Ministry of Energy, and subsequently at the Ministry of State Assets and the Ministry of Climate and Environment, he has implemented the concept of energy clusters and developed regulations supporting the development of distributed energy. Furthermore, he oversaw work related to the planning of development of renewable energy sources and the creation of legal conditions for their continued operation,including in the field of offshore wind energy. Since January 2021, as Director of Regulation, and currently as Vice-President of the Polish Wind Energy Association, he has been involved in issues related to promoting the development of wind energy in Poland, including the implementation of Polish offshore wind farm projects. Since 2022, he has been collaborating with the RE-Source Poland Hub Foundation to promote the use of PPAs in the context of RES project development and the use of green energy in businesses. Since 2023, he has also served as Vice-President of the Wind Industry Hub Foundation.

PIOTR MACIOŁEK

He has been involved in the energy market for over 20 years. He is currently a member of the management team at EnercoNet S.A. and is responsible for the finances of one of the most experienced players in Poland's RES market, a developer and operator of wind farms and other RES sources active since 2001. Previously, he spent 20 years with the Polenergia Group. Between 2004 and 2008, he was responsible for finance and client relations in Poland's largest industrial biomass energy project – Polish Energy Partners developed it at the Mondi Świecie paper mills. From 2008 to 2016, he was responsible for the industrial energy segment, first at Polish Energy Partners and subsequently at the Polenergia Group. Between 2016 and 2023, as Chief Operating Officer (COO), he was responsible for the management, maintenance and operation of all operational energy projects within the Group. From 2020 to 2024, he was appointed to the Management Board of Polenergia S.A. From 2023, he served as Chief Commercial Officer (CCO), responsible for the commercialisation of electricity and other elements of the Polenergia Group's market offering. He has many years of operational experience, gained, among others, at Telekomunikacja Polska, Sony Music Entertainment Polska and Master Foods Polska. A graduate of the Faculty of Management at the University of Warsaw. In 2001, he obtained an MBA from the University of Minnesota through the WEMBA programme run by the Warsaw School of Economics and the University of Minnesota. In 2025, he completed the Academy of Leadership Psychology at the Warsaw University of Technology Business School.

MICHAŁ FORYCKI

A specialist at the Wind Industry Hub Foundation, operating within the Polish Wind Energy Association, he has been involved in the energy sector for over three years. As part of his work, he strengthens the supply chain for offshore and onshore wind energy, actively supporting the development of Local content in the wind industry. Author of numerous publications and articles on wind energy; co-author of the Polish Strategy for the Development of the Onshore Wind Farm Industry. He is also affiliated with the Warsaw School of Economics. In 2025, the SGH Publishing House released the first monograph he edited, entitled 'The Polish Energy Sector's Path to Green Transition'.

Notes

Notes

PWEA

www.psew.pl

WIND INDUSTRY HUB

www.windindustry.pl

CEE Energy Group

www.cee-energy.com